

BOARD OF WATER SUPPLY

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



January 10, 2001

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Manager and Chief Engineer

01 JAN 10 410 59

OFC OF ENVIRONMENTAL QUALITY CONTROL

Ms. Genevieve Salmonson, Director
Office of Environmental Quality Control
State of Hawaii
State Office Tower, Suite 702
235 South Beretania Street
Honolulu, Hawaii 96813

Dear Ms. Salmonson:

Subject: Final Environmental Assessment for the
Honouliuli 228' Reservoir No. 3, Honouliuli,
Ewa, Oahu, Hawaii, TMK: 9-2-01: 01

The Board of Water Supply has reviewed the comments received during the public comment period that ended on September 22, 2000. We have determined that the environmental impacts of this project have been adequately addressed as discussed in the Final Environmental Assessment (FEA) and are, therefore, issuing a "Finding of No Significant Impact." We request that the proposed project be published as such in the January 23, 2001 issue of the OEQC Bulletin. ✓

Attached are the completed OEQC Bulletin Publication Form and four (4) copies of the FEA for your use.

If you have any questions, please contact Mike Matsuo at 527-5121.

Very truly yours,

FOR CLIFFORD S. JAMILE
Manager and Chief Engineer

Attachment

cc: Kelly Chuck, Marc M. Siah & Associates, Inc.

JAN 23 2001

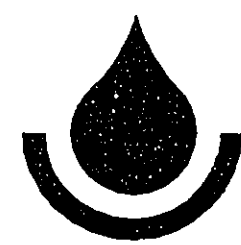
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**FINAL ENVIRONMENTAL ASSESSMENT/
FINDING OF NO SIGNIFICANT IMPACT (FONSI)
FOR THE
(HONOULIULI 228' RESERVOIR NO. 3)
EWA, OAHU, HAWAII**

FINAL

Prepared for:



**Board of Water Supply
City and County of Honolulu**

**Prepared By:
Marc M. Siah & Associates, Inc.**

January 2001

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January 2001

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Marc M. Siah & Associates, Inc.

Consulting Civil • Structural • Environmental & Ocean Engineers
810 Richards Street, Suite 888, Honolulu, Hawaii 96813

**FINAL ENVIRONMENTAL ASSESSMENT
FOR THE
HONOULIULI 228' RESERVOIR NO. 3
EWA, OAHU, HAWAII**

This environmental document is prepared pursuant to Chapter 200 of Title 11,
Department of Health Administrative Rules, "Environmental Impact Statement Rules"

ACCEPTING AUTHORITY

Board of Water Supply
City and County of Honolulu

Responsible Official:

Date:

PREPARED BY:

Marc M. Siah & Associates, Inc.
810 Richards Street
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January 2001

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PREFACE

PREFACE

This Final Environmental Assessment is prepared pursuant to the requirements of Chapter 343, *Hawaii Revised Statutes*, Act 241, Session Laws of Hawaii 1992, and Chapter 200 of Title 11, Department of Health Hawaii Administrative Rules, "Environmental Impact Statement Rules".

This assessment documents the technical characteristics and environmental impacts of the proposed Honouliuli 228' Reservoir No. 3 project, and presents the findings, determination, and reasons supporting the determination associated with the significance of the project.

SUMMARY



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Consulting Civil • Structural • Environmental & Ocean Engineers
810 Richards Street, Suite 888, Honolulu, Hawaii 96813

**SUMMARY OF THE FINAL ENVIRONMENTAL ASSESSMENT
FOR THE
HONOULIULI 228' RESERVOIR NO. 3**

1.1 Proposing Agency

Board of Water Supply
City and County of Honolulu
630 South Beretania Street
Honolulu, Hawaii 96843
Contact: Ms. Lyann Okada, P.E.

1.2 Approving Authority

Mr. Clifford S. Jamile, P.E.
Manager and Chief Engineer
Board of Water Supply
City and County of Honolulu
630 South Beretania Street
Honolulu, Hawaii 96843

1.3 Name of Action

Construction of the 6 Million Gallon Honouliuli 228' Reservoir No. 3.

1.4 Description of Proposed Action

The action proposed by the Honolulu Board of Water Supply is to construct a 6 million gallon water reservoir in Honouliuli. The construction of this reservoir will increase the storage capacity of the existing Ewa-Waipahu 228' Water System to meet existing requirements and will enhance the Honolulu Board of Water Supply's capability to provide adequate potable water service to the Ewa area.

1.5 Project Setting

The project site is located in the Honouliuli area of Ewa, Oahu, Hawaii. The proposed reservoir site is situated on a portion of a lot identified by TMK: 9-2-01-1 and owned by the Estate of James Campbell. The proposed site is in a zone designated as a Restricted Agricultural District (AG-1). Since the proposed project is classified as a

Type-A utility, the development of the reservoir is considered a permissible use of AG-1 land. The final grade of the project site after the completion of construction will be 10 to 50 feet below existing grades. This will allow the reservoir to be placed in a depression and therefore less imposing on the surroundings. The existing water system in the area provides water service to Waipahu, West Loch Estates, West Loch Fairways, Honouliuli, Ewa by Gentry, Ewa Beach and Puuloa. The average daily water demand for the area in 1998 was approximately 9 million gallons per day. This amounts to just under 10 percent of the island-wide water demand.

1.6 Relationship to Plans, Policies and Controls

Plan, policies, and controls considered in the evaluation of the project are as follows:

- ▶ State Land Use Districts
- ▶ Honolulu City and County General Plan
- ▶ Ewa Master Plan

1.7 Probable Impacts

Impacts associated with the proposed project can be classified as having short-term and long-term effects. Short-term impacts are those related to construction activities, namely noise, air quality, water quality, erosion, and public health and safety and traffic. Long-term impacts are those associated with operation of the reservoir. These include impacts on flora, fauna, society, public health and safety and infrastructure.

Short-term Impacts

The impacts generated from the construction activities are not expected to be significant. During construction, soil erosion control measures and appropriate Best Management Practices (BMPs) will be implemented. Dirt/soil tracking will be minimized by gravelling all ingress and egresses to the site. Potential soil loss is anticipated to be minimal and within an acceptable range. Any excess material excavated during construction activities will be removed to ensure proper drainage. Furthermore, existing drainage areas will not be impacted or reduced. There will be no significant impacts on water quality, water resources, historical sites or archaeological features. Furthermore, there are no known rare or threatened species of flora or fauna in the project area. Traffic may increase locally on Farrington Highway during construction especially while transporting construction equipment and materials, as well as while hauling away excavated material. This impact, although not significant, will be properly mitigated by

limiting the hauling and transportation of construction equipment and materials to off-peak traffic hours as well as utilizing flagmen to ensure smooth traffic flow along the highway. The existing roads providing direct access to the site are privately owned and will be maintained for continual use by the farmers leasing the affected lands. Noise control measures such as muffling devices will be employed on construction equipment during construction. Dust control measures such as sprinkling and watering will be implemented to minimize emissions.

Long-term Impacts

In the long-term, the operation of the reservoir will not have adverse environmental impacts. Long term impacts to the visual resources of the area will be mitigated through revegetation and the use of screening trees to be planted along the makai boundary of the site, between the reservoir and the H-1 Freeway. The design consultant will consult with the Nature Conservancy of Hawaii on the use of native plants to serve these purposes. The project will also have little or no effect on the forested watershed areas north of the proposed reservoir and the water resources of the area. The water used to supply the proposed reservoir will come from various sources that tap the basal aquifers in Waipahu and Honouliuli. However, hydraulic barriers, as well as differences in head levels and water chemistry, between these aquifers will prevent their impacting each other and the forested watershed areas.

1.8 Alternatives Considered

No Action

The "No Action" alternative means that no water reservoir will be constructed and as the population in the area increases, the water supply will become inadequate and unreliable for both residential consumption and fire protection. This alternative is unacceptable to the community, since water supply issues will remain unresolved.

Delayed Action

The "Delayed Action" alternative means that the water reservoir construction takes place at some time in the future. This alternative will postpone the resolution of water storage concerns in the area, causing continued potential water supply shortages due to inadequate supply. Furthermore, the delay of the water reservoir construction will also result in higher construction costs in the future due to inflation.

Alternative Sites

The "Alternative Sites" alternative means that the water reservoir will be constructed at a site other than the proposed site. In a feasibility study prepared by Marc M. Siah & Associates, Inc. for the Honolulu Board of Water Supply entitled "Site Feasibility Study for Honouliuli 228' Reservoir No. 3 - Final Submittal" (Reference No. 8), four alternative sites were evaluated for optimum feasibility. All of these alternatives were found to be less feasible than the proposed reservoir site. In general, use of an alternative site would result in higher costs, higher maintenance requirements and more disruptive drainage and grading impacts to the area.

Irreversible and Irretrievable Commitments of Resources

The proposed water reservoir construction project involves irreversible and irretrievable uses of energy, labor, materials, and capital funds by the City and County of Honolulu's Board of Water Supply. Construction of the proposed reservoir will resolve water storage concerns throughout the Ewa area.

1.9 List of Necessary Permits and Approvals

Permits required in order to fulfill the drainage ditch improvements are listed as follows:

<u>Permit</u>	<u>Approving Agencies</u>	<u>Approximate Processing Time</u>
NPDES: Hydrotesting Permit	Department of Health State of Hawaii Clean Water Branch	60 - 90 days
NPDES: Storm Water Runoff Permit	Department of Health State of Hawaii Clean Water Branch	60 - 90 days
Building Permit	Department of Planning and Permitting City and County of Honolulu	30 - 45 days
Grading Permit	Department of Planning and Permitting City and County of Honolulu	15 - 30 days

SECTION 1
GENERAL DESCRIPTION OF THE PROJECT'S
TECHNICAL CHARACTERISTICS



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SECTION 1

GENERAL DESCRIPTION OF THE PROJECT'S TECHNICAL CHARACTERISTICS

1.1 Project Location

Honouliuli is located at the northern end of the Ewa District in Leeward Oahu (see Figure 1-1). Located in the Ewa Plains, the Honouliuli area is relatively flat, with an average grade of less than six percent covering over 400 acres. The area ranges in elevation from 50 feet above mean sea level (MSL) makai of Farrington Highway to 500 feet MSL mauka of the Honouliuli Wells II.

Honouliuli primarily supports agricultural land and is home to many independent farmers growing vegetables and diversified agriculture. The area has been historically used for growing sugar cane. Land in the majority of the Honouliuli area is owned by the Estate of James Campbell.

The proposed Honouliuli 228' Reservoir No. 3 project will be located mauka of the H-1 Freeway at an elevation of 208 feet, as shown in Figure 1-2. The proposed reservoir site is approximately four miles inland from Ewa Beach. Access to the reservoir is via a dirt road which branches off from the main black-top road and then runs parallel to the H-1 Freeway.

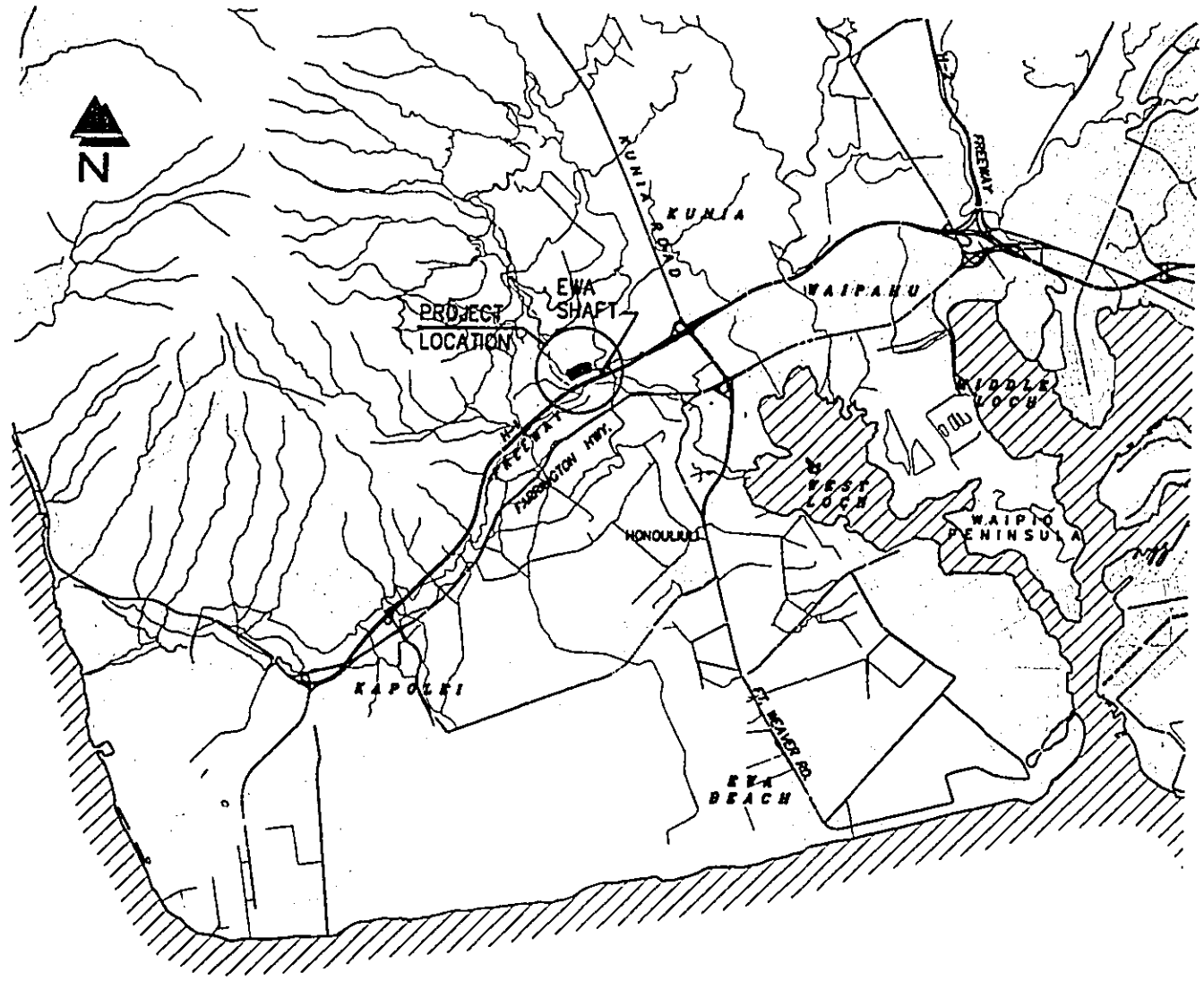
1.2 Background

The communities of Leeward Oahu stretching from Waipahu to Koolina receive their water supply from five water systems. Each water system is composed of wells, reservoirs, transmission lines, and pumping/booster stations. The five systems together contain 20 operational water wells and 17 storage reservoirs. The majority of these wells are located in the eastern half of the Ewa area, between Honouliuli and Waipahu. A water system is usually classified by its location and the overflow elevation of its reservoirs. The five water systems in the Ewa area are classified as follows:

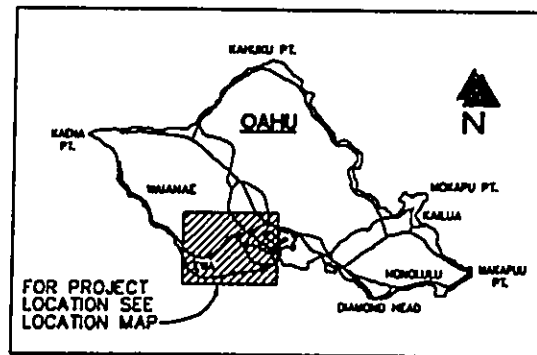
- ▶ 228' System
- ▶ 440' Honouliuli System
- ▶ 440' and 665' Kunia Booster System
- ▶ 215' System
- ▶ 440', 675', 920', and 1230' Makakilo Booster System

The 228' Water System is one of the five systems serving the area and named by the overflow elevation of its reservoirs which is 228 feet above Mean Sea Level (MSL). This system extends

Figure 1-1 Project Location Map



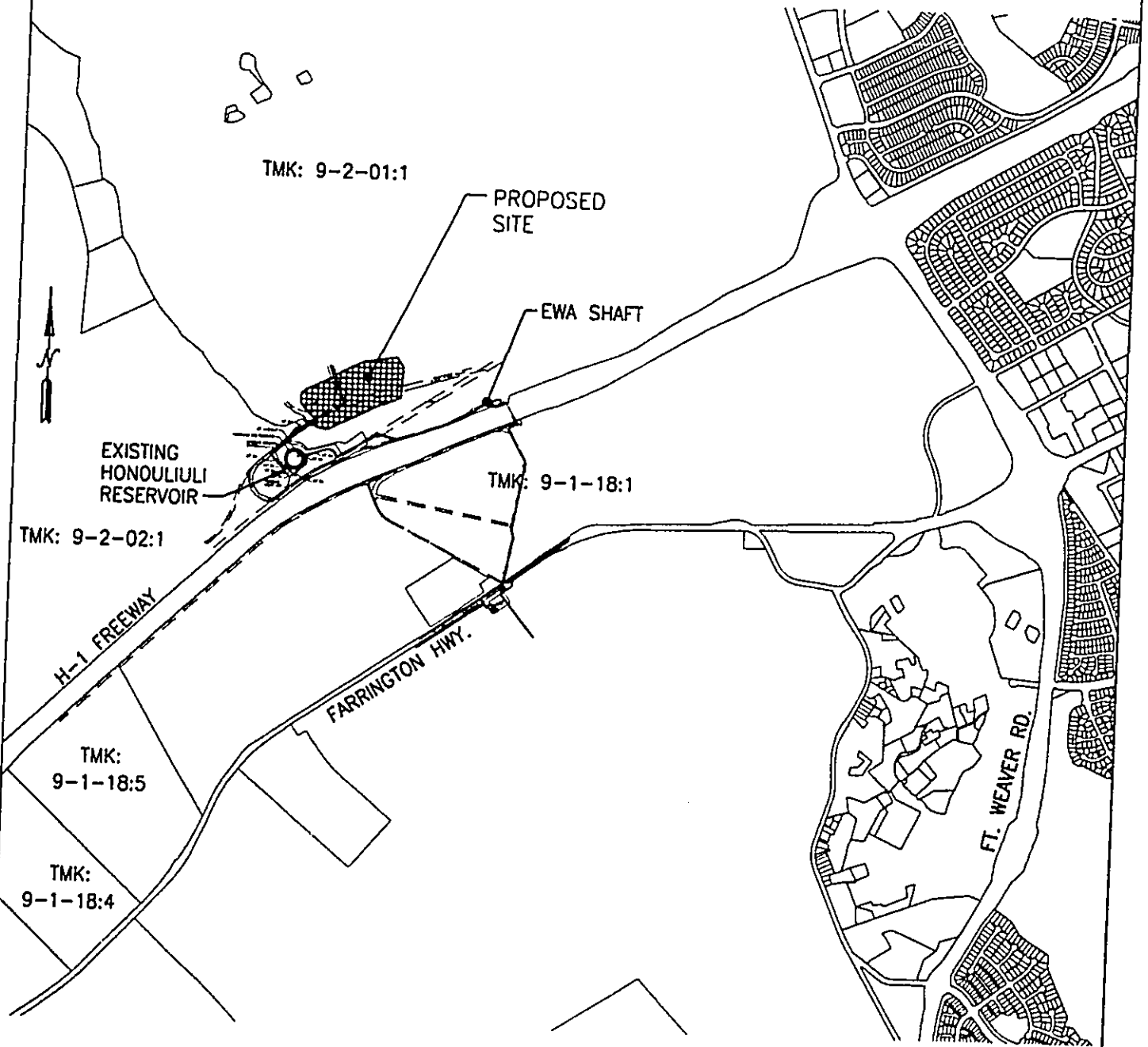
Vicinity Map



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MMS Marc M. Siah & Associates, Inc.
 Consulting Civil, Structural, Environmental & Ocean Engineers
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Figure 1-2 Proposed Reservoir Site



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GENERAL DESCRIPTION OF THE PROJECT'S TECHNICAL CHARACTERISTICS
SECTION ONE

from Waipahu to the Honouliuli 228' Reservoir and provides water service for Waipahu, West Loch Estates, West Loch Fairways, Honouliuli, Ewa By Gentry, Ewa Beach, and Puuloa.

The population served by the 228' System is approximately 28,500, and the average daily demand in 1998 was recorded at 9 MGD. Excluding the daily demands by private developments such as Ewa by Gentry and Ewa Marina, the average daily demand in the 228' system is about 6.8 MGD. The BWS's standards require that the system must have storage capacity to meet the maximum daily demand, defined as 1.5 times the average daily demand. In other words, the required storage capacity to meet this demand is a little more than 10 Million Gallons. The current 4 million gallon storage capacity of the 228' System is, therefore, below the required storage capacity and an additional 6 MG reservoir is needed to meet the projected future demands.

1.3 Site Selection

The process of planning and site selection for the proposed reservoir started by identifying several alternate locations which met the following minimum criteria:

1. The proposed site has sufficient elevation to allow integration of the proposed reservoir into the 228' Water System.
2. The proposed site has adequate area sufficient for construction of multiple reservoirs in any combination of 4, 5, and 6 Million Gallons of storage capacity as well as for construction of screening berms.
3. Access to the proposed reservoir site is available for operational personnel and equipment.
4. The geological substrata at the proposed site is adequate to support the loads imposed by the reservoir.
5. Storm runoff from the proposed site can be readily discharged downstream without adverse impacts on adjacent property and/or the environment.

In a feasibility study prepared for the project, four other alternate sites were identified in the Honouliuli area. The feasibility of each site was evaluated based on the suitability of each alternate site in regards to meeting several criteria including geology and soil characteristics, grading requirements, environmental impacts and construction costs. The strong desire of the BWS to consolidate the proposed reservoir with the future Ewa Shaft water treatment facility in

GENERAL DESCRIPTION OF THE PROJECT'S TECHNICAL CHARACTERISTICS
SECTION ONE

a single location, combined with the fact that all four alternate sites were associated with higher construction costs, higher maintenance requirements and more disruptive grading and drainage impacts to the area, led the BWS to select the proposed site for the reservoir project. The complete study of alternative sites can be found in the "Site Feasibility Study for Honouliuli 228' Reservoir No. 3 - Prefinal Submittal" (Reference No. 9).

1.4 Technical Description

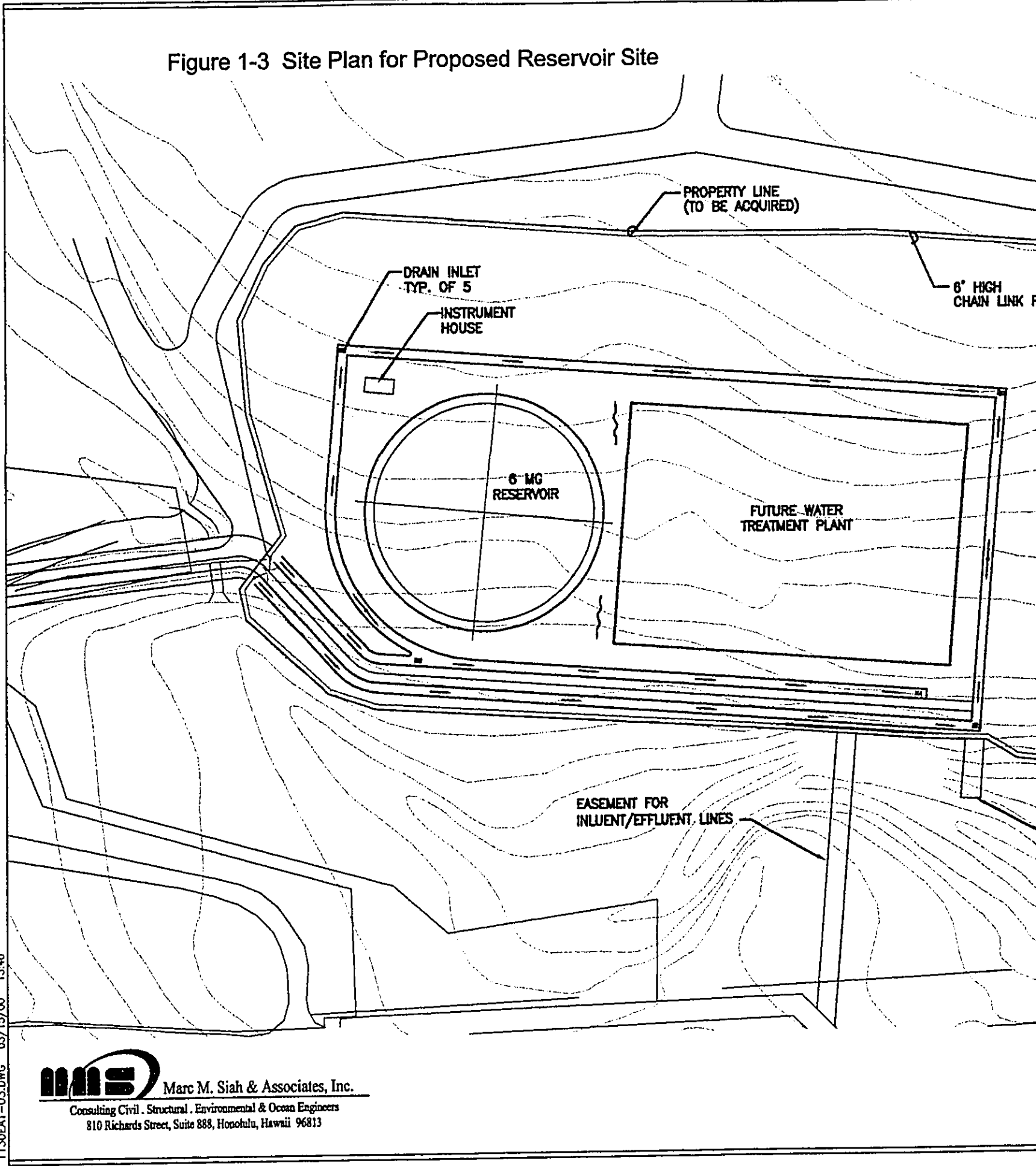
The Honouliuli 228' Reservoir No. 3 system will be integrated into the existing water system by means of separate influent and effluent lines. This allows the new reservoir to float in the system while ensuring less reservoir residence time and less stagnation. Installation of two separate influent and effluent lines also ensures a much simpler and more efficient reservoir operation as dictated by the system hydraulics. The proposed reservoir will be supplied by treated water from the renovated Ewa Shaft. The new reservoir will be connected to the effluent line exiting the proposed GAC treatment plant which will be located on the same site and adjacent to the new Honouliuli reservoir.

The reservoir will be constructed on a pad elevation of 208 feet and the spillway will be set at elevation 228 feet (hence, the name Honouliuli 228'). An instrument house, a small structure about 8 feet wide by 10 feet long by 8 feet high, will house the electrical control system. This system will include a water flow regulator to and from the reservoir, a level recorder and telemetry equipment. The existing cane haul road will be rerouted along the northern boundary of the site with a new 12 feet wide access road branching off into the site. Landscaping will be provided to minimize erosion and to lessen the visual impact of the new reservoir.

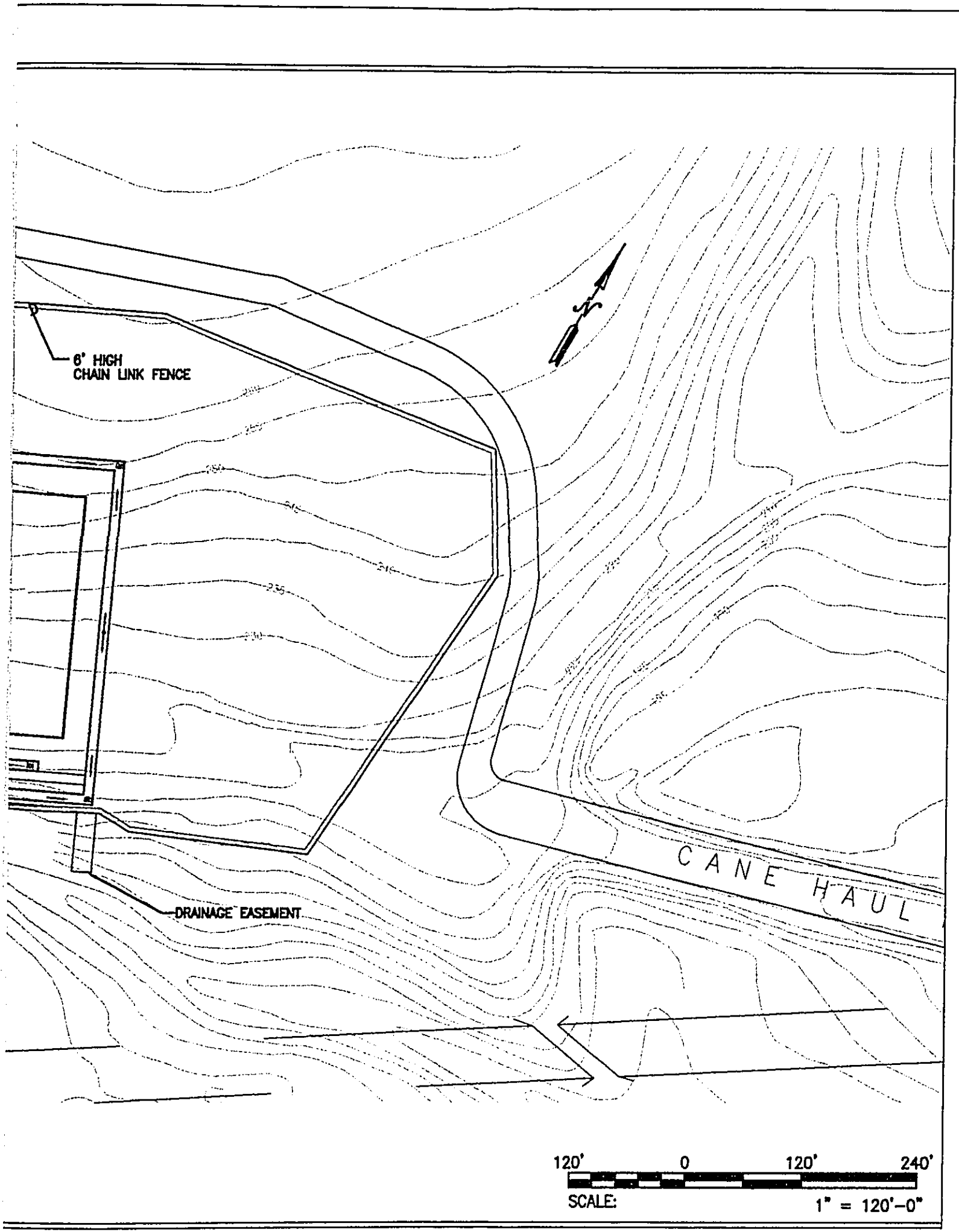
1.4.1 Reservoir Site

The proposed reservoir site is a portion of the lot identified by Tax Map Key (TMK) Number: 9-2-01:1 and owned by the Estate of James Campbell, as shown in Figure 1-2. The lot is located in the Ewa Plains and in the vicinity of the Ewa Shaft, in southwest Oahu. The lot is located mauka of the H-1 Freeway and on the north bank of the Honouliuli Gulch as it meanders past the existing Honouliuli reservoir site, as shown in Figure 1-3. On the west, an existing dirt road (cane haul road) separates the site from the Honouliuli Gulch which turns east along the southern border of the site on its way to the H-1 Freeway crossing and ultimately to the ocean. On the north and west sides of the site, vast expanses of former sugar cane lands lie vacant. Kunia Road passes approximately 5 miles east of the site. The existing Honouliuli 228' Reservoir is located approximately ½ mile from the southwest corner of the property.

Figure 1-3 Site Plan for Proposed Reservoir Site



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6' HIGH
CHAIN LINK FENCE

DRAINAGE EASEMENT

CANE HAUL

120' 0 120' 240'
SCALE: 1" = 120'-0"

**GENERAL DESCRIPTION OF THE PROJECT'S TECHNICAL CHARACTERISTICS
SECTION ONE**

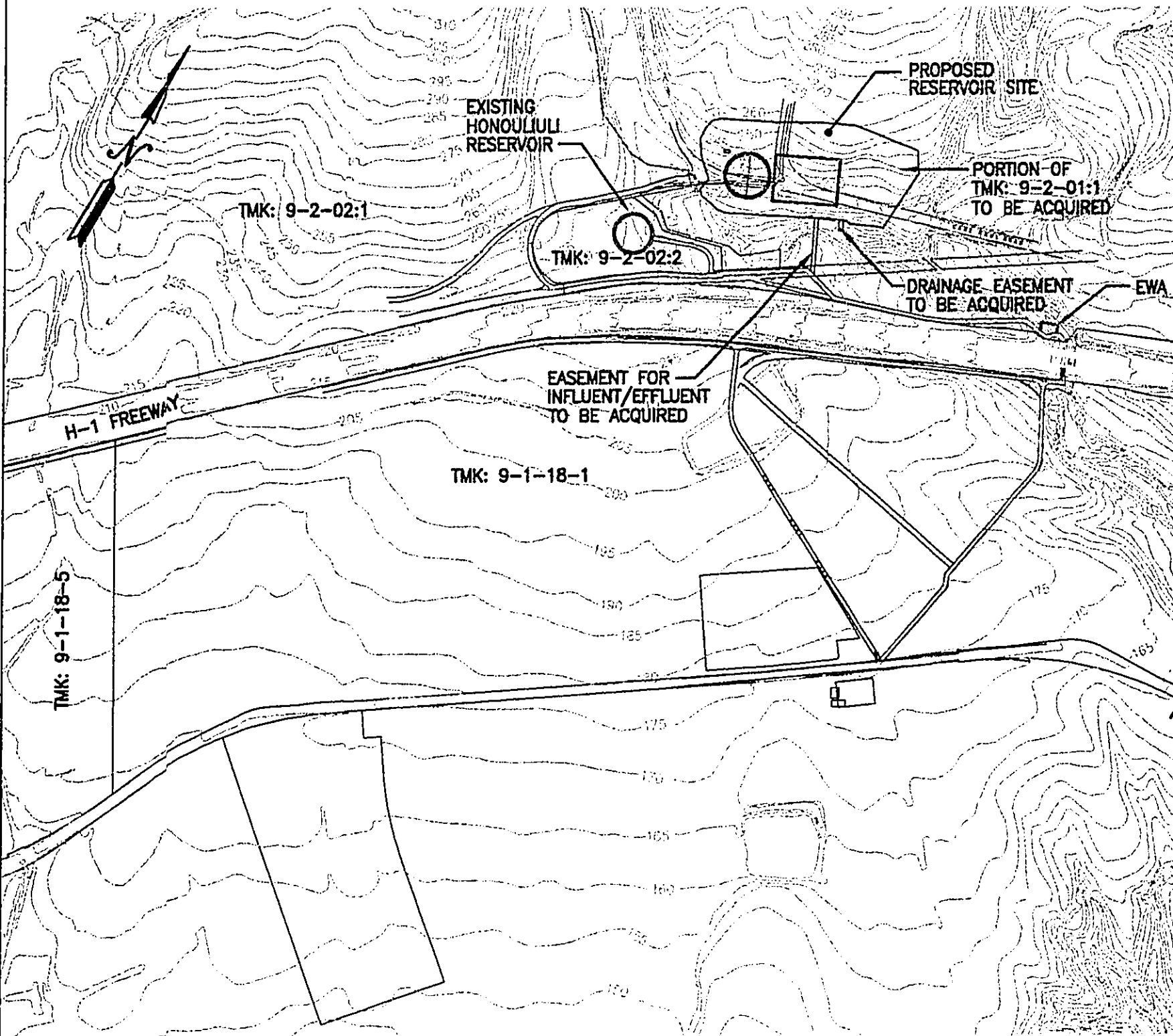
An unpaved cane haul road passes through the northern half of the parcel in the direction of Kunia Road. An existing Hawaiian Electric Company 44 kV transmission line runs along the cane haul road and through the proposed site. The 42-inch transmission line supplying the existing Honouliuli Reservoir also passes through the northwestern quadrant of the site. The northwest corner of the property is currently used by independent farmers for growing vegetables and diversified agriculture. The general area of the property has historically been used for growing sugar cane. With the demise of the sugar industry in recent years, the area is undergoing a transition from predominantly agricultural to residential and other uses more compatible with the regional master plan for Ewa Plains.

Elevations of the proposed site range from approximately 265 feet above Mean Sea Level (MSL) in the northeast corner to approximately 250 feet in the northwest corner of the site. The elevation along the southern boundary of the site is approximately 210 feet above MSL.

Reservoir construction requires a suitable foundation in stable sub-strata to support the structure as well as the weight of the water it contains. It is, therefore, imperative to locate the proposed reservoir on cut rather than fill areas. The proposed reservoir-treatment plant site, has adequate elevations to allow construction of the facilities on cut areas. Figure 1-4, shows the boundaries of an area with a minimum elevation of 210 feet suitable for the proposed reservoir with over flow elevation of 228 feet. The area delineated consolidates the proposed Ewa Shaft Treatment Plant and a new 6-Million Gallon reservoir site on a single and contiguous lot with a total area of 14.3 acres.

Although subsurface conditions at the proposed reservoir site were not explored, data from a single 50-foot deep soil boring from a nearby site was used for a preliminary description of the geological conditions at the proposed reservoir site. Due to the fact that the area had historically been used for agriculture and sugar cane production, there was no available soil boring data for the site. We have also been unsuccessful in obtaining boring logs and soil data compiled for the existing Honouliuli Reservoir site. Due to similarity in soil texture and bedrock, it is assumed that the proposed site has soil and geological characteristics and conditions similar to the site located immediately makai of the H-1 Freeway, where the boring data was collected. An actual soil boring will have to be collected prior to the design of the proposed reservoir. The approximate location of the boring is shown in Figure 1-5. During soil boring, samples were collected at selected depths and analyzed to assess the subsurface soil conditions. The results of laboratory analysis of the single soil boring indicates that the subsurface soils consist of very stiff lean clay underlain by tuff rock (cemented volcanic ash). Numerous

Figure 1-4 Boundaries of the Proposed Reservoir Site



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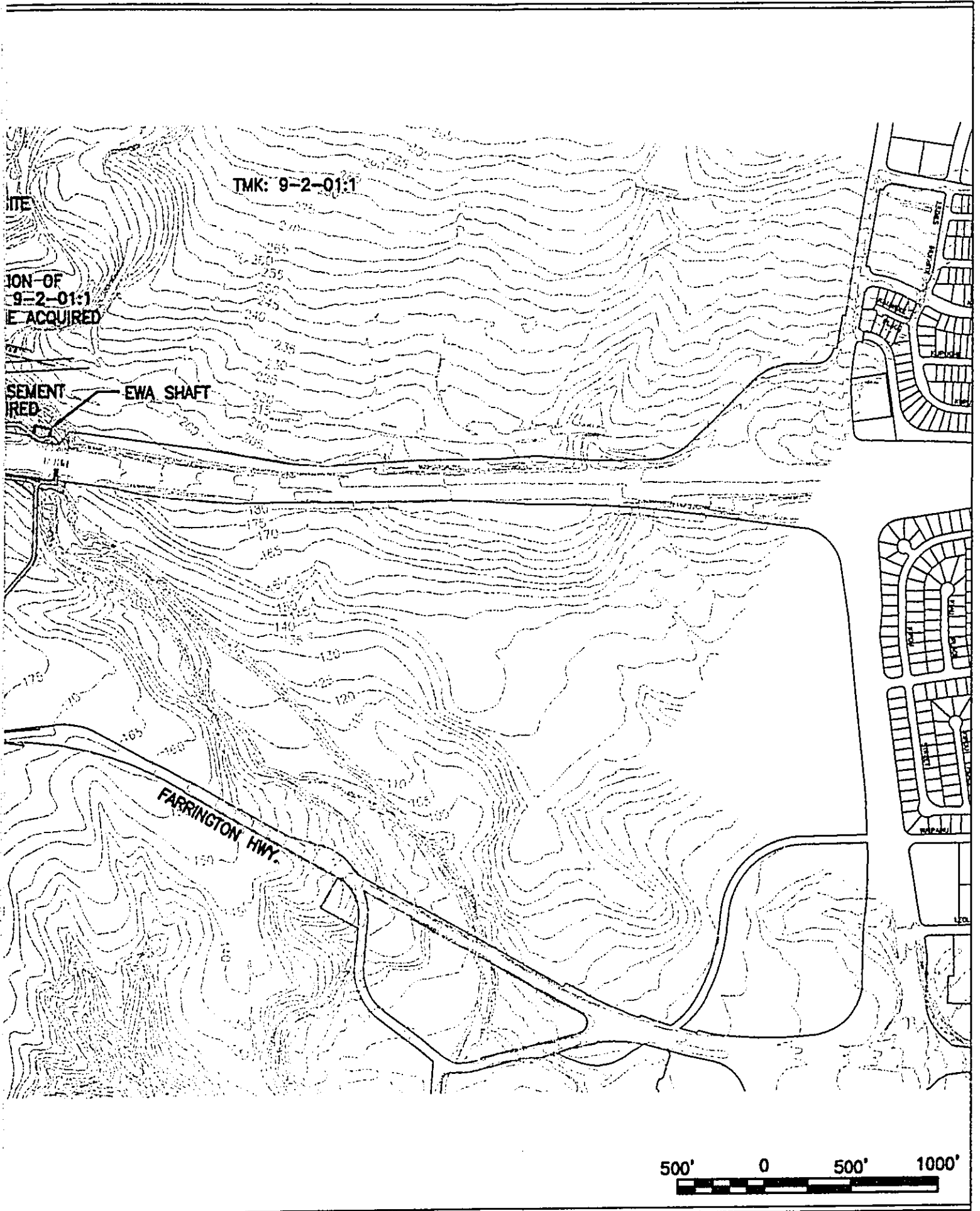
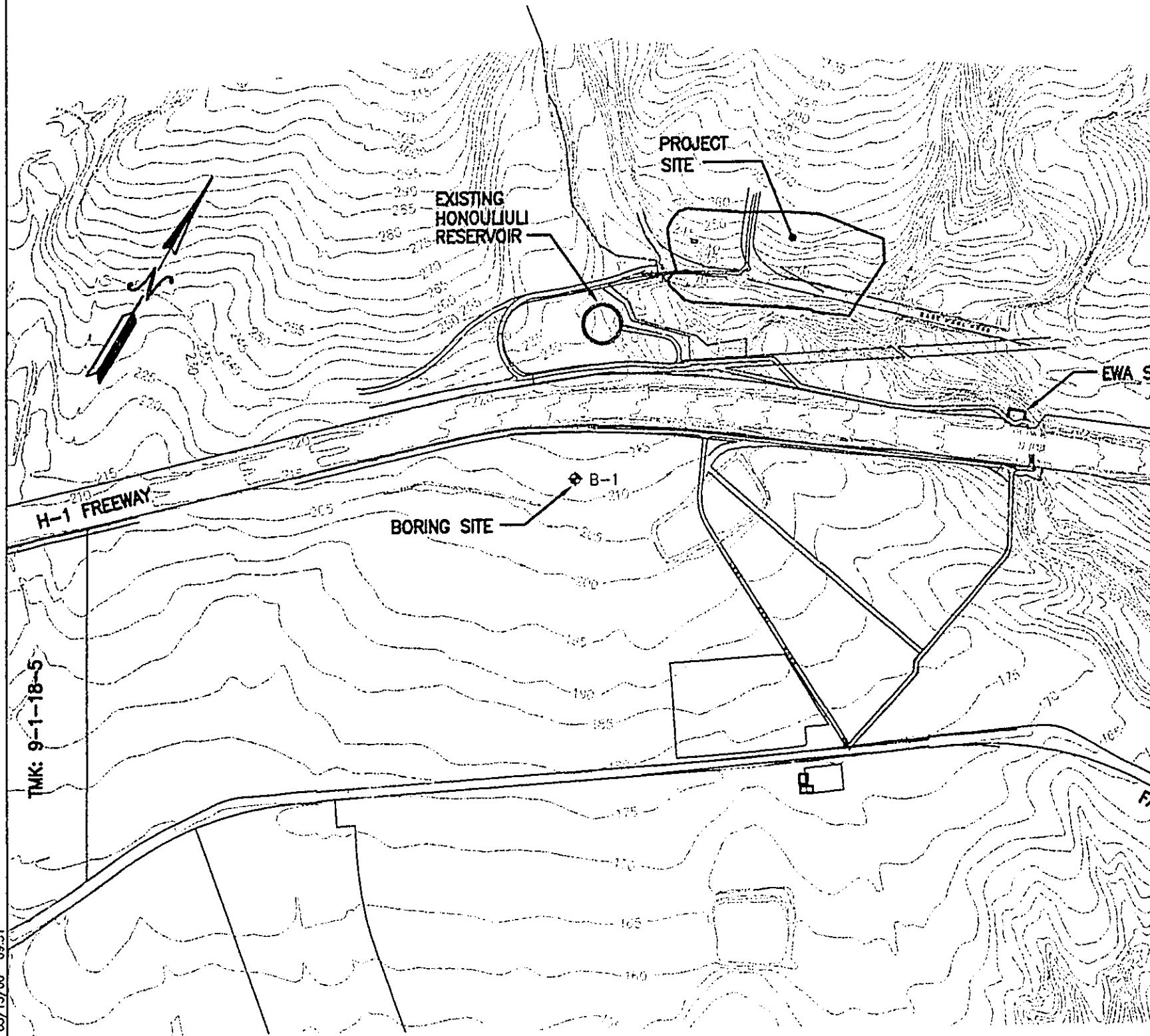


Figure 1-5 Location of Soil Boring



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GENERAL DESCRIPTION OF THE PROJECT'S TECHNICAL CHARACTERISTICS
SECTION ONE

boulders and cobbles were also encountered in the clay soil between 7 feet and 24 feet in depth. The boring further indicates that tuff occurs below clay soils in the 50 feet of soil profile thus explored. The tuff has a low to moderate hardness to about 35 feet. Below 35 feet, the tuff becomes friable and intensely fractured. The soil report is included in Appendix A. The report concludes that, from a geotechnical point of view, the site is suitable for construction of the proposed reservoir structures. The footing bearing directly on the firm, proof-rolled in-situ soil or on approved engineered fill, may be designed for allowable bearing pressure of 2,500 pounds per square foot. The allowable bearing pressure is for dead plus long-term live loads. The allowable bearing pressure may be increased by 1/3 for transient loads including wind and seismic.

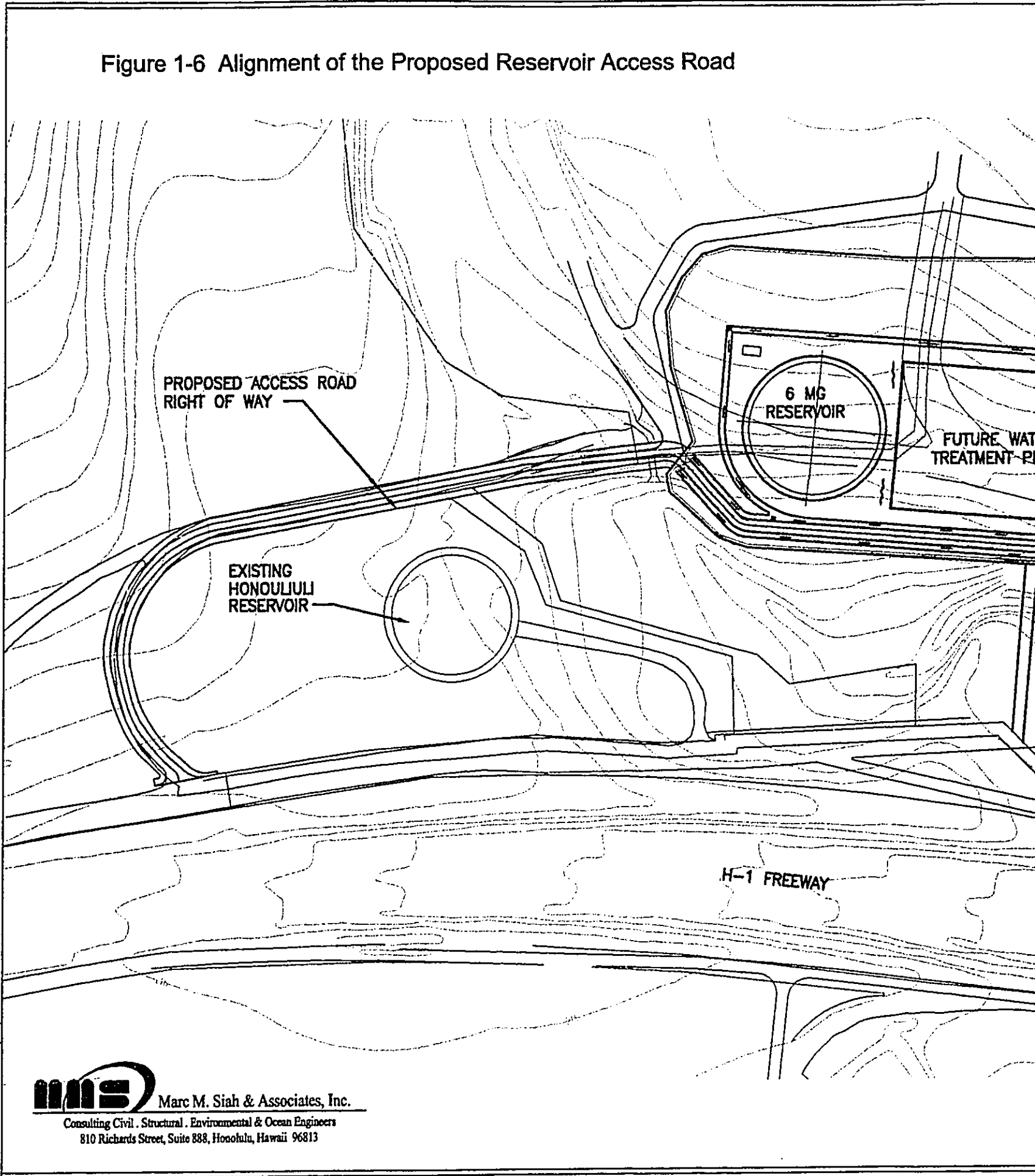
1.4.2 Access Roads

The site is currently accessed by a dirt road which branches off from the main black-top road and then runs parallel to the H-1 Freeway and serves as the access road to the existing Honouliuli Reservoir. Construction access to the reservoir will be provided using this access road. After branching off the black-top road, the proposed reservoir access road will follow the perimeter fence circling the existing Honouliuli reservoir before crossing the gulch and terminating at the proposed site. The existing culvert under this road may need to be resized. The existing dirt road, which currently passes through the property, must then be rerouted outside the northern boundary of the proposed reservoir site. The alignment of the proposed reservoir access road and rerouting of the existing dirt road in the vicinity of the reservoir site are shown in Figure 1-6. Both roads are relatively flat with maximum slopes of less than 10 percent. Since the alignment of the existing dirt road, which will be used as the access road to the proposed reservoir both during and after construction, does not follow an established easement, its adoption as the reservoir access road requires the BWS to acquire the necessary right-of-way easement. This would require acquisition of approximately 1,349.25 linear feet of 40-foot wide right-of-way in favor of the BWS for the proposed reservoir access. The access road shall be designed in accordance with BWS Water System Standards based on the following criteria:

- a. Twelve feet pavement width
- b. Pavement grades of less than twelve percent shall be of asphaltic concrete; pavement grades in excess of twelve percent shall be constructed of reinforced concrete.

The proposed access road may affect the University of Hawaii, West Oahu Campus property if construction of the campus begins prior to or during construction of the

Figure 1-6 Alignment of the Proposed Reservoir Access Road

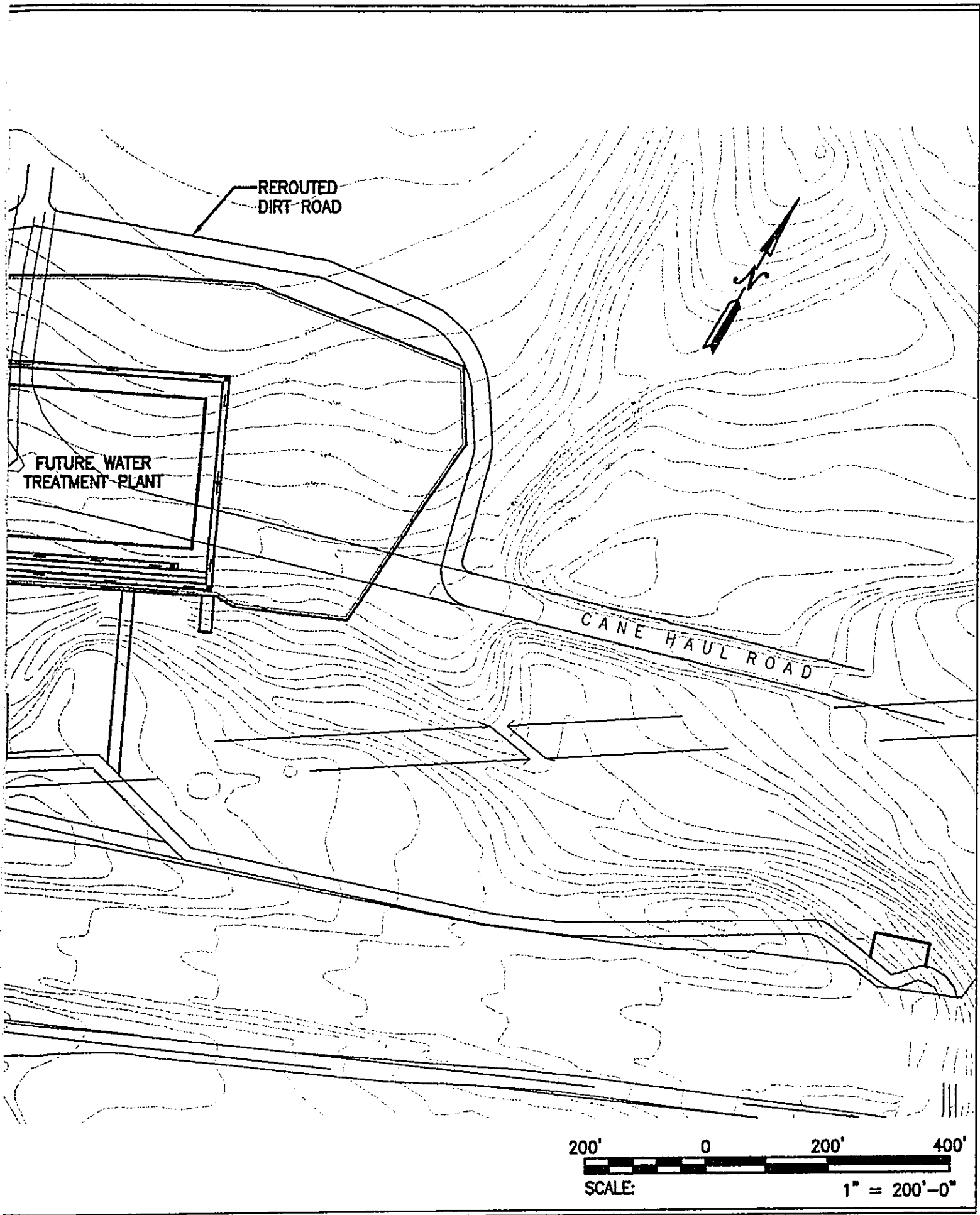


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GENERAL DESCRIPTION OF THE PROJECT'S TECHNICAL CHARACTERISTICS
SECTION ONE

proposed reservoir. The Board of Water Supply will make arrangements with the University of Hawaii for access through a portion of the West Oahu Campus if the Palehua Road underpass is used for access. A preliminary plan and profile for the access road is presented in Figure 1-7.

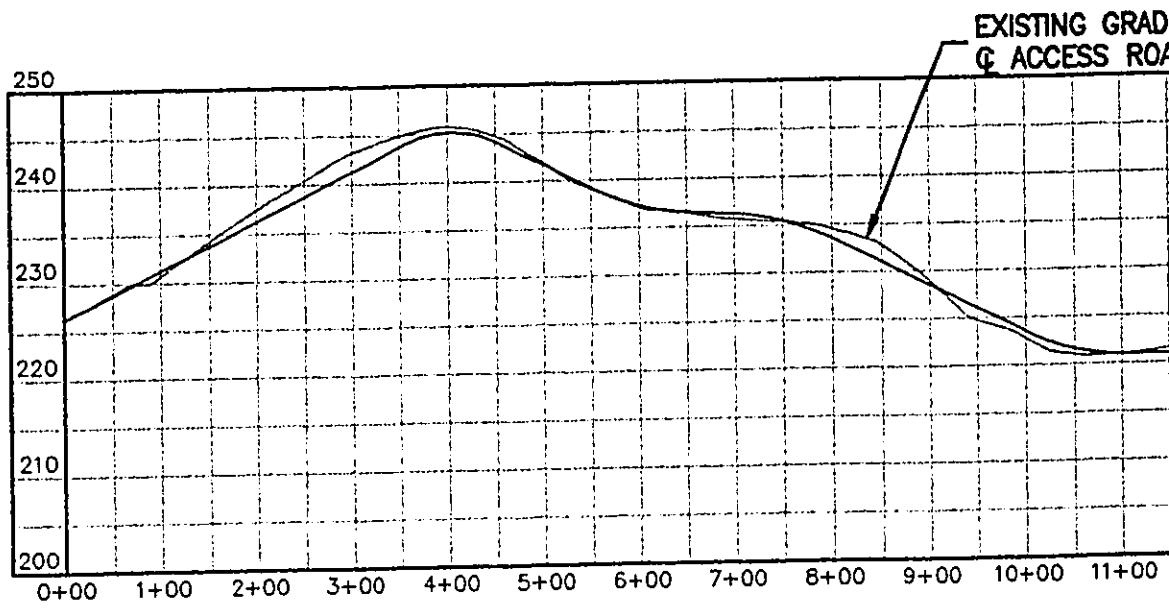
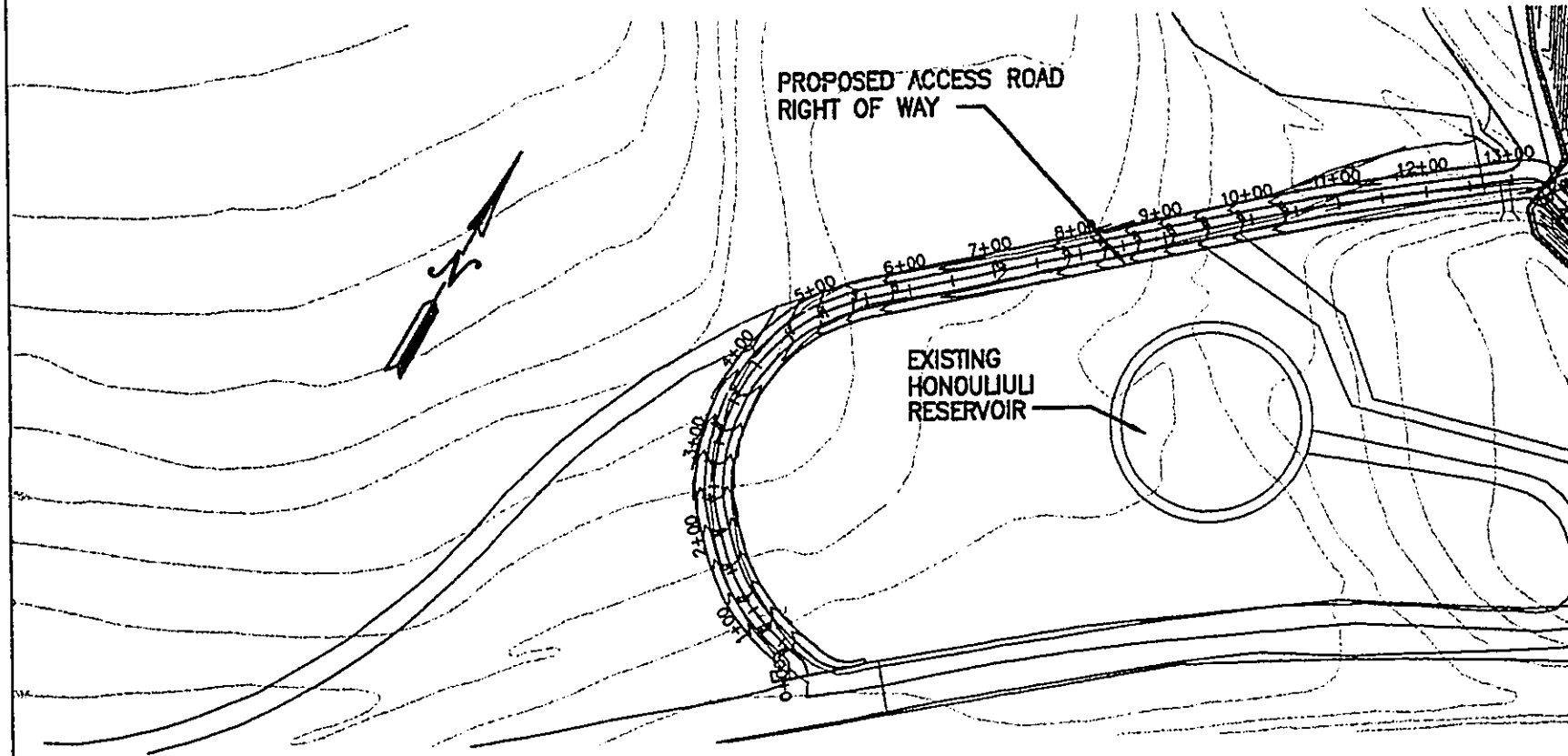
1.4.3 Water System Integration

The proposed reservoir will be integrated into the existing water system by means of drawing water from the GAC treatment plant for the Ewa Shaft. The proposed alignment for the influent line is shown in Figure 1-8. Approximately 150 linear feet of 36-inch Ductile Iron (D.I.) pipe will connect the proposed reservoir to the effluent line exiting the treatment plant. Similarly, the new reservoir will be connected to the existing transmission and distribution system by means of approximately 700 linear feet of a new 36-inch D.I. pipe between the new reservoir and the 42-inch effluent line exiting the existing Honouliuli reservoir. The proposed alignment and connection points for the effluent line are also shown in Figure 1-8. This configuration requires acquisition of approximately 290 linear feet of 20-foot wide easement in favor of the BWS.

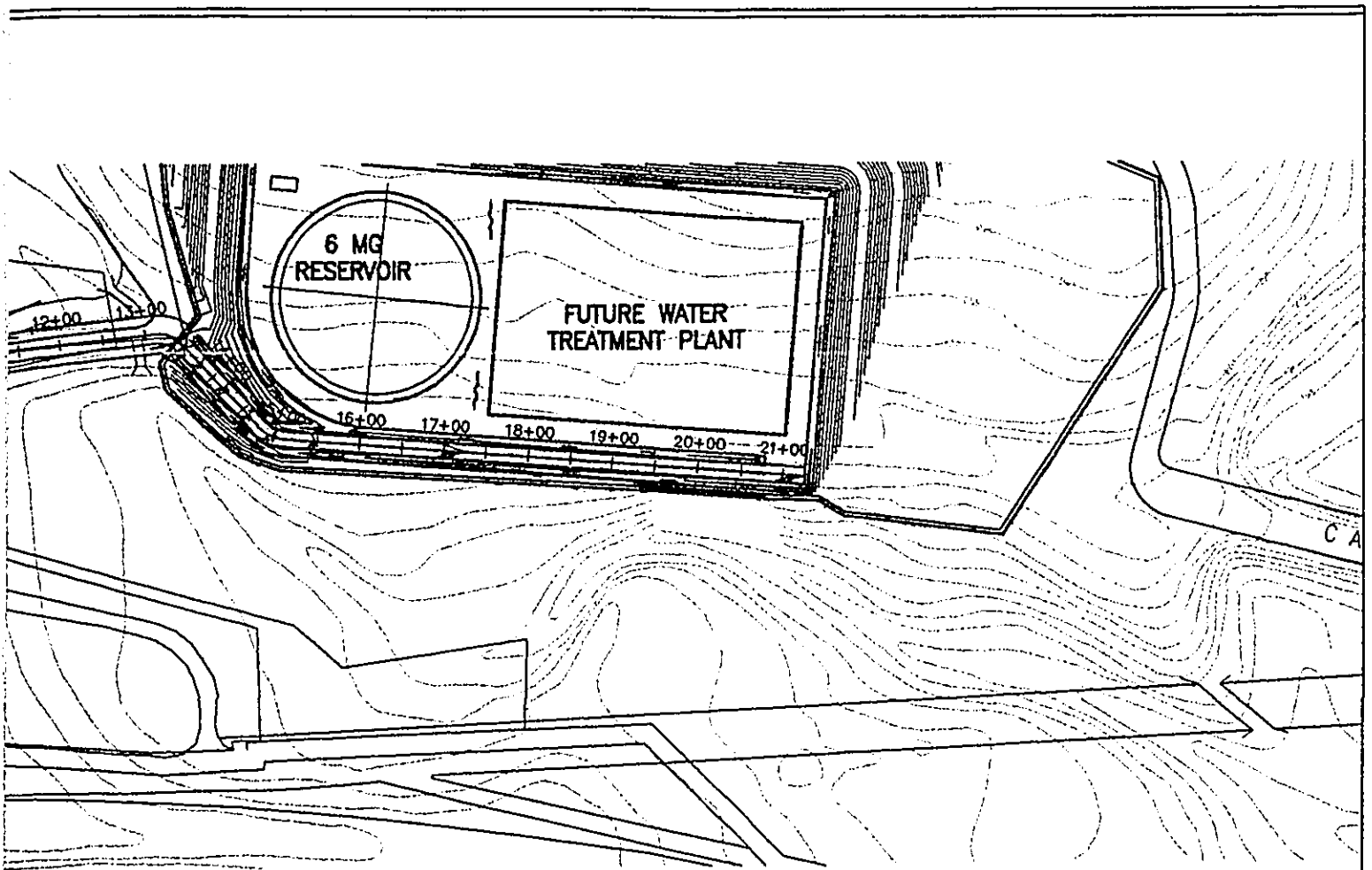
1.5 Project Cost

The preliminary estimated construction costs for the project, as summarized in Appendix B, total to \$17.453 million. This project will be funded through the Capital Improvements Program monies of the Board of Water Supply.

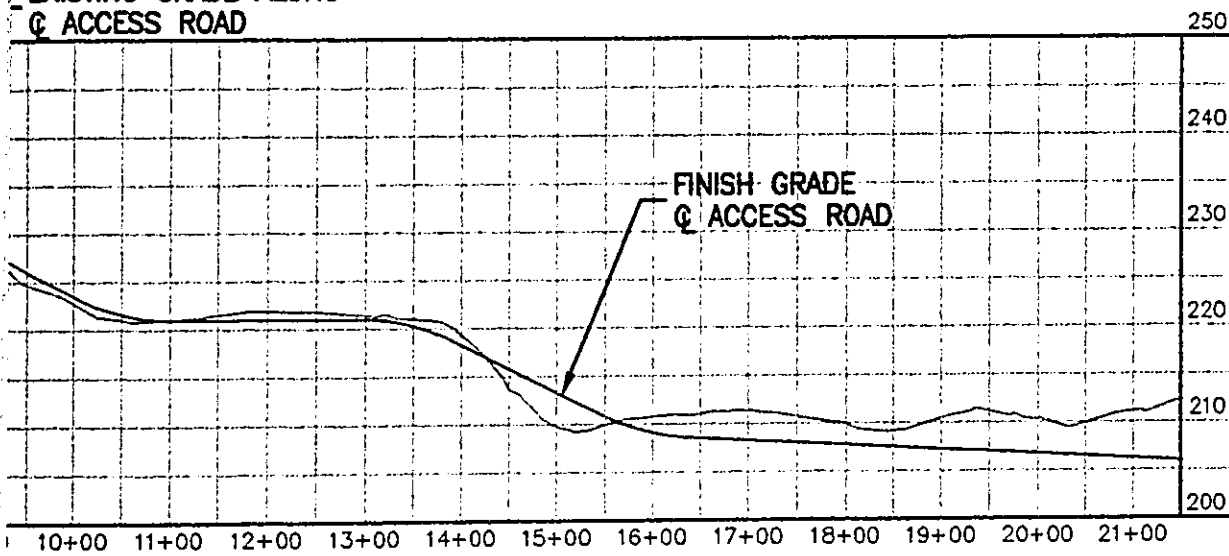
Figure 1-7 Reservoir Access Road - Plan and Profile



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EXISTING GRADE ALONG
 C ACCESS ROAD



MAP/DRAWING#

102-G

SECTION 2
DESCRIPTION AND OBJECTIVES
OF THE PROPOSED ACTION



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SECTION 2

DESCRIPTION AND OBJECTIVES OF THE PROPOSED ACTION

The purpose of this environmental assessment is to address and evaluate the environmental impacts of constructing a new 6-Million Gallon water reservoir at Honouliuli in the Ewa Plains as proposed by the City and County of Honolulu's Board of Water Supply (BWS). The proposed reservoir will be integrated into the Ewa-Waipahu 228' Water System. Installation of this reservoir will increase the storage capacity of the system to meet existing requirements and will enhance the Honolulu Board of Water Supply's capability to provide potable water service to the Ewa area. The proposed location for the new reservoir is illustrated in Figure 1-1.

The 228' Water System, which is part of the BWS's Ewa-Waipahu Water System, currently serves a population of approximately 28,500 people. In 1998, the average daily demand of this population was approximately 9 Million Gallons. When adjusted for the demands of private developments such as the Ewa Marina and Ewa by Gentry, the daily demand for the BWS's 228' Water System is about 6.8 MGD. Available storage capacity in this water system excluding the existing, privately owned, Honouliuli 228' Reservoir, currently totals 4.0 Million Gallons (MG). Based on the current demand and available storage serving the area from Waipahu to Ewa Beach, the BWS has determined that a single 6-MG reservoir is needed to satisfy the existing storage requirements of the 228' Water System. To meet this projected demand, the BWS is proposing to construct a single 6-MG reservoir in the vicinity of the existing Honouliuli 228' Reservoir. In light of the fact that the proposed reservoir is to be supplied with water from the Ewa Shaft Treatment Plant once treatment of the shaft is required, consolidation of the two facilities on a single site would reduce construction costs. The BWS proposes to use a parcel of land located mauka of the H-1 Freeway and in the vicinity of the existing Honouliuli 228' Reservoir, for this development.

The proposed location for the new reservoir, as illustrated in Figure 1-1, is on a 14.3-acre portion of lot identified by Tax Map Key (TMK): 9-2-01-1 located in Ewa Plains, mauka of the H-1 Freeway, and owned by the Estate of James Campbell. This site is adequate to house the proposed reservoir as well as a proposed Ewa Shaft Treatment Plant.

SECTION 3
DESCRIPTION OF EXISTING ENVIRONMENT

SECTION 3

DESCRIPTION OF THE EXISTING ENVIRONMENT

3.1 Physical Setting

3.1.1 Climate

The proposed 6 MG reservoir will be located on the leeward side of Oahu. With the exception of a few months in the winter, like most areas on Oahu, the climate in the project area is characterized by prevailing trade winds. The general climate on the leeward side of Oahu is sunny, dry and relatively uniform throughout the year. Daytime temperatures range between 70 -75 °F, whereas at night, the temperatures dip into the 60's.

The rainfall pattern on Oahu as shown in Figure 3-1, depicts the mean annual precipitation in Honolulu to be approximately 27 inches. Most of this rainfall occurs during winter months.

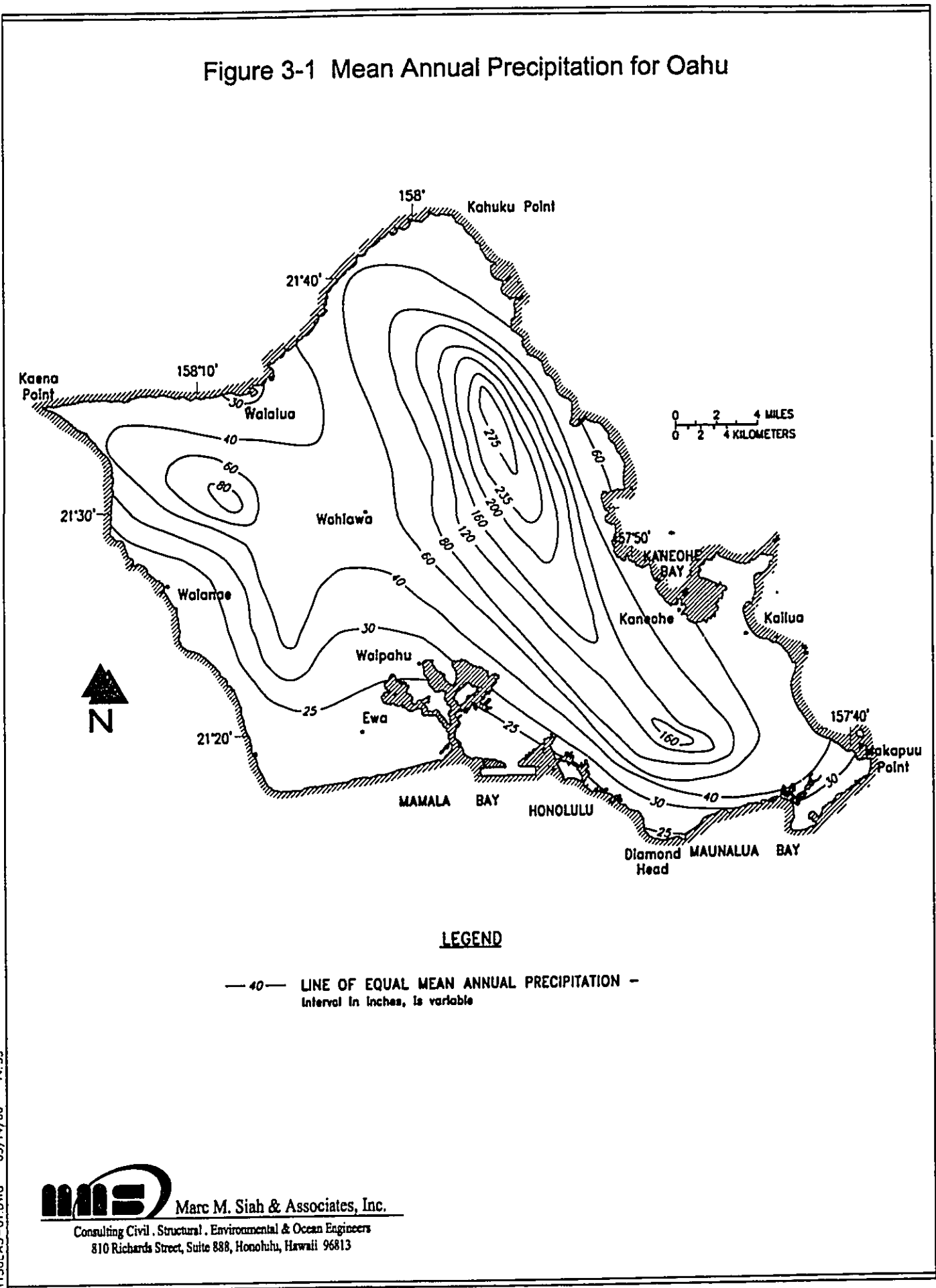
3.1.2 Geology

Oahu, the third largest island in the State, covers an area 44 miles long and 30 miles wide. The total land area of Oahu is 604 square miles. The Ewa Plain is bordered by the Koolau Range on the east and the Waianae range to the west. The geology of the Ewa area was formed by a combination of volcanic activity and the emergence of reefs along the southern edge of Oahu. During the volcanic activity along the Koolau volcanic range, a series of lava flows, cinder cones and tuff cones were formed. These volcanic formations, which are very different in composition from the older Koolau rocks, are known as the Honolulu Volcanic Series. The Ewa plain is underlain by a broad elevated coral reef, partly covered by alluvium carried out from the mountains. Figure 3-2 shows the geological features of Oahu.

3.1.3 Topography

The existing topography at the proposed reservoir site is gently sloping from north to south, towards the Honolulu Gulch. The site is suitable for construction of either a single or multiple reservoirs with a floor elevation of 208 feet above MSL. In the north, the existing elevations range from 258 to 265 feet, whereas the center and south of the parcel are approximately at 230 feet and 210 feet above MSL, respectively. The lot has

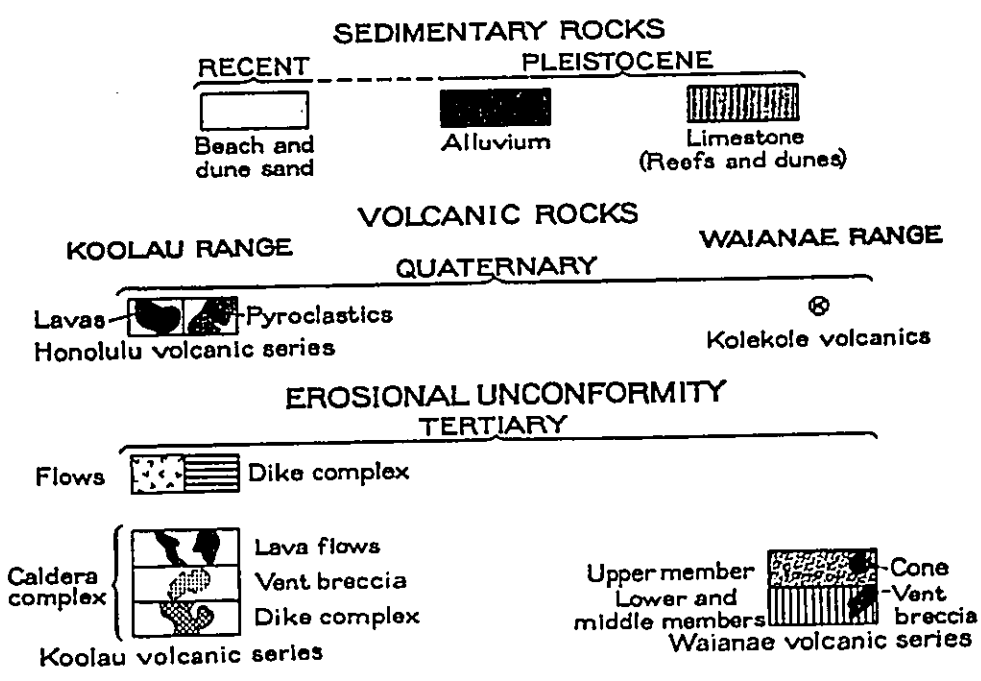
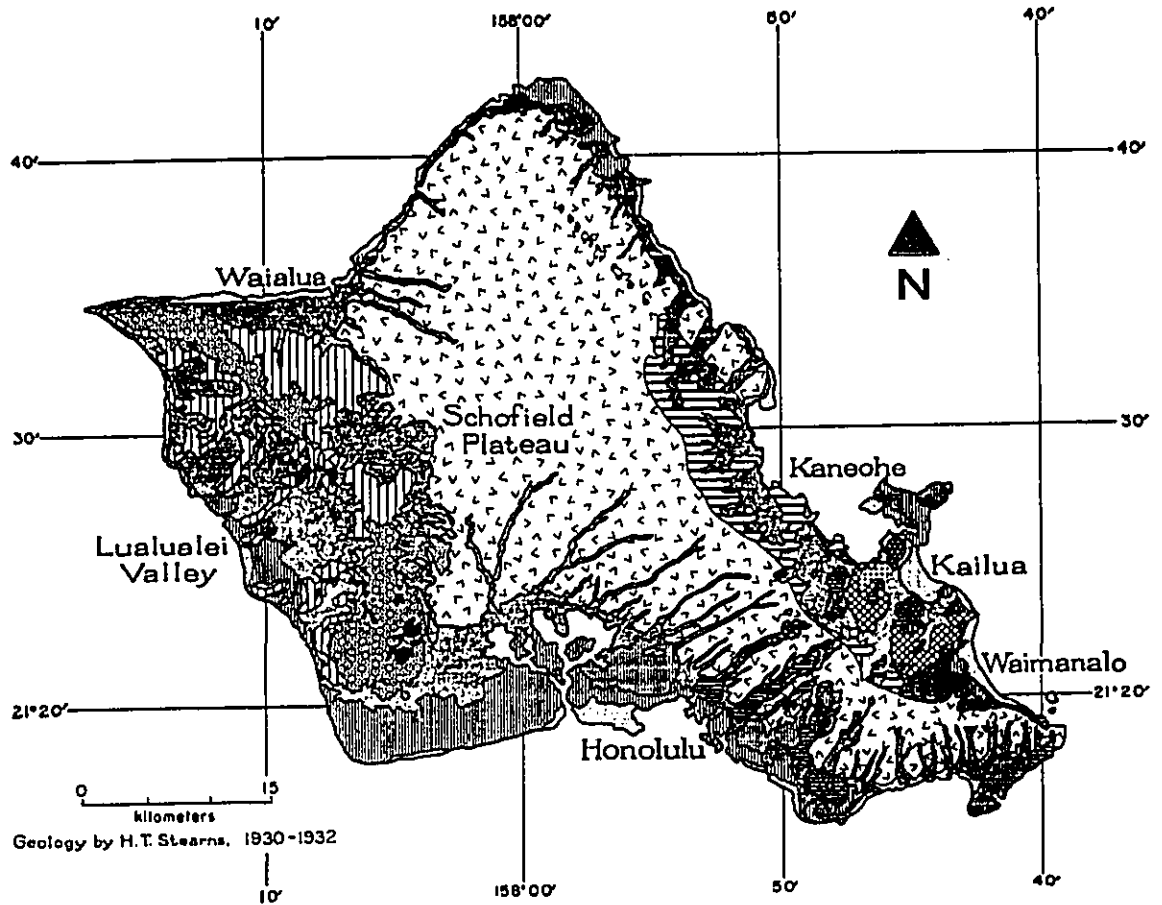
Figure 3-1 Mean Annual Precipitation for Oahu



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Figure 3-2 Geological Features of the Island of Oahu



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a southwardly slope at about 12 percent. The southern boundary of the sites runs parallel to the Honouliuli gulch. The finished grade elevations of the project will be much lower than the existing grade. Figure 3-3 presents the general slope of the terrain in the area as delineated by U. S. Geological Survey.

3.1.4 Soils

The soils that have developed in the area are reddish in color and consist of clay and silty clay loams. The general soil map of Oahu, depicted in Figure 3-4, shows that soils found on and in the vicinity of the proposed site belong to either the Helemano-Wahiawa Association or the Lualualei-Fill Land-Ewa Association.

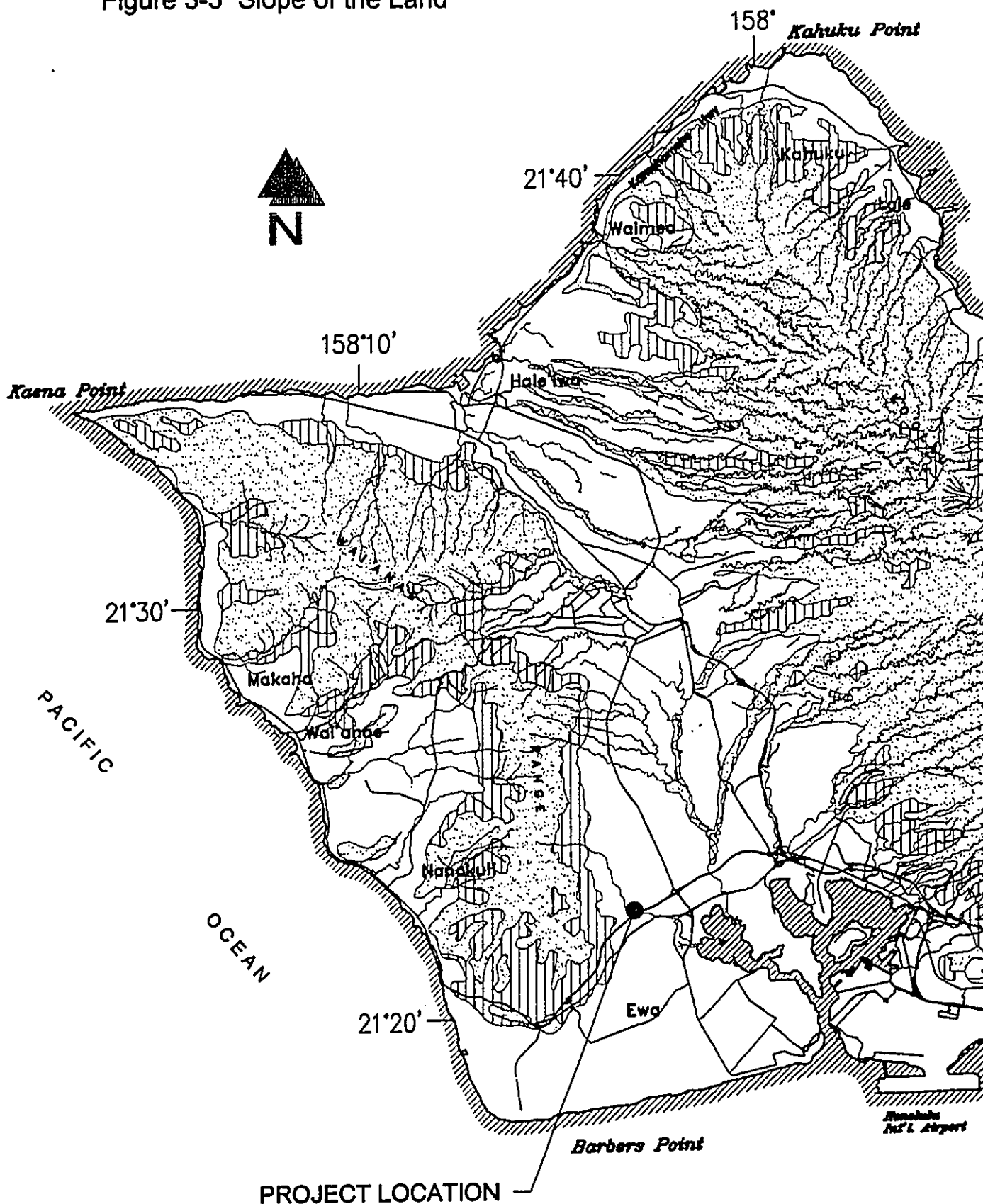
According to the United States Department of Agriculture National Resources Conservation Service (NRCS), six broad classes of soil types are found within the proposed project site. They include Kawaihapai Clay Loam (KIA), Kawaihapai Clay Loam (KIB), Molokai Silty Clay Loam (MuB), Molokai Silty Clay Loam (MuC), Molokai Silty Clay Loam (MuD) and Rock Land (rRK). Figure 3-5 shows the general soil survey at the reservoir site.

The Kawaihapai Clay Loam (KIA) type soil occurs at the southwest corner of the proposed site. Typical slopes for Kawaihapai Clay Loam (KIA) range from 0 to 2 percent. This is a poorly drained soil that occupies smooth slopes. The surface layer is dark brown clay loam. The subsoil is dark brown stratified sandy loam. The substratum is stony and gravelly. The soil is neutral in general. Runoff is slow and the erosion hazard is no more than slight.

The Kawaihapai Clay Loam (KIB) type soil occurs at the south edge of the proposed site. Typical slopes for Kawaihapai Clay Loam (KIB) range from 2 to 6 percent. This is also a poorly drained soil that occupies smooth slopes. The surface, subsoil and substratum are identical to the KIA soil type. The depth to coral limestone is 20 to 50 inches. The soil is also neutral in general. Runoff is slow and the erosion hazard is slight.

The Molokai Silty Clay Loam (MuB) type soil occurs on the north side of the proposed site. Typical slopes for Molokai Silty Clay Loam (MuB) range from 3 to 7 percent. This is a well drained soil on uplands on the islands of Maui, Lanai, Molokai and Oahu. The surface layer is a dark reddish-brown silty clay loam. The subsoil is dark reddish-brown silty clay loam that has a prismatic structure. The substratum is soft, weathered rock. The soil is slightly acid to neutral. Runoff is slow to medium and the erosion hazard is

Figure 3-3 Slope of the Land






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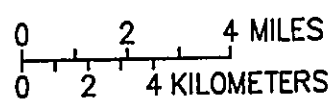
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Maui Point

PACIFIC

LEGEND

-  Less than 10% Slope
-  10% to 20% Slope
-  Greater than 20% Slope



157°50'

Mokapu Point

OCEAN

Waimanalo

Makapu'u Point

Honolulu

Honolulu Int'l Airport

Waikiki

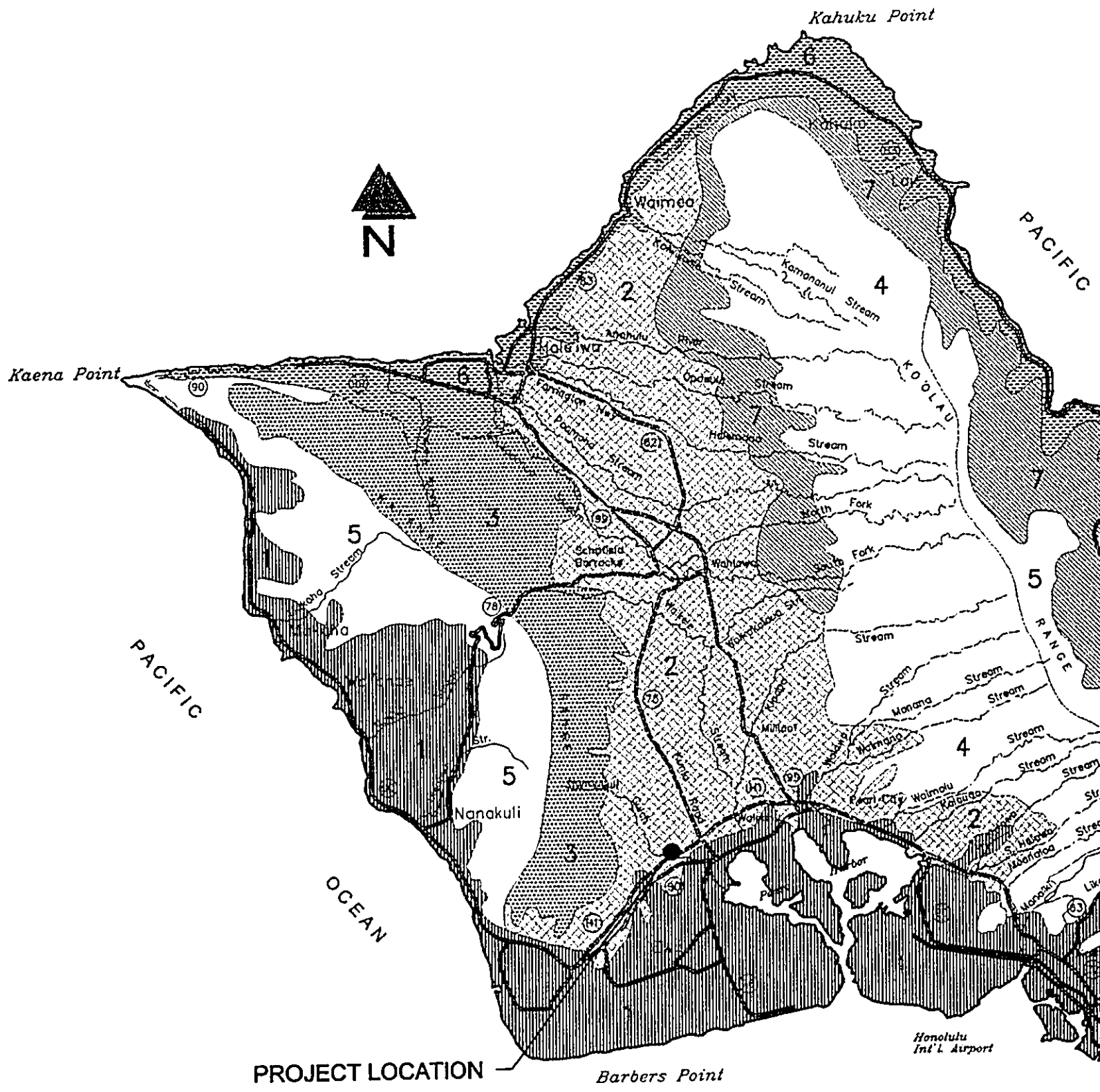
Maunaloa Bay

157°40'

Diamond Head

Koko Head

Figure 3-4 General Soil Map of Oahu



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SOIL ASSOCIATIONS



Lualualei-Fill land-Ewa association: Deep, nearly level to moderately sloping, well-drained soils that have a fine textured or moderately fine textured subsoil or underlying material, and areas of fill land; on coastal plains



Helemano-Wahiawa association: Deep, nearly level to moderately sloping, well-drained soils that have a fine textured subsoil; on uplands



Tropohumults-Dystrandeps association: Gently sloping to very steep, well-drained soils that are underlain by soft weathered rock, volcanic ash, or colluvium; on narrow ridges and side slopes



Rough mountainous land-Kopaa association: Very steep land broken by numerous drainageways and deep, well-drained soils that have a fine textured or moderately fine textured subsoil; in gulches and on narrow ridges



Rock land-Stony steep land association: Steep to precipitous, well-drained to excessively drained, rocky and stony land



Kaena-Waiialua association: Deep, mainly nearly level and gently sloping, poorly drained to excessively drained soils that have a fine-textured to coarse-textured subsoil or underlying material; on coastal plains and talus slopes and in drainageways



Lolekaa-Waikane association: Deep, nearly level to very steep, well-drained soils that have a dominantly fine-textured subsoil; on fans, terraces, and uplands

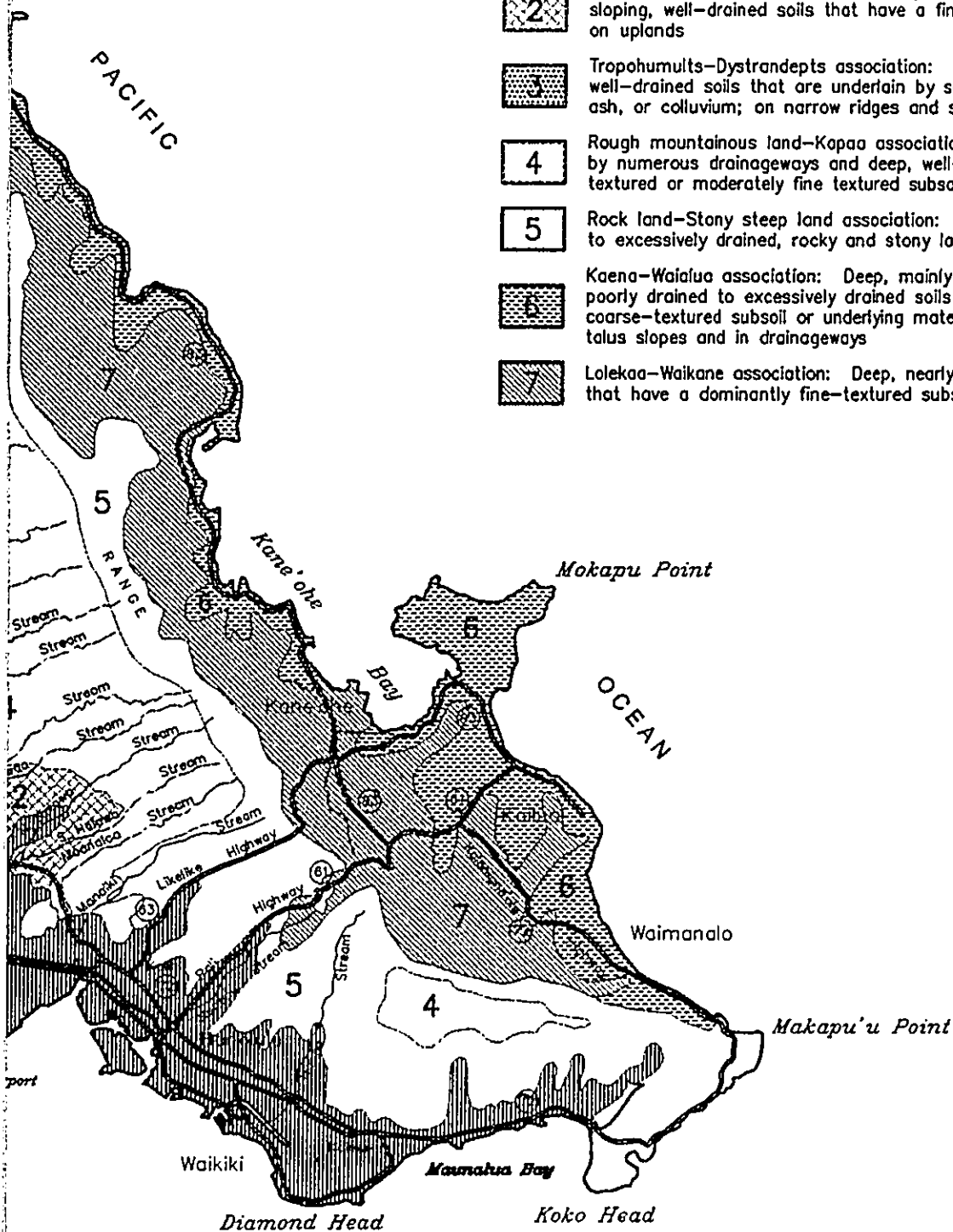
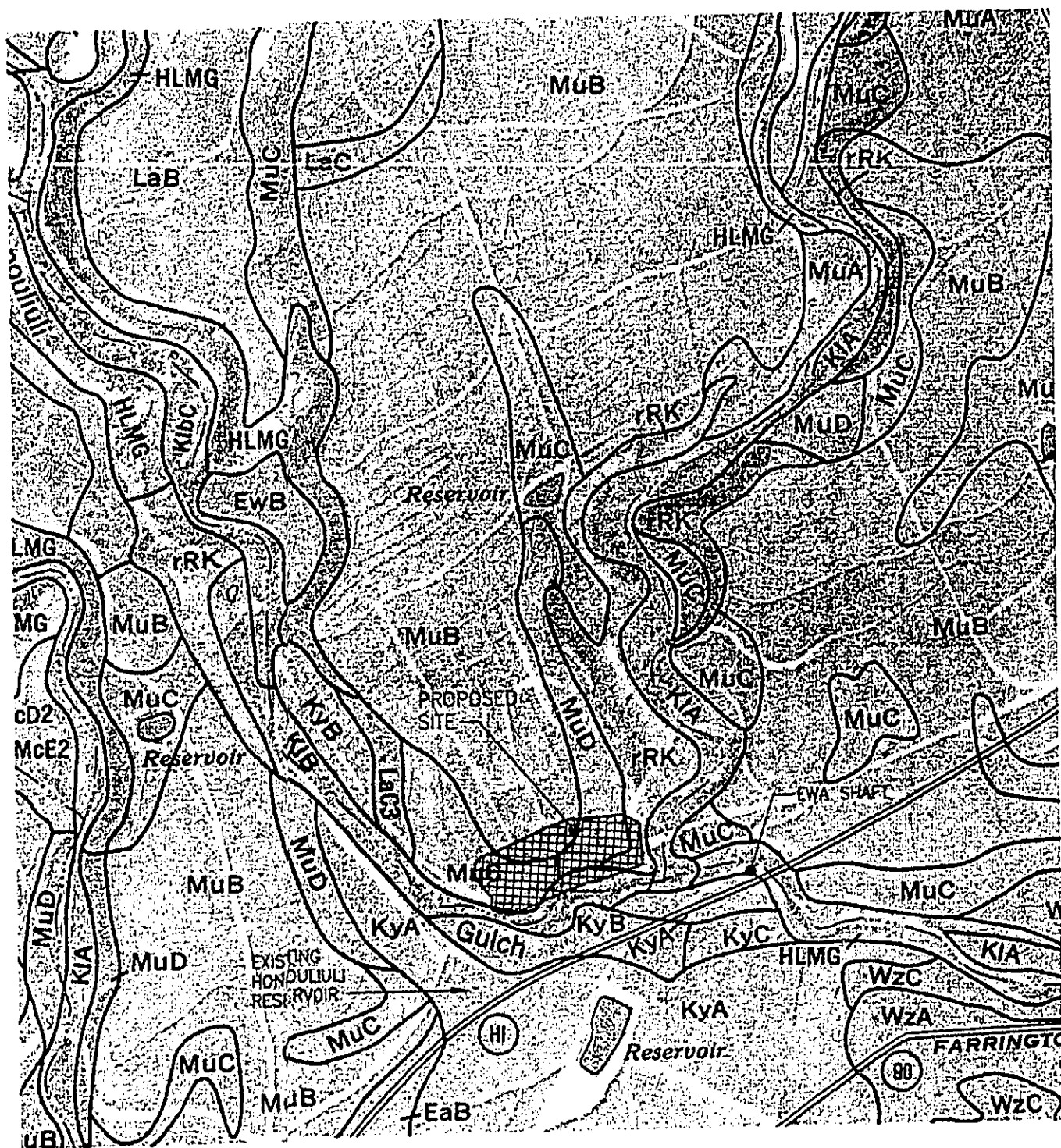


Figure 3-5 Soil Survey



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slight to moderate.

The Molokai Silty Clay Loam (MuC) type soil occurs on the west side of the proposed site. Typical slopes for Molokai Silty Clay Loam (MuC) range from 7 to 15 percent. This is also a well drained soil on uplands on the islands of Maui, Lanai, Molokai and Oahu. This soil occurs on knolls and sharp slope breaks. The surface layer, subsoil and substratum are similar to the MuB soil type. The soil is also slightly acid to neutral. Runoff is medium and the erosion hazard is moderate.

The Molokai Silty Clay Loam (MuD) type soil occurs on the northeast corner of the proposed site. Typical slopes for Molokai Silty Clay Loam (MuD) range from 15 to 25 percent. This soil occurs on Oahu. The surface layer, subsoil and substratum are similar to the MuB and MuC soil types. The soil is also slightly acid to neutral. Runoff is medium and the erosion hazard is severe.

The Rock Land (rRK) soil type is found on the southeast corner of the proposed site. Rock Land (rRK) is made up of areas where exposed rock covers 25 to 90 percent of the surface. Rock outcrops and very shallow soils are the main characteristics. The rock outcrops are mainly basalt and andesite. This land type is nearly level to very steep.

3.1.5 Flood and Tsunami Hazard

The lowest ground elevation in the project area is approximately 200 feet above MSL at the southeast corner of the proposed reservoir site. According to tsunami inundation maps, the proposed reservoir site is far from designated inundation areas. Honouliuli Gulch is the closest natural drainage pathway to the proposed reservoir site. Presently, no records are available for flooding history in the area. Furthermore, FEMA has not conducted any flood studies for the area in the vicinity of the proposed reservoir site. Flood plain studies for the Honouliuli Gulch conducted to date have a mauka limit of as far south as Farrington Highway while the study for the Kaloi Gulch went only slightly upstream of Waimanalo Road (approximately 2 miles makai of the H-1 Freeway). A recent study by Marc M. Siah & Associates, showed that the 100-year flood levels for Honouliuli Gulch in the vicinity of its crossing of the H-1 Freeway, may reach elevations as high as 84 feet. The proposed reservoir site with minimum elevations of 200 feet is outside of the potential flood hazard zone.

3.1.6 Flora and Fauna

A botanical survey of the area under investigation was conducted by the Botanical Consultants, details of which are presented in Appendix C. The site has no outstanding vegetative features and no proposed or listed, threatened or endangered species were found during the field survey. The most predominant vegetation at the site consists mostly of weedy plants that can be found on the leeward side of most Hawaiian islands. Destruction of this vegetation will not seriously impact on the vegetation in the area. The survey report further concludes that the proposed reservoir site is free of any significant and/or endangered species as set forth in the Endangered Species Act of 1973, and none were found during the survey.

The tracks of a single small pig were identified at the site, although no pig was seen by the surveyor. Very few birds were seen as well, since (1) the recent plowing had destroyed any mature, seed bearing weed crops upon which many of the seed eating birds depend and (2) open water sources no longer exist at the site. The most abundant bird found was the Zebra Dove (*Geopelia striata*). A single pair of House Sparrows or Feathered Mice (*Passer domesticus*) were seen as well as a single Lesser Golden Plover (*Pluvialis dominica*).

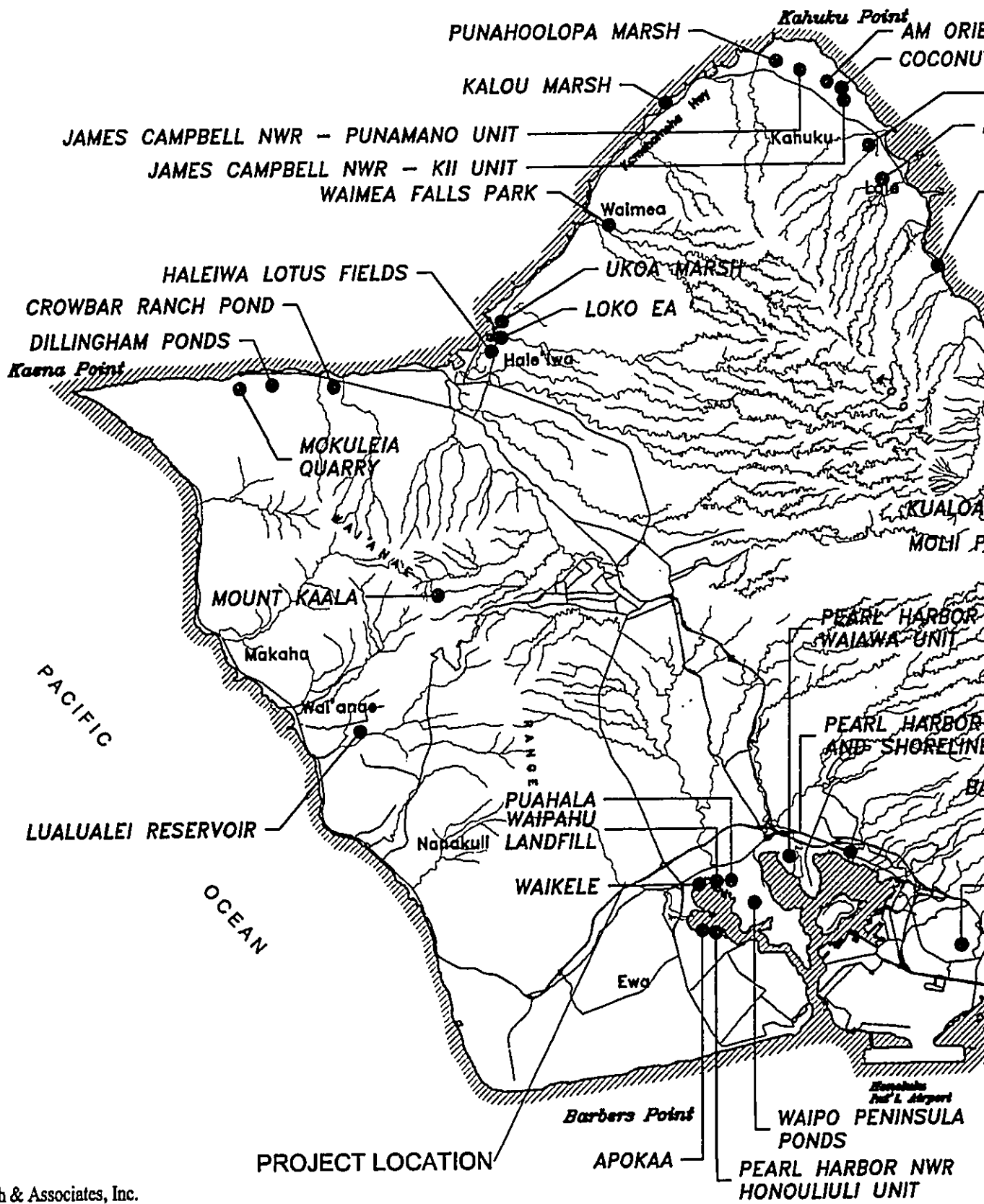
3.1.7 Historic/Archaeological Features

In response to an inquiry regarding the presence of archaeological and/or cultural resources at the proposed site, the State of Hawaii Department of Land and Natural Resources, Historic Preservation Division reported that no known historic sites are in the area of the proposed reservoir site, nor is it likely that any will be found. It was noted that the sugar cane industry had cultivated the land to depths greater than historic sites are commonly found. A copy of the letter regarding this information is found in Appendix D.

3.1.8 Wetlands

The Office of State Planning's Wetlands and Waterbird Recovery Habit map shows no wetlands in the project area as presented in Figure 3-6. The only wetland and/or sensitive riparian habitats near the proposed reservoir site is within the Honouliuli Gulch. U.S. Fish and Wildlife Service's National Wetland Inventory Map identifies the Honouliuli Gulch as an R4SBC habitat or *Riverinr, Intermittent, Stream Bed, Seasonal*. Figure 3-7 details this wetland designation and Table 3-1 provides a map legend. The proposed project does not impact the existing wetland ecosystem.

Figure 3-6 Wetlands and Waterbird Recovery Habit Map



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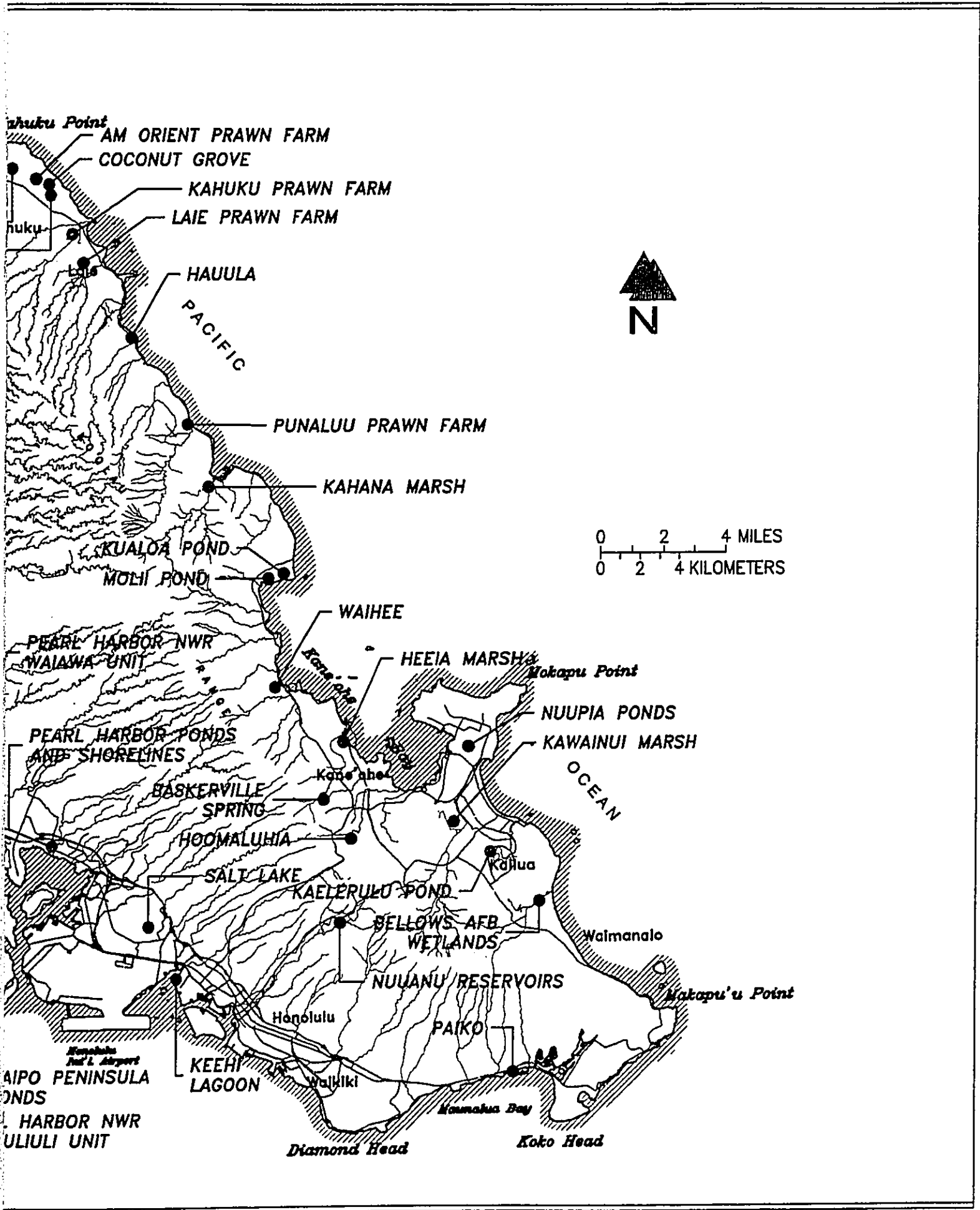
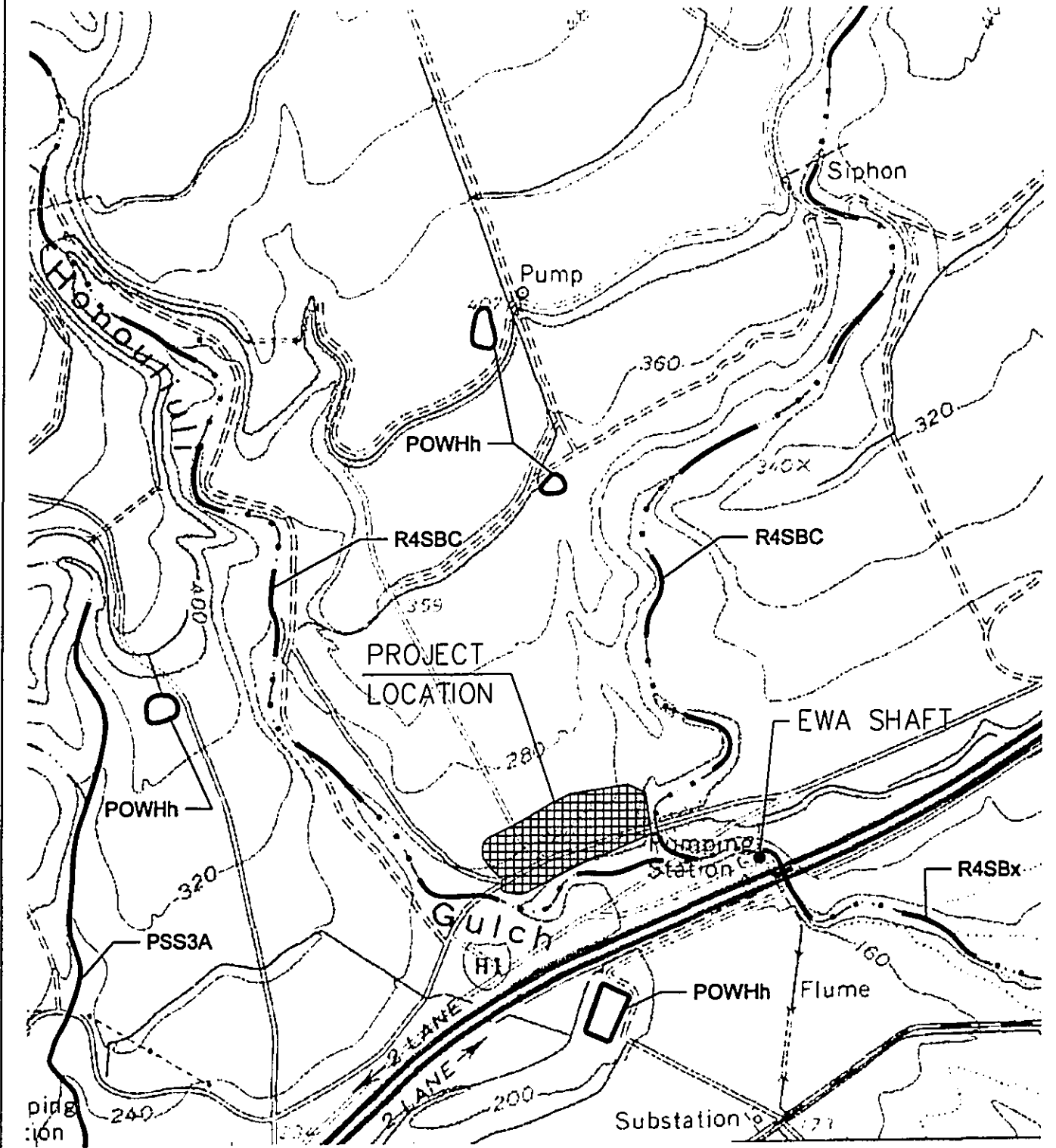


Figure 3-7 National Wetlands Inventory Map

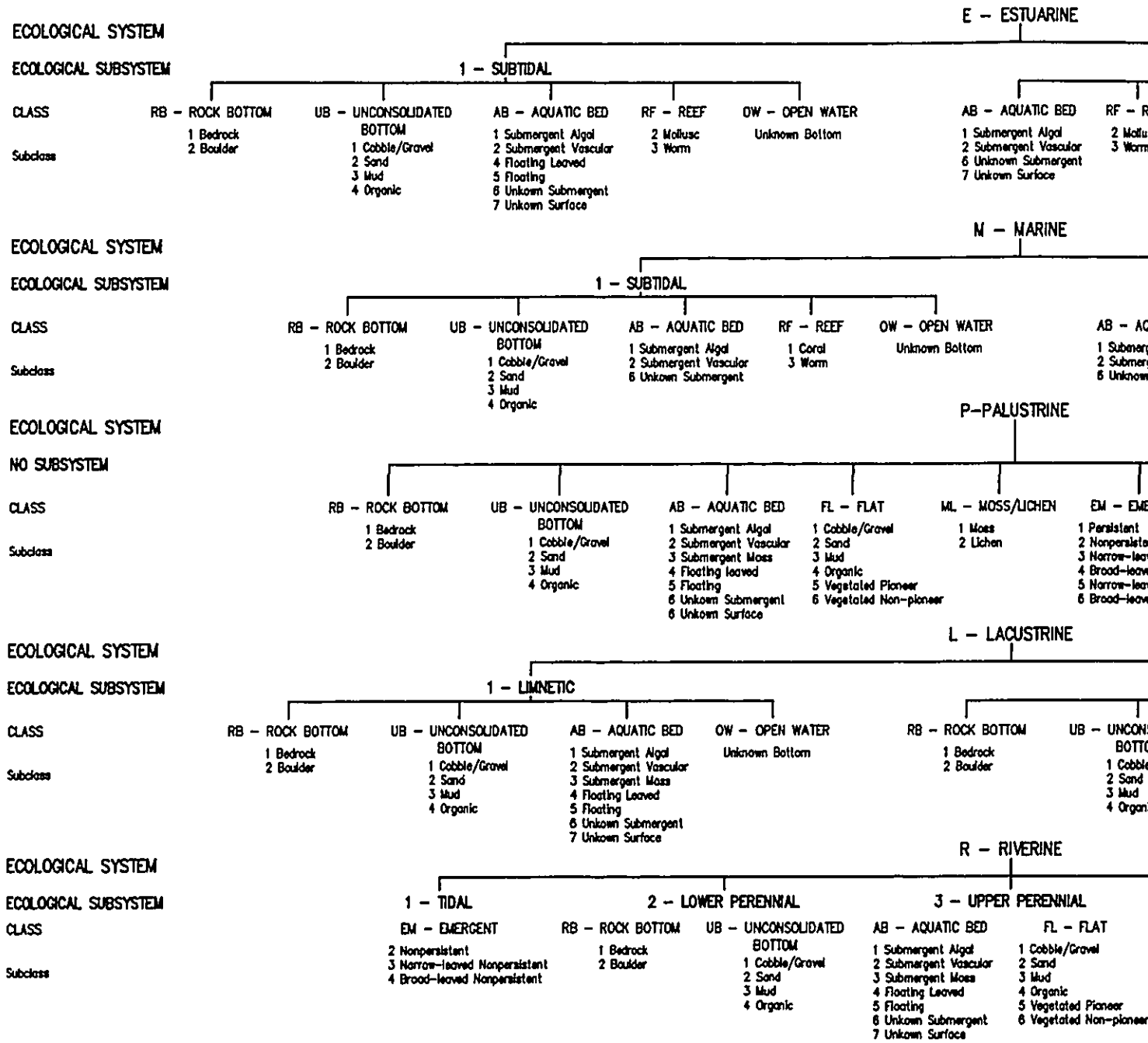


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Table 3-1 National Wetlands Inventory Map Legend



In order to more adequately describe
may be applied at the class

WATER REGIMEN			
Non-Tidal		Tidal	
A Temporary	H Permanent	K Artificial	R Seasonal
B Saturated	J Intermittently Flooded	L Subtidal	S Temporary
C Seasonal	K Artificial	M Irregularly Exposed	T Semipermanent
D Seasonal Well-drained	Z Intermittently Exposed/Permanent	N Regular	V Permanent
E Seasonal Saturated	W Intermittently Flooded/Temporary	P Irregular	U Unknown
F Semipermanent	Y Saturated/Semipermanent/Seasonal		
G Intermittently Exposed	U Unknown		

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TUARINE

2 - INTERTIDAL

AQUATIC BED	RF - REEF	FL - FLAT	SB - STREAM BED	RS - ROCKY SHORE	BB - BEACH/BAR	EM - EMERGENT	SS - SCRUB/SHRUB	FO - FORESTED
1 Submergent Algal	2 Mollusc	1 Cobble/Gravel	1 Cobble/Gravel	1 Bedrock	1 Cobble/Gravel	1 Persistent	1 Broad-leaved Deciduous	1 Broad-leaved Deciduous
2 Submergent Vascular	3 Worm	2 Sand	2 Sand	2 Boulder	2 Sand	2 Nonpersistent	3 Broad-leaved Evergreen	3 Broad-leaved Evergreen
3 Submergent Surface		3 Mud	3 Mud	6 Vegetated Non-pioneer		3 Narrow-leaved Nonpersistent	4 Needle-leaved Evergreen	4 Needle-leaved Evergreen
		4 Organic	4 Organic			4 Broad-leaved Nonpersistent	5 Dead	5 Dead
		5 Vegetated Pioneer				5 Narrow-leaved Persistent	6 Deciduous	6 Deciduous
		6 Vegetated Non-pioneer				6 Broad-leaved Persistent	7 Evergreen	7 Evergreen

MARINE

2 - INTERTIDAL

AB - AQUATIC BED	RF - REEF	FL - FLAT	RS - ROCKY SHORE	BB - BEACH/BAR
1 Submergent Algal	1 Coral	1 Cobble/Gravel	1 Bedrock	1 Cobble/Gravel
2 Submergent Vascular	3 Worm	2 Sand	2 Boulder	2 Sand
6 Unknown Submergent		3 Mud	6 Vegetated Non-pioneer	
		6 Vegetated Non-pioneer		

ESTUARINE

EM - EMERGENT	SS - SCRUB/SHRUB	FO - FORESTED	OW - OPEN WATER
1 Persistent	1 Broad-leaved Deciduous	1 Broad-leaved Deciduous	Unknown Bottom
2 Nonpersistent	3 Broad-leaved Evergreen	3 Broad-leaved Evergreen	
3 Narrow-leaved Nonpersistent	4 Needle-leaved Evergreen	4 Needle-leaved Evergreen	
4 Broad-leaved Nonpersistent	5 Dead	5 Dead	
5 Narrow-leaved Persistent	6 Deciduous	6 Deciduous	
6 Broad-leaved Persistent	7 Evergreen	7 Evergreen	

ESTUARINE

2 - LITTORAL

UB - UNCONSOLIDATED BOTTOM	AB - AQUATIC BED	FL - FLAT	RS - ROCKY SHORE	BB - BEACH/BAR	EM - EMERGENT	OW - OPEN WATER
1 Cobble/Gravel	1 Submergent Algal	1 Cobble/Gravel	1 Bedrock	1 Cobble/Gravel	2 Nonpersistent	Unknown Bottom
2 Sand	2 Submergent Vascular	2 Sand	2 Boulder	2 Sand	3 Narrow-leaved Nonpersistent	
3 Mud	3 Submergent Moss	3 Mud			4 Broad-leaved Nonpersistent	
4 Organic	4 Floating Leaved	4 Organic				
	5 Floating	5 Vegetated Pioneer				
	6 Unknown Submergent	6 Vegetated Non-pioneer				
	7 Unknown Surface					

ESTUARINE

PERENNIAL	4 - INTERMITTENT	5 - UNKNOWN PERENNIAL
FL - FLAT	SB - STREAM BED	RS - ROCKY SHORE
1 Cobble/Gravel	1 Cobble/Gravel	1 Bedrock
2 Sand	2 Sand	2 Boulder
3 Mud	3 Mud	
4 Organic	4 Organic	
5 Vegetated Pioneer		
6 Vegetated Non-pioneer		
		BB - BEACH/BAR
		1 Cobble/Gravel
		2 Sand
		OW - OPEN WATER
		Unknown Bottom

MODIFYING TERMS

more adequately describe wetland and aquatic habitats one or more of the water regimen, water chemistry, soil or special modifiers be applied at the class or lower level in the hierarchy. The formed modifier may also be applied to the ecological system.

	WATER CHEMISTRY			SOIL	SPECIAL MODIFIERS
Tidal	Coastal Salinity	Inland Salinity	pH Modifiers for all Fresh Water	g Organic n Mineral	b Beaver d Partially Drained/Ditch f Formed h Diked/Impounded r Artificial s Spoil x Excavated
Artificial	1 Hyperhaline	7 Hyperhaline	a Acid		
Subtidal	2 Euhaline	8 Eusaline	t Circumneutral		
Regularly Exposed	3 Mixohaline (Brackish)	9 Mixosaline	l Alkaline		
Regular	4 Polyhaline	0 Fresh			
Irregular	5 Mesohaline				
	6 Oligohaline				
	0 Fresh				

3.1.9 Air Quality

The Ewa Plains area is considered an open agricultural area which is not exposed to adverse air quality conditions. There are no point sources of airborne emissions in the immediate vicinity of the project site. The vehicular traffic on the H-1 Freeway and Farrington Highway is the primary source of indirect emissions in the project area. The air quality along the project alignment is generally considered good and well within the State and Federal Ambient Air Quality Standards.

3.1.10 Noise Characteristics

Since the proposed reservoir site is in an open, agricultural area, there are no significant fixed noise generators in the vicinity of the project. Background noise in the area can be attributed to vehicular traffic and agricultural farming equipment. The ambient noise level in the project area is in the range of 25 to 30 decibels (dB) and is considered *normal and acceptable*.

3.1.11 Water Quality

The proposed reservoir site is approximately four miles from the ocean. The only other waterway near the site is Honouliuli Gulch Stream, which is seasonal and intermittent. Water flowing through the gulch drains into Pearl Harbor's West Loch. According to the State Department of Health (DOH), the Honouliuli Gulch Stream has a Class A water quality classification and is designated as Class 2 inland water. Class A waters are suggested for protection for recreational and aesthetic enjoyment. According to DOH guidelines regarding Class A waters, "any other use shall be permitted as long as it is compatible with the protection and propagation of fish, shellfish and wildlife and with recreation in and on these waters".

3.2 Community Setting

3.2.1 Land Use And Ownership

Historically, the Ewa Plains have been the primary location for the island's agricultural resources. Specifically, the site for the proposed reservoir is located within the central portion of the Ewa Plains, which has been cultivated by Oahu Sugar Co., Ltd. for the better part of the 20th century. Because of the relatively high sugar cane yields and low farming costs, the central portion of the Ewa Plains was referred to as the "golden triangle." Oahu Sugar Co., Ltd. did, however, cease operations in 1995, freeing up 10,500 acres on Oahu for other land uses. The 14.3 acre portion of land, which is

identified by Tax Map Key (TMK): 9-2-01-1, is presently owned by the Estate of James Campbell.

3.2.2 Population

The population density throughout the Honouliuli area is lower than the average density for Oahu. The area is primarily home to agricultural businesses. The nearest areas with concentrated populations are Makakilo and Waipahu. Makakilo is located 2.5 miles to the west of the site with an estimated population of 10,000. Waipahu is approximately 1.3 miles to the east of the site with an estimated population of 31,000.

3.2.3 Economy

The economy of the Ewa Plains area is mainly agriculturally oriented. The immediate vicinity of the proposed reservoir site had been cultivated by the Oahu Sugar Co., Ltd. until 1995. The general vicinity of the proposed reservoir site is currently used by independent farmers for growing vegetables and diversified agriculture.

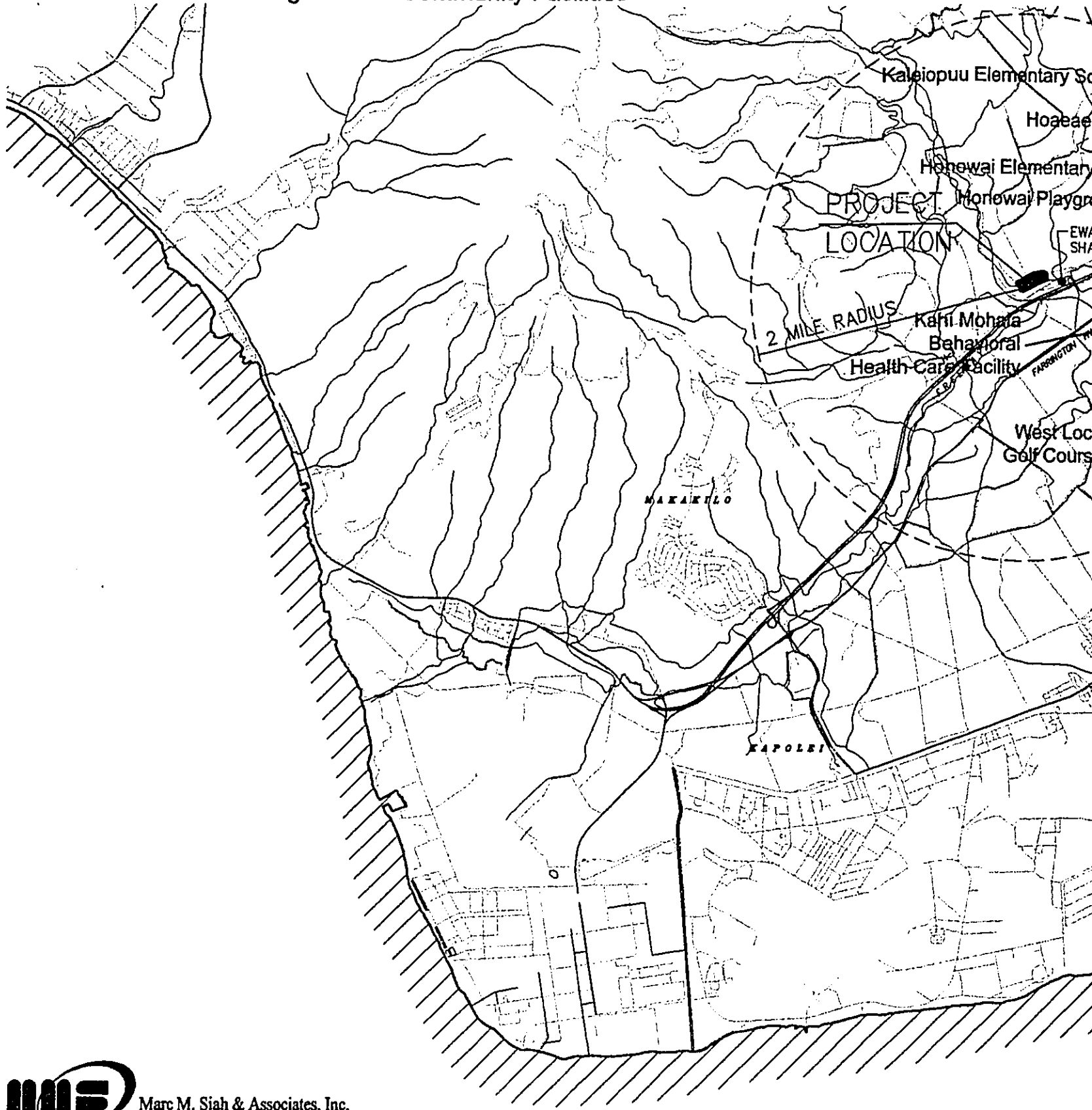
3.2.4 Police and Fire Protection

Because the project site is not in a residential area, there are no police or fire stations in the immediate vicinity. The nearest police stations are in Waipahu and Kapolei. Fire protection for the area is supplied by stations located in Waipahu and Makakilo. Figure 3-8 shows the locations of these emergency services.

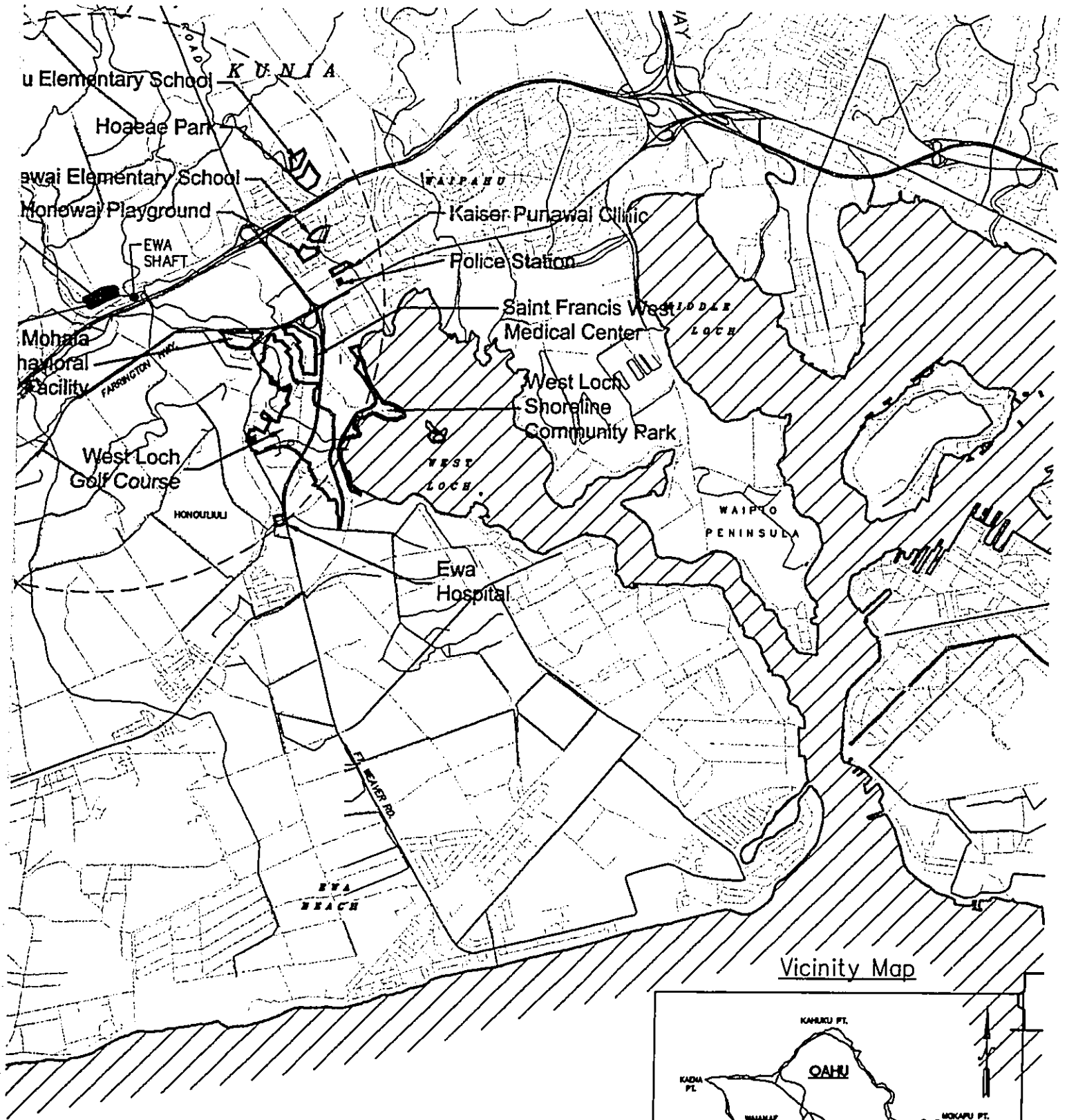
3.2.5 Medical Facilities

There are many medical facilities throughout the City and County of Honolulu. Health care on Oahu is provided by various general hospitals. Health care facilities for in-patient medical care include 29 hospitals of various types, including acute and long term facilities, 16 skilled nursing facilities and intermediate care facilities, and 261 care homes. Eight acute hospitals are operated directly by the state government and one by the federal government; 12 are nonprofit community hospitals. There are 7,651 beds available for general, acute, and other care services. Most other medical institutions - skilled nursing facilities, intermediate care facilities, and care homes are privately owned. The only major medical facility in the general vicinity of the proposed reservoir site is the Saint Francis West Medical Center, located 2 miles southeast of the project between Waipahu and Ewa. Other facilities in the area include Kahi Mohala Behavioral Healthcare Facility near the Saint Francis West Medical Center, the Ewa Hospital located in Ewa and the Kaiser Punawai Clinic in Waipahu.

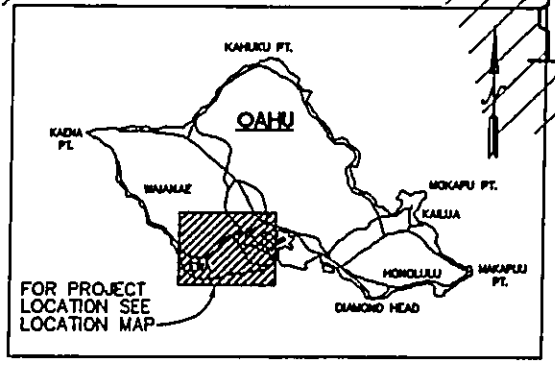
Figure 3-8 Community Facilities



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Vicinity Map



3.2.6 Recreational Facilities

The nearest recreational facilities to the proposed project site are primarily located within the adjacent residential areas. There are 11 parks within the west Waipahu, Makakilo, Kapolei and Ewa areas. Specifically, these parks are the Mauka Lani Community Park, Mauka Lani Neighborhood Park, Makakilo Park, Kapolei Regional Park, Ewa Mahiko Park, West Loch Shoreline Community Park, Honowai Playground, Hooeae Community Park, Pupuloe Street Mini Park, Waipahu Cultural Park and Waipahu Uka Park.

The Ewa Plains area is also home to many golf courses. The eight nearest golf courses to the proposed reservoir site are the Kapolei, Hawaii Prince, Coral Creek, Ewa Villages, Ewa Beach International, West Loch, Waikele and the Hawaii Country Club. The nearest golf course, West Loch, is two miles from the project site. Figure 3-8 indicates the locations of nearby recreational facilities.

3.2.7 Schools

There are numerous schools in the communities adjacent to the project area. The schools nearest to the proposed reservoir site are Makakilo Elementary, Kapolei Elementary, Lanakila Baptist and Honowai Elementary. The nearest school, Honowai Elementary, is approximately 1.25 miles from the project site. Refer to Figure 3-8 for the locations of these schools.

3.2.8 Refuse Collection and Disposal

Solid waste collection is provided by the City and County of Honolulu on a twice weekly basis. Refuse from this area is collected and transported to the H-Power plant for final disposal.

3.2.9 Public Transportation

Bus service is the main public transportation system within the City and County of Honolulu. Regular daily bus schedules adequately provide transportation services to residents in the Ewa area. Ten different bus routes pass in the vicinity of the proposed reservoir site. Handivan and Taxi Cab services are also available in the area upon request.

3.3 Infrastructure

3.3.1 Roadway and Traffic

The site is currently accessed by a dirt road which branches off from the main black-top road which runs parallel to the H-1 Freeway and serves as the access road to the existing Honouliuli Reservoir. Both roads are relatively flat with maximum slopes of less than 10 percent. The alignment of the existing dirt road, which will be used as the access road to the proposed reservoir, does not follow any established easement.

3.3.2 Wastewater System

The project area is not currently serviced by the Ewa sewer system. The existing land is currently used for agriculture and has no permanent on-site structures that produce wastewater.

3.3.3 Electricity/Telephone

An existing Hawaiian Electric Company 46 kV overhead transmission line runs along the existing cane haul road and through the proposed site. Also, at the present time there is no telephone service either available or required at the proposed reservoir site.

3.3.4 Drainage

Honouliuli Gulch is the closest natural drainage pathway to the proposed reservoir site, which is in the Honouliuli watershed. The Honouliuli watershed encompasses approximately 6,900 acres of agricultural land, mostly located mauka of the H-1 Freeway and west of Kunia Road. The Honouliuli watershed has two natural drainage pathways which direct and collect surface runoff to the watershed's outlet. The Honouliuli Gulch drains the western half of the watershed, whereas the Kunia Gulch collects runoff from the eastern half of the watershed. Stormwater sheet flows from the proposed reservoir site to the Honouliuli Gulch, which in turn flows to Pearl Harbor's west lagoon. The estimated runoff generated on site is 41 cubic feet per second (cfs). This quantity of water is insignificant when compared to the 100-year flood flows in the Honouliuli Gulch which are estimated at 7,000 cfs.

Although no records are available for flooding history in the area, a recent study by Marc M. Siah & Associates, Inc. shows the 100-year flood levels for the Honouliuli Gulch, in the vicinity of its crossing with the H-1 Freeway, to be as high as 84 feet. With minimum

elevations of 200 feet, the proposed reservoir site is considered to be outside of the potential flood hazard zone and stormwater inundation is not anticipated. The relationship of the proposed reservoir to the flood hazard zone will be confirmed during the design phase of the project.

3.4 Water System Infrastructure

This section presents general information about the existing water system infrastructure in the Ewa area including detailed information about the 228' Water System. The proposed Honouliuli 228' Reservoir No. 3 will be integrated into the latter water system.

3.4.1 General Description of Existing Water System in the Ewa Area

The Ewa area, stretching from Waipahu to Ko Olina, is served by five water systems. Each water system is composed of wells, reservoirs, transmission lines, and pumping/booster stations. The five systems together contain 20 operational water wells and 17 storage reservoirs. The majority of these wells are located in the eastern half of the Ewa area, between Honouliuli and Waipahu. A spatial overview of the water system infrastructure in Ewa Plains is depicted in Figure 3-9. A schematic of the facilities, showing various system's components and their relative positions from east to west, is shown in Figure 3-10.

A water system is usually classified by its location and the overflow elevation of its reservoirs. The five water systems in the Ewa area are classified as follows:

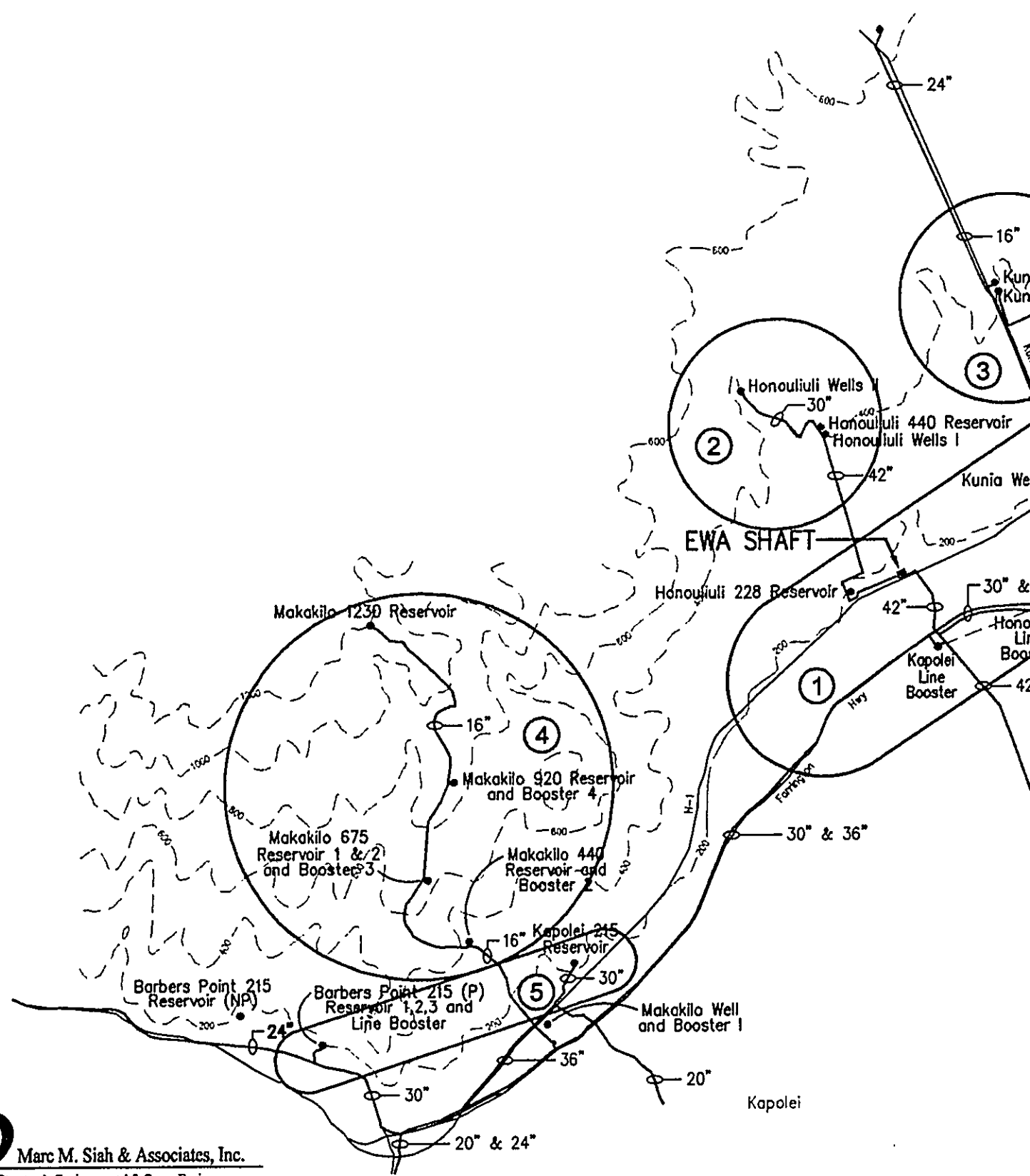
- ▶ 228' System
- ▶ 440' Honouliuli System
- ▶ 440' and 665' Kunia Booster System
- ▶ 215' System
- ▶ 440', 675', 920', and 1230' Makakilo Booster System

Table 3-2 lists the 17 storage reservoirs, grouped according to the above systems, along with their storage capacities.

3.4.2 Description of Existing 228' Water System

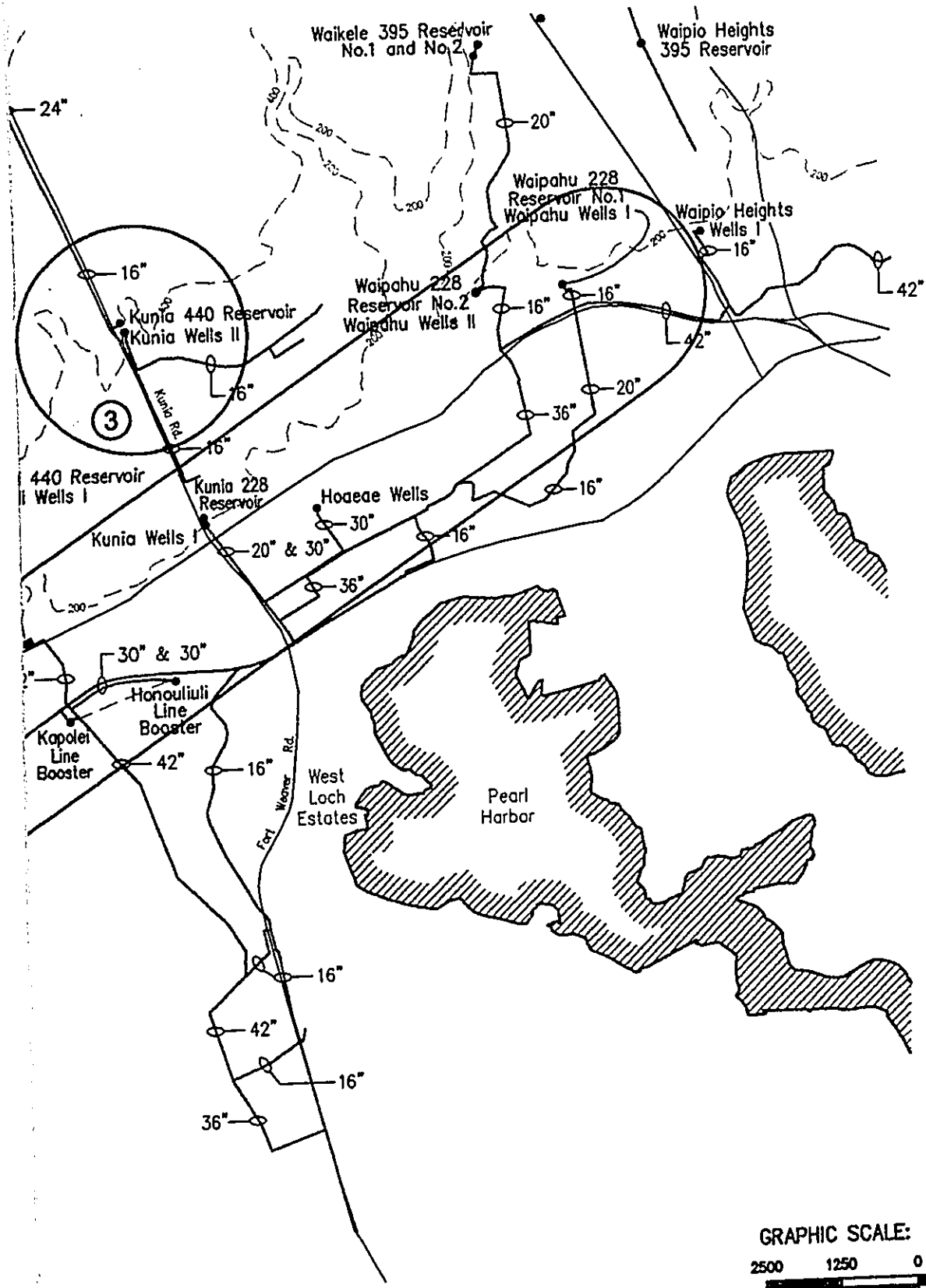
The 228' Water System is one of the five systems mentioned above and named by the overflow elevation of its reservoirs which is 228 feet above Mean Sea Level (MSL). This system extends from Waipahu to the Honouliuli 228' Reservoir and provides water service for Waipahu, West Loch Estates, West Loch Fairways, Honouliuli, Ewa By

Figure 3-9 Existing BWS Potable Water System



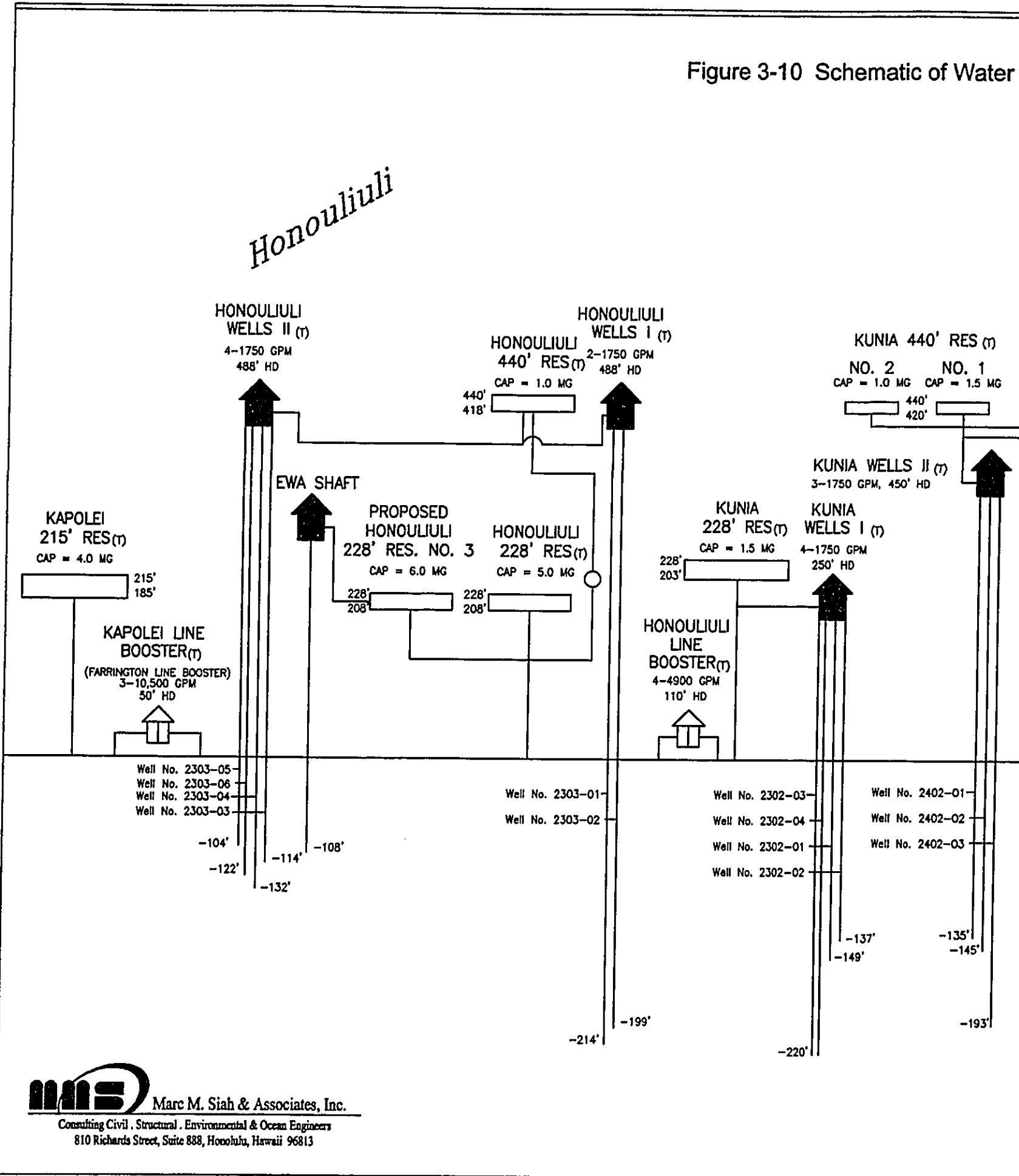
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Water System Facilities in the Ewa Plains



GRAPHIC SCALE:
2500 1250 0 1250 2500 3750 5000
SCALE: 1" = 2500'

Figure 3-10 Schematic of Water

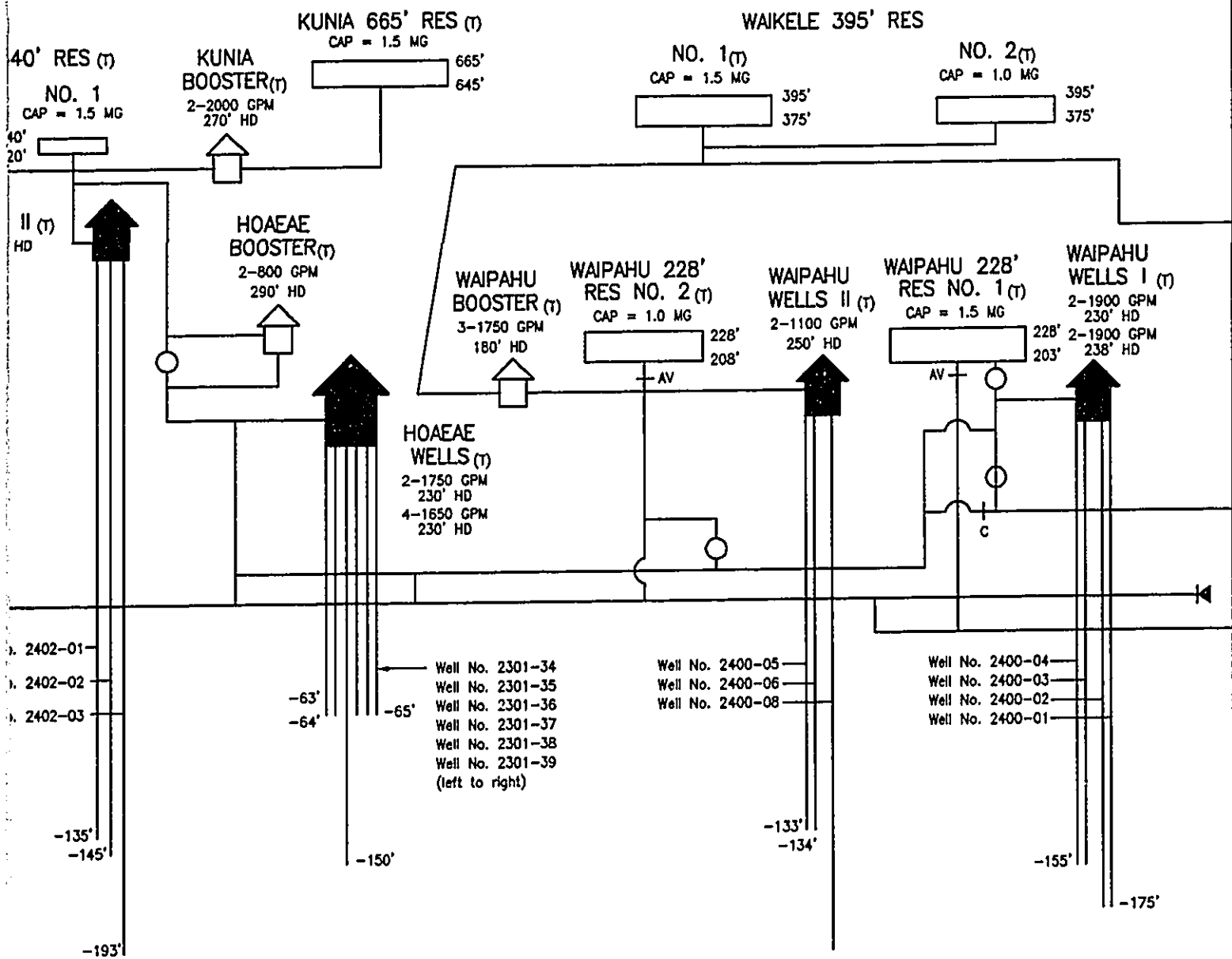


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of Water System Facilities

Hoaeae

Waipahu



SOURCE:
BOARD OF WATER SUPPLY
CITY & COUNTY OF HONOLULU
SCHEMATIC DIAGRAM OF WATER SUPPLY SYSTEM, JUNE 30, 1997

**DESCRIPTION OF THE EXISTING ENVIRONMENT
SECTION THREE**

Table 3-2 List of Reservoirs in the Ewa Water System

WATER SYSTEM	RESERVOIR	CAPACITY MG
228' System:	Waipahu 228' - No. 1	1.5
	Waipahu 228' - No. 2	1.0
	Kunia 228'	1.5
	Honouliuli 228'	5.0
440' System:	Honouliuli 440'	1.0
440' and 665' Kunia Booster System:	Kunia 440 - No. 1	1.5
	Kunia 440 - No. 2	1.0
	Kunia 665'	1.5
215' System:	Barbers' Point 215' - No. 1	4.0
	Barbers' Point 215' - No. 2	5.0
	Barbers' Point 215' - No. 3	3.0
	Kapolei 215'	4.0
440', 675', 920', and 1230' Makakilo Booster System:	Makakilo 440'	1.0
	Makakilo 675' - No. 1	0.5
	Makakilo 675' - No. 2	0.5
	Makakilo 920'	1.5
	Makakilo 1230'	2.0
TOTAL STORAGE CAPACITY:		35.5

Gentry, Ewa Beach, and Puuloa.

The population served by the 228' System is approximately 28,500, and the average daily demand in 1998 was recorded at 9 MGD. The 228' Water System is composed of 114,170 lineal feet of transmission lines, 2 booster pumping stations, 18 wells and 4 reservoirs, a brief description of which is presented in the following paragraphs.

3.4.2.1 Water Sources

A total of 18 wells supply water to the 228' Water System. A list of these wells and their average pumping rates are reported in Table 3-3.

Table 3-3 Wells Serving the 228' Water System

NAME OF WELL	NO. OF WELLS	TOTAL PUMPAGE (MGD)
Waipahu Wells II	2	0.76
Hoaeae Wells	6	9.78
Kunia Wells I	4	4.55
Honouliuli Wells I	2	Out of Service
Honouliuli Wells II	4	6.58

Specific information on the size and depth of each of the 18 operational wells in the 228' System is presented in Table 3-4.

All of these wells are located within the Pearl Harbor Water Management Area (WMA), the largest groundwater body on Oahu. Groundwater pumped from the Pearl Harbor WMA supplies over 50% of Oahu's municipal water demand.

The Pearl Harbor WMA is divided into five aquifers: Waimalu, Waiawa, Waipahu, Ewa, and Kunia as depicted in Figure 3-11. All of the wells listed in Table 3-4, with the exception of the Honouliuli Wells, tap into the Waipahu Aquifer. The Honouliuli Wells tap into the Ewa Aquifer.

These wells provide water to various reservoirs in the system, which in turn supply the water either by gravity or via booster stations through a network of transmission and distribution lines to the service areas. The Honouliuli Wells I are no longer in service while Honouliuli Wells II supplies water to the existing Honouliuli 228' and 440' Reservoirs. The primary source for the proposed 228' reservoirs is planned to be the Ewa Shaft.

3.4.2.2 Storage Reservoirs

There are four reservoirs in the 228' System. They are the Honouliuli 228' Reservoir, Kunia 228' Reservoir, Waipahu 228' Reservoir No.1, and Waipahu 228' Reservoir No.2. The total storage volume of these four reservoirs is 9 MG. Since the Honouliuli Reservoir only provides storage for private developments, namely Ewa by Gentry and Ewa Marina, the available storage capacity in the 228' system is therefore limited to 4 MG. Detailed information about these

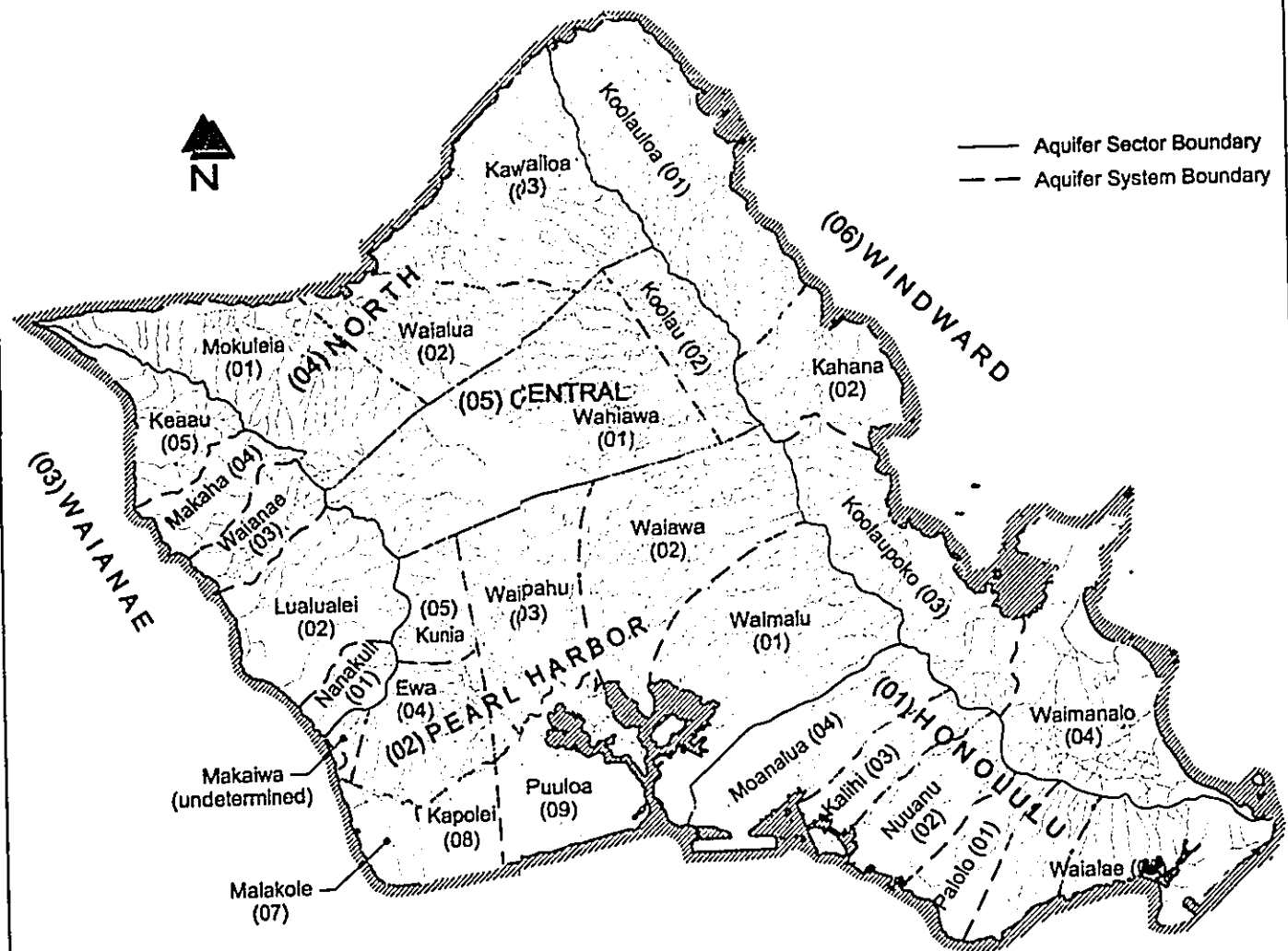
DESCRIPTION OF THE EXISTING ENVIRONMENT
SECTION THREE

Table 3-4 Detailed Information on Wells in the 228' Water System

Well Name	Year Drilled	Casing Diameter (In)	Ground Elevation* (Ft)	Bottom of Solid Casing	Bottom of Perf. Casing	Bottom of Hole (Ft)	Static Head (Ft)
Waipahu II #1	1983	12	207	-32	NA	-133	21
Waipahu II #2	1983	12	207	-32	NA	-135	19.3
Hoaeae P1	1959	16	131	24	-24	-63	17
Hoaeae P2	1959	16	133	20	-22	-64	18.2
Hoaeae P3	1959	16	131	24	-26	-67	19.5
Hoaeae P4	1959	16	130	22	NA	-65	19.3
Hoaeae P5	1974	16	126	-50	NA	-150	NA
Hoaeae P6	1974	16	123	-50	NA	-150	NA
Kunia I P1	1957	16	201	-20	NA	-149	20.8
Kunia I P2	1957	16	201	-20	NA	-137	20.9
Kunia I P3	1972	16	206	-40	NA	-221	NA
Kunia I P4	1972	16	201	-40	NA	-219	NA
Honouliuli I #1	1986	14	412	-138	NA	-213	16
Honouliuli I #2	1987	14	411	-139	NA	-199	16
Honouliuli II #1	1987	14	419	-31	NA	-115	17.04
Honouliuli II #2	1988	14	421	-34	NA	-134	12.2
Honouliuli II #3	1989	14	432	-33	NA	-113	16
Honouliuli II #4	1989	14	432	-23	NA	-103	17.4

* Elevation in feet above Mean Sea Level (MSL)

Figure 3-11 Delineation of Aquifer Sectors and Systems on Oahu



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reservoirs is listed in Table 3-5.

Table 3-5 Reservoirs in the 228' Water System

RESERVOIR NAME	STORAGE CAPACITY (MG)	WATER HEIGHT (FEET)	TANK DIAMETER (FEET)	BOTTOM ELEVATION (FT. above MSL)
Waipahu 228' Res. No.1	1.5	25	101	203
Waipahu 228' Res. No.2	1.0	20	92	208
Kunia 228' Reservoir	1.5	25	101	203
Honouliuli 228' Reservoir	5.0	20	206	208

Each of the reservoirs is fed by wells adjacent to them which have the same location name as the reservoir. The Honouliuli 228' Reservoir can be fed by effluent from the Honouliuli 440' Reservoir as well as by water directly from Honouliuli Wells II or the Honouliuli Line Booster. There are approximately 5,650 linear feet (1.1 miles) of 42-inch Concrete Cylinder (CC) pipe connecting the two existing Honouliuli reservoirs.

3.4.2.3 Transmission Mains and Line Boosters (Distribution)

As discussed in Section 3.4.2, water from the 228' system is used to supply water to consumers within the Ewa district. A relatively extensive network of transmission mains and distribution lines as well as two line boosters, the Honouliuli Line Booster and the Kapolei Line Booster, have been set up for distribution. Water from the wells located in the 228' System is distributed as follows:

- **Waipahu Wells I** supplies water service to Honolulu via a 42-inch CC pipe.
- **Waipahu Wells II** serves the Waipahu area and is boosted by the Waipahu Booster to the 395' system which serves the Waikele and Waipio areas.

**DESCRIPTION OF THE EXISTING ENVIRONMENT
SECTION THREE**

- **Hoaeae Wells** supplies local water service to Waipahu and sends excess water to the Honouliuli Line Booster via a 30-inch CC transmission main.
- **Kunia Wells I** water is blended with water from Hoaeae Wells to provide service locally to Waipahu as well as to Ewa Plains and Waianae.
- **Honouliuli Wells I** has been out of service since 1996.
- **Honouliuli Wells II** supplies local water service (by gravity flow) from Honouliuli to Ewa Beach. Water from these wells is also sent to the Kapolei Line Booster for service to the Waianae area.

The transmission mains within the 228' System consists of the following:

- ▶ Approximately 18,600 linear feet (3.5 miles) of 36-inch CC pipe connecting Waipahu 228' Reservoir No.1 to the Honouliuli Line Booster.
- ▶ Approximately 8,450 linear feet (1.6 miles) of 30-inch CC pipe from the Hoaeae Wells to the Honouliuli Line Booster.
- ▶ Approximately 25,100 linear feet (4.8 miles) of 16-inch pipe along Old Fort Weaver Road for service to Ewa.
- ▶ Approximately 16,400 linear feet (3.1 miles) of 42-inch CC pipe from the Honouliuli 228' Reservoir to Ewa. At a junction just below Farrington Highway this line is connected to the Kapolei Line Booster. Water from the Kapolei Line Booster is sent west to the Waianae area in a 36-inch CC pipe..
- ▶ Approximately 10,250 linear feet (1.9 miles) of 36-inch CC pipe for service to Ewa Beach.
- ▶ Approximately 2,900 linear feet of 30-inch CC pipe from Kapolei Line Booster running along Farrington Highway and continuing westward towards Waianae.

The two Booster Pumping stations in the Honouliuli 228' Water System are the Honouliuli and Kapolei Line Boosters. The former has four pumps with a capacity of 4,900 GPM supplying 110 feet of head, and the latter has three pumps with a capacity of 10,500 GPM supplying 375 feet of head.

3.5 Relationship to Land Use Plans, Policies, And Controls

The following land use plans, policies and controls apply to the project area:

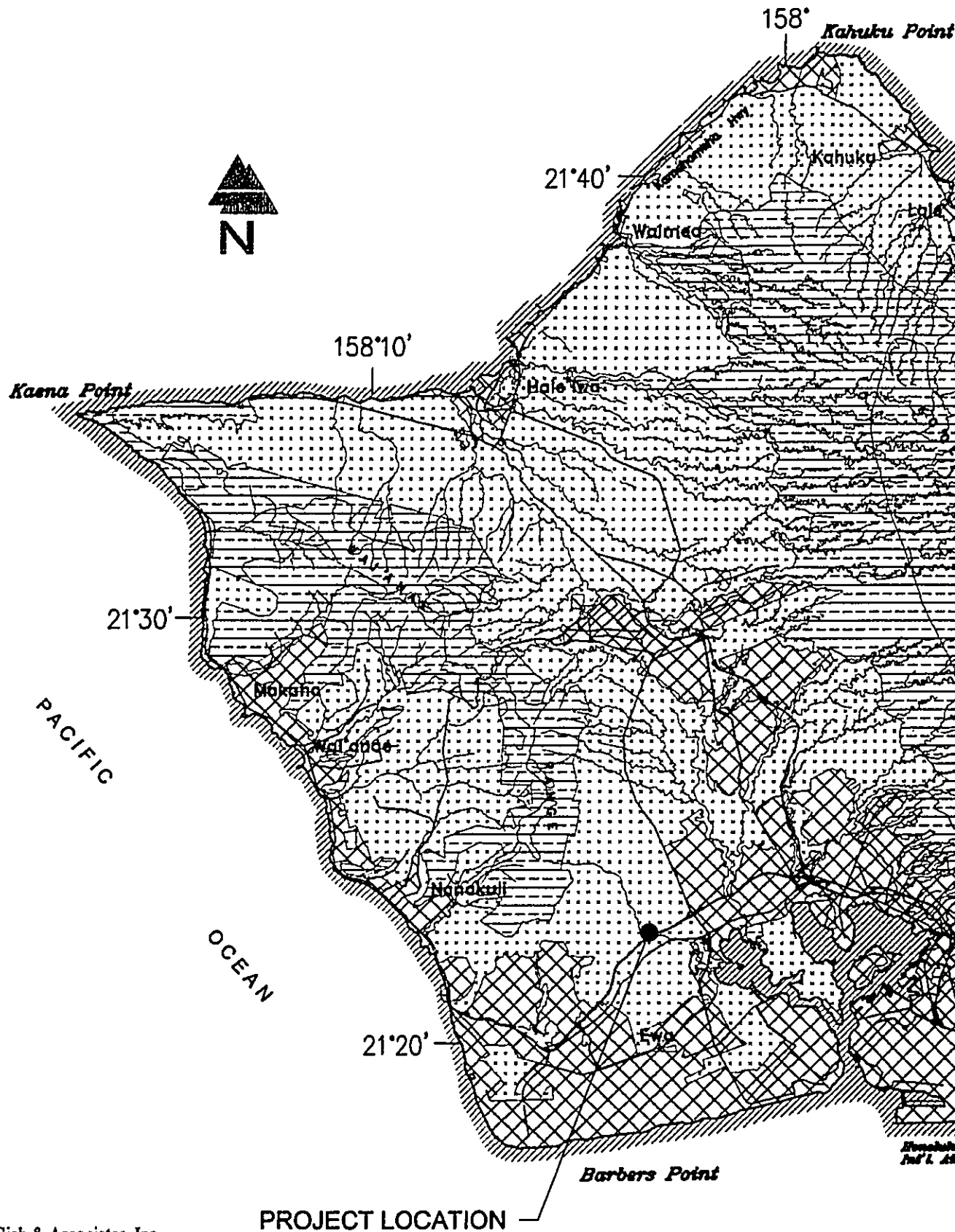
3.5.1 State Land Use Districts

Under the State Land Use Law, Chapter 205, Hawaii Revised Statutes, all lands are classified as either "Urban", "Rural", "Agricultural", or "Conservation". The project area is designated as an "Agricultural District" as shown in Figure 3-12. The proposed reservoir project is allowed within the agricultural district.

3.5.2 Honolulu City and County General Plan

The City and County of Honolulu's general plan is a comprehensive statement of objectives and policies which sets forth the long range development of Oahu and strategies of actions to achieve them. The comprehensive general plan addresses physical, social, economic and environmental concerns affecting the City and County of Honolulu. These objectives contain both statements of desirable conditions to be sought over the long run and statements of desirable conditions which can be achieved in the future. The main objectives of the general plan are: (1) to control the growth of Oahu's resident and visitor populations in order to avoid social, economic and environmental disruptions; (2) to plan for future population growth and to establish a pattern of population distribution that will allow the people of Oahu to live and work in harmony; (3) to promote employment opportunities that will enable all the people of Oahu to attain a decent standard of living; (4) to maintain the viability of Oahu's visitor industry and agriculture; (5) to make full use of the economic resources of the sea and to increase the amount of Federal spending on Oahu; (6) to protect and preserve the natural environment and to preserve the natural monuments and scenic views of Oahu for the benefit of both residents and visitors; (7) to provide decent housing for all the people of Oahu at prices they can afford; (8) to improve the transportation system; (9) to meet the needs of the people of Oahu for an adequate supply of water and for environmentally sound systems of waste disposal; (10) to maintain transportation and utility systems which will help Oahu continue to be a desirable place to live and visit; (11) to coordinate change in the physical environment of Oahu to ensure that all new development is timely, well-designed, and appropriate for the area in which it will be located; (12) to maintain those development characteristics in the urban fringe and rural areas which make them desirable places to live and to maintain attractive, meaningful and stimulating environments throughout Oahu; (13) to promote and enhance the social and physical character of Oahu's old towns and neighborhoods; and (14) to protect the

Figure 3-12 Land Use District Map of Oahu



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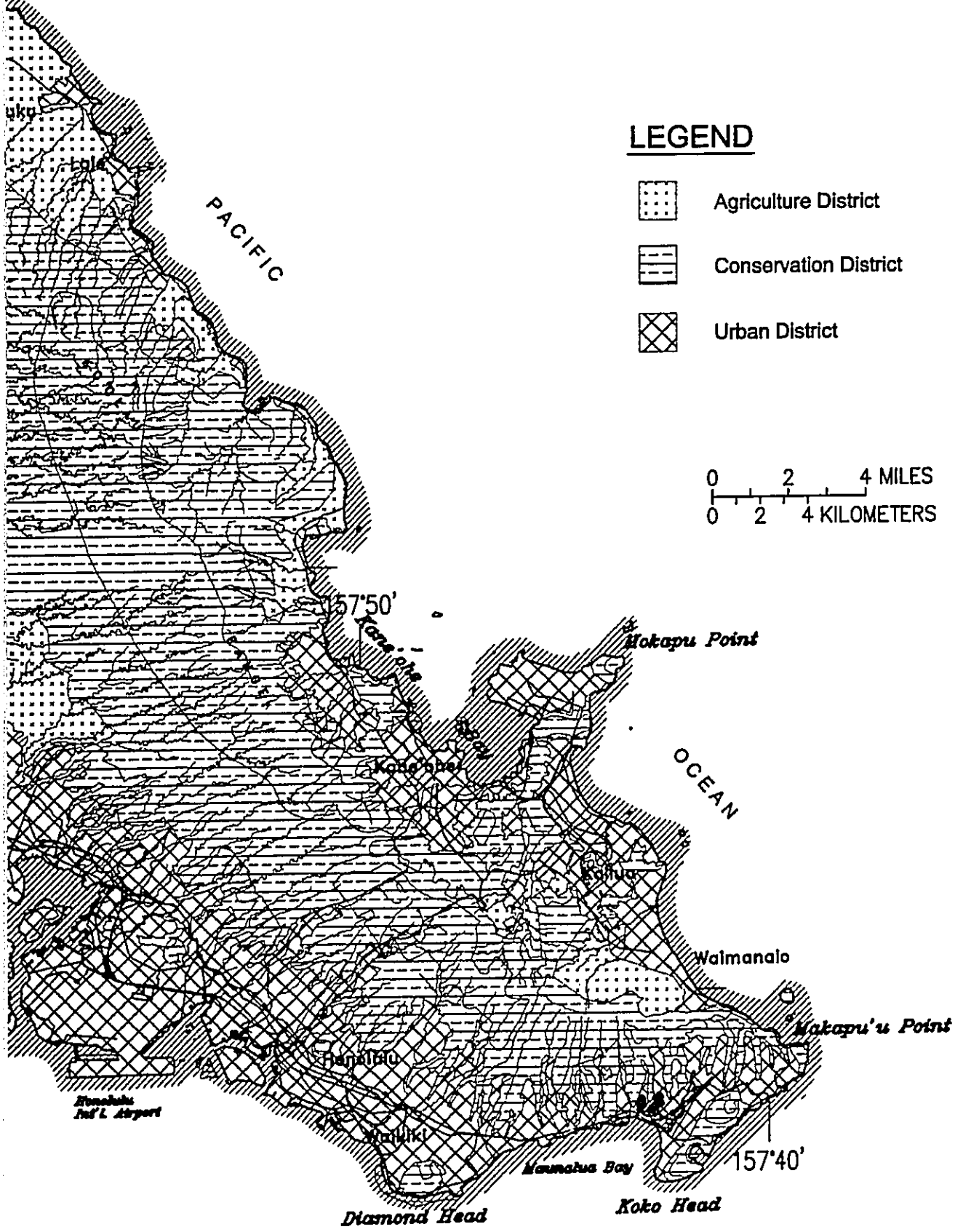


Marc M. Siah & Associates, Inc.

Consulting Civil, Structural, Environmental & Ocean Engineers
810 Richards Street, Suite 888, Honolulu, Hawaii 96813

PROJECT LOCATION

Huku Point



people of Oahu and their property against natural disasters and other emergencies, traffic and fire hazards, unsafe conditions, etc. The proposed reservoir project is consistent with this general plan.

In addition to the General Plan, there are eight other development plans which serve to guide development and improvement of the City. These development plans, first adopted in the years 1981-83 cover eight geographical sub-regions, encompassing the entire City and County of Honolulu as shown in Figure 3-13. Each region's growth and development is guided by its corresponding development plan, which delineates special area plans and zoning or other land use regulations in accordance with the City's General plan.

The proposed reservoir project falls within the boundaries of the Ewa development plan. The proposed reservoir project will supplement the existing water system and aid in providing adequate storage capacity for the Ewa area as future development occurs. The proposed reservoir project is consistent with the current Ewa Development Plan.

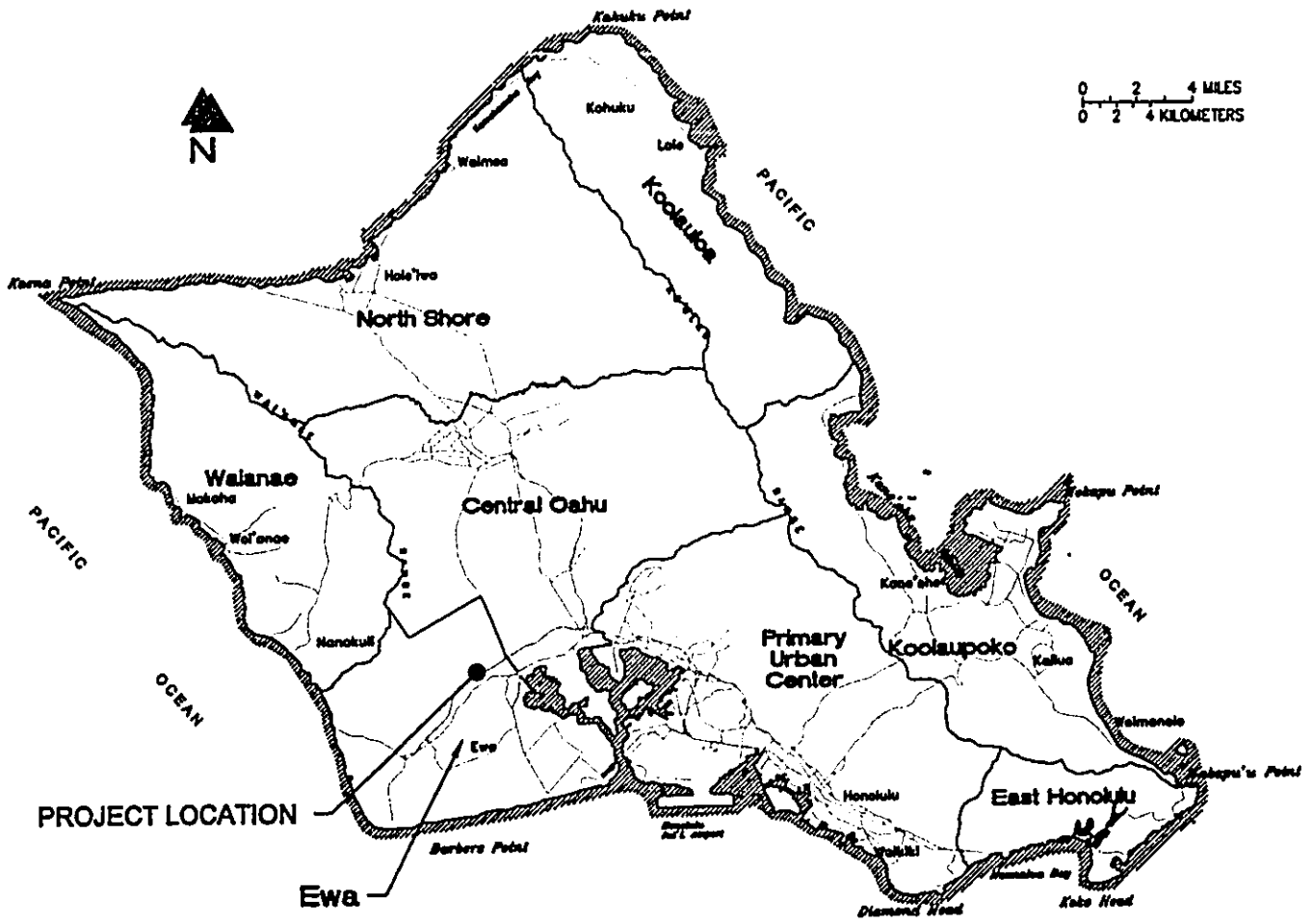
3.5.3 County Zoning

The proposed reservoir project takes place within the City and County of Honolulu. The proposed site is in a zone designated as a Restricted Agricultural District (AG-1). Since the proposed project is classified as a Type-A utility, the development of the reservoir is considered a permissible use of AG-1 land.

3.5.4 County Special Management Area

The proposed project is not within the City and County of Honolulu's Special Management Area (SMA) as identified by the City and County of Honolulu Department of Land Utilization. Therefore, it is not subject to requirements of Chapter 205-A of Hawaii Revised Statutes.

Figure 3-13 Eight Geographical Sub-Regions



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Marc M. Siah & Associates, Inc.
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SECTION 4
ENVIRONMENTAL CONSEQUENCES
DURING CONSTRUCTION

SECTION 4

ENVIRONMENTAL CONSEQUENCES DURING CONSTRUCTION

In general, construction of the proposed reservoir will include grading of the site to accommodate the reservoir structure and drainage needs, constructing the reservoir structure itself and rerouting the existing cane haul road around the perimeter of the site. Obviously, construction activities at the proposed site will alter the existing conditions and will have an impact on the topography, drainage and flora and fauna. In the following paragraphs, potential impacts of the proposed action on the physical environment are discussed. During construction, utmost efforts will be made to minimize the potential impacts. For instance, Best Management Practices will be utilized during construction in order to minimize soil erosion and to mitigate the tracking of mud/dirt onto City streets. At the completion of the project, all disturbed areas will be grassed, the entrance to the site paved and trees planted in order to screen the reservoir from public view.

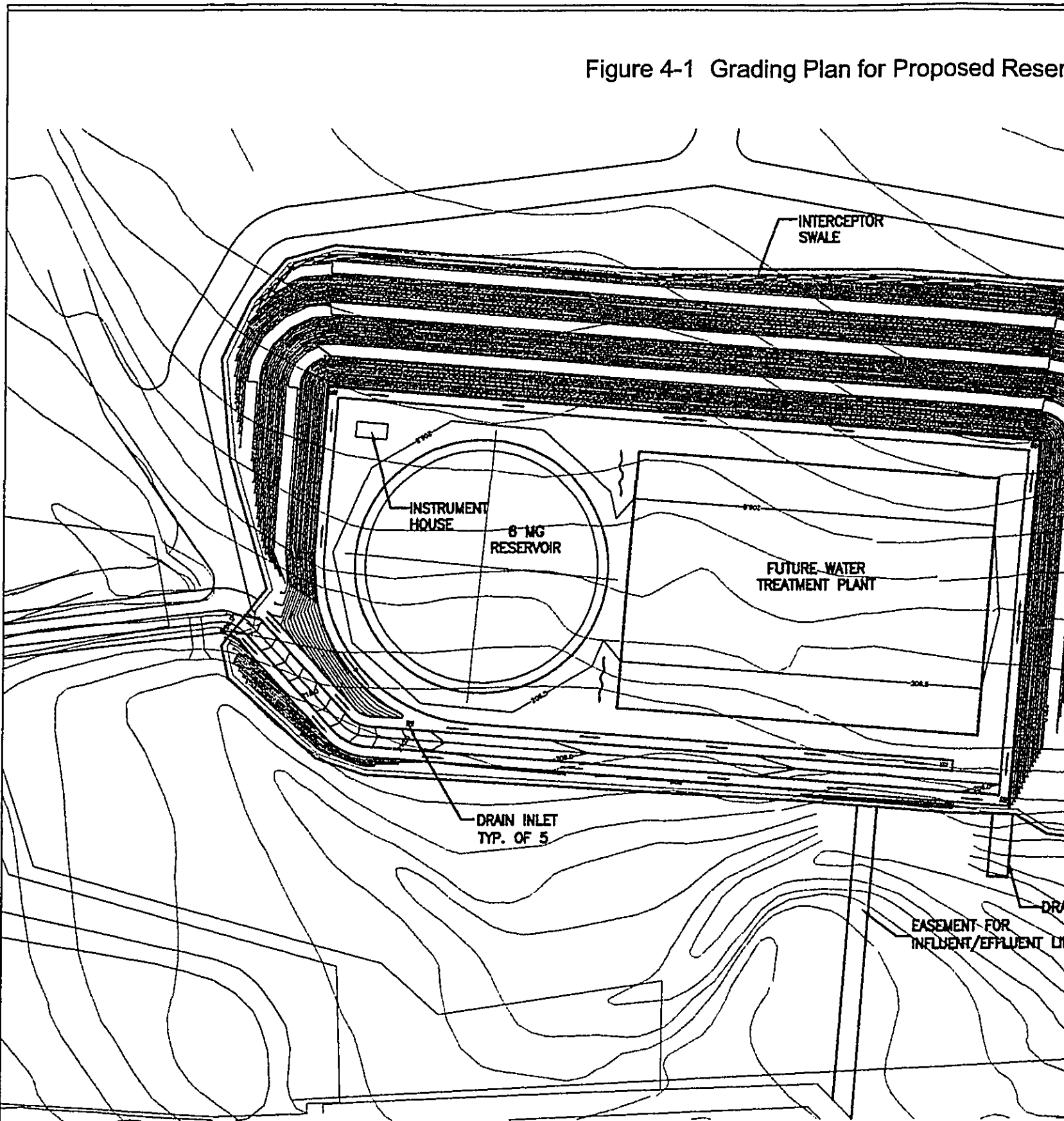
4.1 Impacts on The Physical Environment

4.1.1 Grading and Drainage

The existing topography of the proposed reservoir site is suitable for construction of a single or multiple reservoirs with the floor elevation of 208 feet above MSL. In the north, the existing elevations range from 265 to 258 feet, whereas elevations of the center and south of the parcel are approximately at 230 feet and 210 feet above MSL, respectively. The lot has a southwardly slope at about 12 percent. The southern boundary of the site runs parallel to the Honouliuli gulch. A grading plan proposed for this site is shown in Figure 4-1. Substantial excavation is necessary to provide floor elevations of about 208 feet for the proposed reservoir and the treatment plant. The depth of excavation along the northern half of the lot reaches as high as 52 feet. The cut slope is interrupted by ten-foot wide benches to allow slope stability. The proposed grading plan is prepared based on conservative cut slopes of 2:1. The final design grading for the site will be based on soil data and recommendations for grading and maximum slopes. The southern boundary of the site which borders Honouliuli Gulch will be partially retained by approximately 114 linear feet of retaining wall with a maximum height of less than five feet. Note that the grading plan includes necessary mass grading for the proposed treatment plant area as well.

The volume of excavation necessary for construction of the proposed 6-MG reservoir and the treatment plant is estimated at 300,000 cubic yards, while the necessary fill volume is a modest 800 cubic yards. The excavation volume reduces to less than half, or about 150,000 cubic yards, if the site is graded for the 6-MG reservoir alone. The corresponding fill volume reduces to 400 cubic yards as well. Except for the benches

Figure 4-1 Grading Plan for Proposed Reser



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sed Reservoir and Treatment Plant Site



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SECTION FOUR

and swales to facilitate on-site drainage, and a relatively short retaining wall along a stretch of the southern boundary of the site, there is no need for any special construction consideration. Any excess material excavated during construction activities will be removed to ensure proper drainage. Furthermore, existing drainage areas shall not be impacted or reduced. Proper grading will alleviate negative environmental consequences such as flooding and soil instability.

4.1.2 Erosion and Dewatering Control

Erosion due to site preparation and reservoir construction is anticipated to be minimal and well within acceptable limits since the nature of the soils involved is clay like. Additionally, Best Management Practices such as the installation of silt fences at the base of all slopes and the immediate grassing of all graded areas will be utilized. It is not anticipated for the construction activities to have an adverse effect on adjacent properties and resources.

Because construction will occur above an elevation of 200' above MSL, no ground water will be encountered and therefore no adverse dewatering issue will exist during construction.

4.1.3 Water Quality

The proposed reservoir construction project is not anticipated to adversely affect water quality in the area. The nearest open body of water is approximately two miles from the proposed site. The method of construction will incorporate methods used to minimize erosion into the Honouliuli Gulch Stream, which is the only waterway in the area. As previously stated, appropriate best management practices will be used during construction to impede transport of silt and debris to the stream.

4.1.4 Flora and Fauna

A botanical survey of the proposed reservoir site was conducted by the Botanical Consultants, details of which are presented in Appendix C. The site has no outstanding vegetative features and no proposed or listed, threatened or endangered species were found during the field survey. The most predominant vegetation at the site consists mostly of weedy plants that can be found on the leeward side of most Hawaiian islands. Destruction of this vegetation will not seriously impact on the vegetation in the area. The survey report further concludes that the proposed reservoir site is free of any significant and/or endangered species as set forth in the Endangered Species Act of 1973, and none were found during the survey.

The tracks of a single, small pig were identified at the site, although no pig was seen by the surveyor. Very few birds were seen as well, since (1) the recent plowing had destroyed any mature, seed bearing weed crops upon which many of the seed eating birds depend, and (2) open water sources no longer exist at the site. The most abundant bird found was the Zebra Dove (*Geopelia striata*). A single pair of House Sparrows or Feathered Mice (*Passer domesticus*) were seen as well as a single Lesser Golden Plover (*Pluvialis dominica*).

The report concludes that development of the site will not bring significant, if any, adverse impacts on the State's flora or fauna.

4.1.5 Historical /Archeological Features

Regarding the presence of archaeological and/or cultural resources at the proposed reservoir site, the State of Hawaii Department of Land and Natural Resources, Historic Preservation Division (DLNR-HPD) reported that no known historic sites are in the area, nor is it likely that any will be encountered during construction. Furthermore, native Hawaiian cultural practices and gathering rights will not be affected in the area. It is noted that the sugar cane industry had cultivated the land to depths greater than historic sites are commonly found. A copy of the letter from DLNR-HPD is in Appendix D.

4.1.6 Noise

Construction activity will unavoidably increase the ambient noise levels. Construction equipment such as trenchers, backhoes, dump trucks and trailers will be the dominant noise producers during the construction period. Impact tools such as hammers may also be a major source of noise. Noise levels will comply with the State Department of Health noise control requirements or a variance will be sought. Contractors will implement mitigative measures through the use of proper muffling devices and vigilant machinery maintenance in order to minimize noise impacts from the project activities.

4.1.7 Air Pollution

Ambient air quality is expected to be affected due to the dust generated by short-term construction related activities. Grading activities will generate air-borne particulates. Construction activities will be required to comply with the provisions of Hawaii Administrative Rules, Chapter 11-60.1, "Air Pollution Control," regarding fugitive dust. The contractor will be responsible for utilizing dust control measures such as regular watering and sprinkling to minimize wind-blown particulates. Ambient air quality may also be adversely affected by emissions from construction equipment and other motor vehicles. The contractor will be required to minimize emissions through proper vehicle

maintenance. Once the project is completed, no adverse impact on local and regional ambient air quality conditions is anticipated.

4.1.8 Public Health and Safety

The contractor shall take appropriate measures to ensure public health and safety during construction. All construction activities shall conform to city, state and federal standards for safety. As indicated earlier in this Section, Best Management Practices shall be used to mitigate the tracking of mud/dirt onto City streets and roads to the reservoir site will be graveled by the Contractor to ensure that all vehicles leaving the site will be free of mud. Access for fire apparatus will need to be maintained throughout the construction site for the duration of the construction activity. Additionally, portable toilets and potable water tanks shall be maintained at the site for the use of all personnel.

4.2 Impacts on the Community Setting

4.2.1 Local Economy

The construction of the proposed reservoir will provide short term additional opportunities for local construction workers. It will also benefit the local material suppliers, in both retail and service sectors.

There will, however, be a long term affect on the agricultural industry. The site is located within the central portion of the Ewa Plain, which has been cultivated by Oahu Sugar Co., Ltd. for the better part of the 20th century. Because of the relatively high sugar cane yields and low farming costs, the central portion of the Ewa Plain was referred to as the "golden triangle." The Oahu Sugar Co., Ltd. did, however, cease operations in 1995, freeing up 10,500 acres on Oahu for other land uses.

There are four classification systems commonly used in Hawaii for the rating of land and soils. The proposed site gets exceptional ratings in each of the classification systems, described as follows:

(1) *Land Capability Grouping*, by the USDA's Natural Resources Conservation Service (NRCS), classifies the soil at the proposed site as Level I. This rating refers to the highest ratings for soil for agricultural use.

(2) *Agricultural Lands of Importance to the State of Hawaii (ALISH)*, by the SCS, University of Hawaii College of Tropical Agriculture and Human Resources (UH-CTAHR), and State of Hawaii Department of Agriculture, classifies the land as "Prime

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SECTION FOUR

Agricultural Land," defined as land best suited for the production of food, feed, forage, and fiber crops. Prime agricultural land produces the highest yields with the lowest inputs of energy or money and with the least damage to the environment.

(3) *Overall Productivity Rating* by UH Land Study Bureau classifies the land with a rating of A (ratings range from A to E), the highest rating for overall crop production.

(4) *Proposed Land Evaluation and Site Assessment (LESA) System*, by State of Hawaii Land Evaluation and Site Assessment Commission, assigns the land a rating of 95 out of a total possible 100 points. All lands with a rating of 66 or above are termed "important agricultural lands".

Current zoning for the site is still AG-1 (Restricted Agricultural District). Although it is not necessary to change the zoning in order to construct the proposed reservoir, the proposed site will no longer be available for agricultural purposes. This loss will be permanent. However, the proposed reservoir will not have any significant impact on existing agricultural operations in the immediate vicinity of the site.

A 1995 study evaluating impacts of a residential development encompassing 793 acres in the central Ewa plain, including the proposed reservoir site, on the growth of diversified agriculture concludes that ample land is available elsewhere on Oahu to easily accommodate the projected growth of diversified agriculture. In other words, such developments would have little or no impact on the agricultural activities since it is the size of the market and not the availability of land which defines the limits to the growth of diversified agriculture. Construction of the proposed reservoir will therefore not have any adverse affects on the agricultural industry in the area.

4.2.2 Other Community Services

The additional requirements for community services generated from the construction are expected to be minimal since relatively few workers are needed. Therefore, there are no project associated impacts on community service needs such as: police and fire protection, medical facilities, recreational facilities, schools and refuse collection and disposal.

4.2.3 Local Traffic

The site is currently accessed by a dirt road which branches off from the main black-top road which runs parallel to the H-1 Freeway and serves as the access road to the existing Honouliuli 228' Reservoir (both the dirt road and the black top road are privately owned and will be maintained for continual use by the farmers leasing the affected

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lands). After branching off the black-top road, the proposed reservoir access road will follow the perimeter fence circling the existing Honouliuli reservoir before crossing the gulch and terminating at the proposed site. The existing culvert under this road may need to be resized. The existing dirt road which currently passes through the property will be rerouted outside the northern boundary of the proposed reservoir site. The alignment of the proposed reservoir access road and rerouting of the existing dirt road in the vicinity of the reservoir site are shown in Section 1, Figure 1-6. Both roads are relatively flat with maximum slopes of less than 10 percent. Since the alignment of the existing dirt road, which will be used as the access road to the proposed reservoir, does not follow an established easement, its adoption as the reservoir access road requires the BWS to acquire the necessary right-of-way easement. This would require acquisition of approximately 1,350 linear feet of 40-foot wide right-of-way in favor of the BWS for the proposed reservoir access. The access road shall be designed in accordance with BWS Water System Standards based on the following criteria:

- a. Twelve feet pavement width
- b. Pavement grades of less than twelve percent shall be of asphaltic concrete; pavement grades in excess of twelve percent shall be constructed of reinforced concrete.

During the construction period, realignment of the new access road will have little effect on traffic passing directly adjacent to the construction site. However, transporting the construction equipment and material, as well as hauling away excess dirt, will cause some temporary inconveniences on Farrington Highway. Best Management Practices will be utilized to mitigate the tracking of mud/dirt onto City streets and all ingresses and egresses to the reservoir site will be graveled by the Contractor to ensure that all vehicles leaving the site are free of mud. A traffic control plan will be prepared during the design phase of the project to minimize disruptions and inconveniences to the public using Farrington Highway. This impact, although not significant, will be properly mitigated by limiting the hauling and transportation of construction equipment and materials to the off-peak traffic hours of 10:30 a.m. to 3:00 p.m., as well as utilizing flagmen (and off-duty police officers, if necessary) to ensure smooth traffic flow along Farrington Highway. The proposed access road may affect the University of Hawaii, West Oahu Campus property if construction of the campus begins prior to or during construction of the proposed reservoir. The Board of Water Supply will make arrangements with the University of Hawaii for access through a portion of the West Oahu Campus if the Palehua Road underpass is used for access.

4.2.4 Night and Weekend Work

In order to alleviate many of the traffic problems to the area, as well as reduce construction time, night and weekend work may be an option. The proposed reservoir site is in an agricultural area. The nearest residential area is along Kunia Road about 6000 feet to the east of the construction site. Noise from night and weekend work will not disrupt these residential areas. The negative impact that night and weekend work entails is an approximate increase in construction cost of 25 percent due to additional overtime pay.

4.3 Impacts on the Infrastructure

With proper planning and design, construction of the proposed water reservoir will not adversely affect the existing water and/or electrical systems. Presently, an existing 42" influent water line traverses the proposed site on its way to the existing Honouliuli 228' Reservoir. The water line enters the site from the existing Honouliuli 440' Reservoir to the north and exits along the site's western boundary. Because of the location of the proposed reservoir pad, approximately 780 linear feet of the water line will be rerouted along the north and west boundaries of the proposed reservoir site. This will prevent the existing C.C. pipe from running under the reservoir structure and allow access for any maintenance needs.

Similarly, an existing overhead HECO line currently traverses the proposed site along the existing east to west cane haul road. During grading operations, the existing power poles and power line will need to be temporarily relocated to the edge of the site. When final grades are established, the power poles and power line can be restored to their original alignment. The restored HECO lines will have enough vertical clearance to pass over the new reservoir structure. The cost of maintaining service to the existing 46 kV electrical line is incidental to the cost of the project. There are no existing telephone, sewer or drainage systems to be affected in the project area.

SECTION 5
ENVIRONMENTAL CONSEQUENCES
AFTER PROJECT COMPLETION



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SECTION 5

ENVIRONMENTAL CONSEQUENCES AFTER PROJECT COMPLETION

5.1 Impacts on The Physical Environment

5.1.1 Water System Improvement

When completed, the proposed reservoir will increase the storage capacity of the Ewa-Waipahu 228' Water System to meet existing and projected requirements and will enhance the Honolulu Board of Water Supply's capability to provide potable water service to the Ewa area.

5.1.2 Forested Water Shed Protection and Water Resources

Forested watersheds retain rainfall runoff to allow deep percolation into the underlying aquifer. Located north of the proposed reservoir is the Honouliuli Preserve, a forested area in the southern Waianae mountains that is managed by the Nature Conservancy of Hawaii for biodiversity protection. This forested area is underlain by high-level dike water.

The proposed reservoir will be served by basal sources in Waipahu and Honouliuli (as shown in figure 3-10) and not dike sources (the Board of Water Supply has no dike sources in the upper Honouliuli area). Based on past experience, withdrawing water from basal sources does not impact the forested watersheds in the mountains. While there is connectivity between the high-level dike water and the basal aquifer (water normally spills over from the high-level dike sources to the basal aquifer), especially in the case of the Waianae aquifer (the basal wells in Honouliuli draw their water from this aquifer), hydraulic barriers preclude the possibility of basal sources appreciably impacting the dike sources.

In the case of Ewa Shaft, which may also serve the proposed reservoir, this source draws water from the Koolau aquifer. The Koolau aquifer, although it overlays the Waianae aquifer, is hydraulically separated (i.e. water cannot pass from the Koolau aquifer to the Waianae aquifer) by alluvial sediment. The hydraulic separation is further supported by the difference in head levels and water chemistry between the two aquifers.

5.1.3 Flora and Fauna

A botanical survey of the area under investigation was conducted by the Botanical Consultants, details of which are presented in Appendix C. The report concludes that

development of the site will not bring significant, if any, adverse impacts to the State's flora or fauna. At the present time, except for the northeastern quadrant of the proposed site which is used to grow watermelon, the site is fallow land. The majority of the existing site is overgrown with weedy grass. The site has no outstanding vegetative features and no proposed or listed, threatened or endangered species. Historically, the proposed site had been used for growing sugar cane up through the early nineteen eighties. Furthermore, the day to day operation of the reservoir is not anticipated to adversely affect the local flora or fauna either. It is anticipated that species of flora and fauna that presently inhabit the area will return after construction. The trees that will be planted for screening and landscaping may provide additional habitat for birds and other fauna. It is not anticipated that new species of flora and fauna will migrate to the area. The design consultant will consult with the Nature Conservancy of Hawaii on the use of native plants to revegetate the area near the proposed reservoir.

5.1.4 Grading

The final grade of the project site after the completion of construction will be 10 to 50 feet below existing grades. This will allow the reservoir to be placed in a depression and therefore less imposing on the surroundings. The finished cut slope on the mauka and eastern sides of the site will be interrupted by ten-foot wide benches to allow slope stability. The proposed grading plan is prepared based on conservative cut slopes of 2:1. The final design grading for the site will be based on soil data and recommendations for grading and maximum slopes. For further soil stability at the site, the southern boundary of the site which borders Honouliuli Gulch will be partially retained by approximately 114 linear feet of retaining wall with a maximum height of less than five feet.

5.1.5 Drainage

Adequate drainage features are provided to facilitate disposal of both on-site and off-site storm runoff as well as overflow and washout from normal reservoir operations. Honouliuli Gulch is the closest natural drainage pathway to the proposed reservoir site. Honouliuli Gulch will be used for disposal of on-site and/or off site runoff water. On-site runoff is to be collected and conveyed to the gulch via a 36-inch drain line which is laid along a 20-foot wide drainage easement discharging into the Honouliuli Gulch along the southern border of the proposed site. The proposed grading plan for the site as depicted in Figure 4-1, shows that an interceptor swale along the northern boundary of the site collects all off-site runoff and diverts it as sheet flow to surrounding areas. The on-site storm run-off is directed to the drain inlets located on the corners of the site by means of perimeter swales and drain pipes. The flow is then piped to the drain inlet located at the southeast corner of the site where it is directed to and discharged into Honouliuli Gulch. The reservoir blow-off and overflow are also conveyed to the gulch by the same pipe and drain inlet system. This discharge will be in accordance with the requirements of the State Department of Health's NPDES permit program.

Approximately 2,040 linear feet of 10 foot wide earth swale, and 1,350 linear feet of 36-inch drain pipe laid around the perimeter of the site and between the drain inlets will be employed to convey the storm water to Honouliuli Gulch.

The estimated run-off generated on-site after construction is only 41 cfs. This quantity of water is insignificant when compared to the 100-year flood flows in Honouliuli Gulch estimated at 7,000 cfs. The approximate length of the necessary flow easement for discharge of storm run-off and reservoir blow off/over flow waters is estimated at 80 feet as shown in the grading plan. The exact length of this easement shall be determined during the design process.

5.1.6 Visual Resources and Other Physical Environment

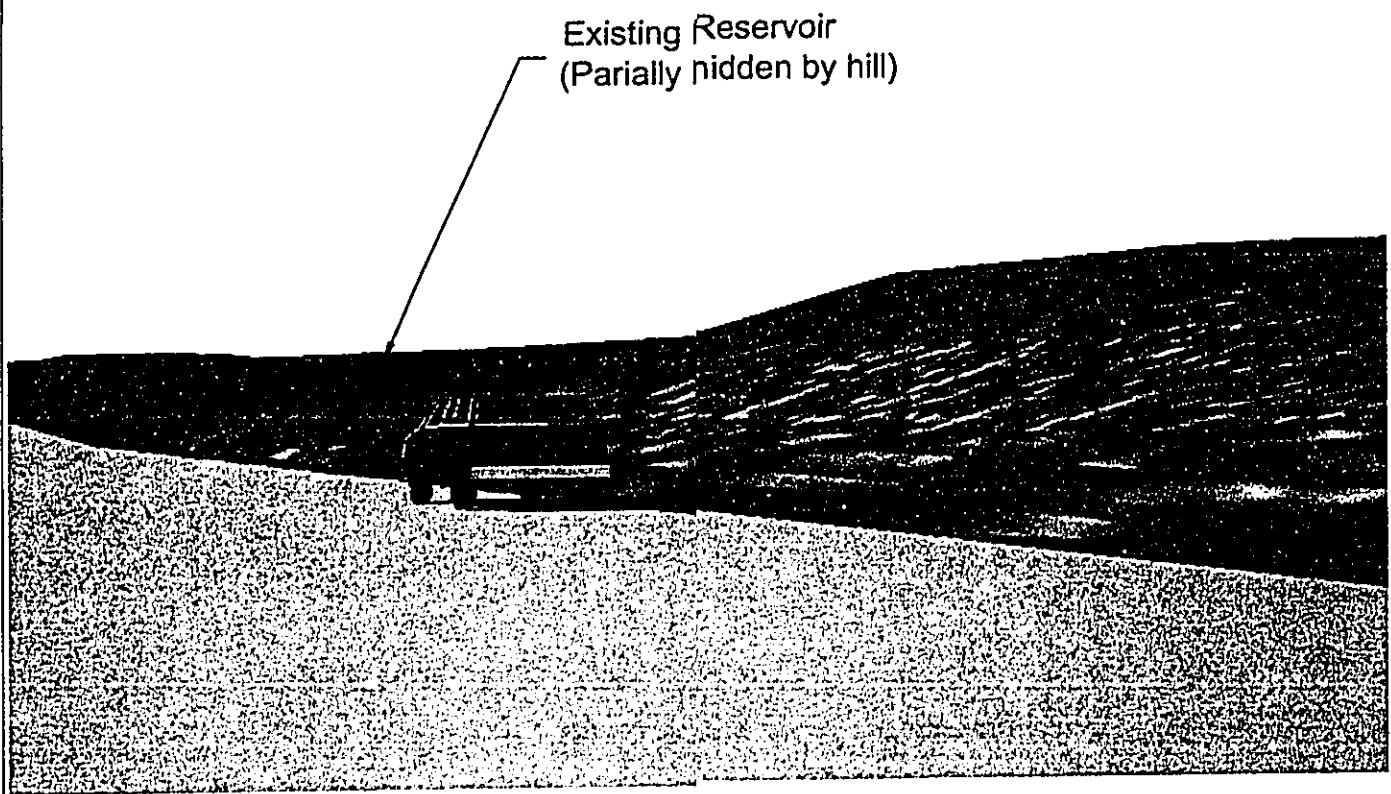
The finished floor elevation of the proposed reservoir will be slightly below grade and the reservoir structure will rise up to 20 feet above this finished floor elevation. However, any affect on the visual resources in and around the proposed reservoir will be minimal because of the existing ground topography and various mitigation measures.

The visual impact from Farrington Highway will ne minimized by the difference in elevation between the roadway (approximately 170 to 180 feet) and the top of the reservoir (228 feet), as well as by the existing topography and vegetation in the area. Ground topography and existing vegetation will also help to minimize the visual impact of the proposed reservoir from the H-1 Freeway (Figures 5-1 through 5-3 show renderings of the existing and proposed reservoir site as viewed from the H-1 Freeway). Any remaining visual impacts will be minimized by plantings, which will screen the reservoir from view. A series of trees such as Geranium-leafed Aralia or Wiliwili (both of which can grow up to a 20-foot height) may be planted on the side of the reservoir facing the H-1 Freeway. Alternatively, any of the columnar coral tree family trees such as Erythrina Variegata, which grows to considerable heights, may be used to accomplish this screening. The design consultant will consider the use of native plants and consult with the Nature Conservancy of Hawaii for input on visual screening of the reservoir. Further mitigation to impacts on visual resources includes grassing all areas cut away in order to accommodate construction. Forming berms around the reservoir in order to mitigate visual impacts will not be done.

The proposed project is not expected to have any adverse historical/archaeological impacts as stated in Appendix D. Furthermore, the improvement will not have a significant impact on the physical environment during and after the construction of the project. No berming will be used around the reservoir.

After project completion, the reservoir will need to be periodically discharged. The

Figure 5-1(a) Existing Honouliuli Reservoir as viewed from H-1 Freeway and 1,875 feet away (West Bound)



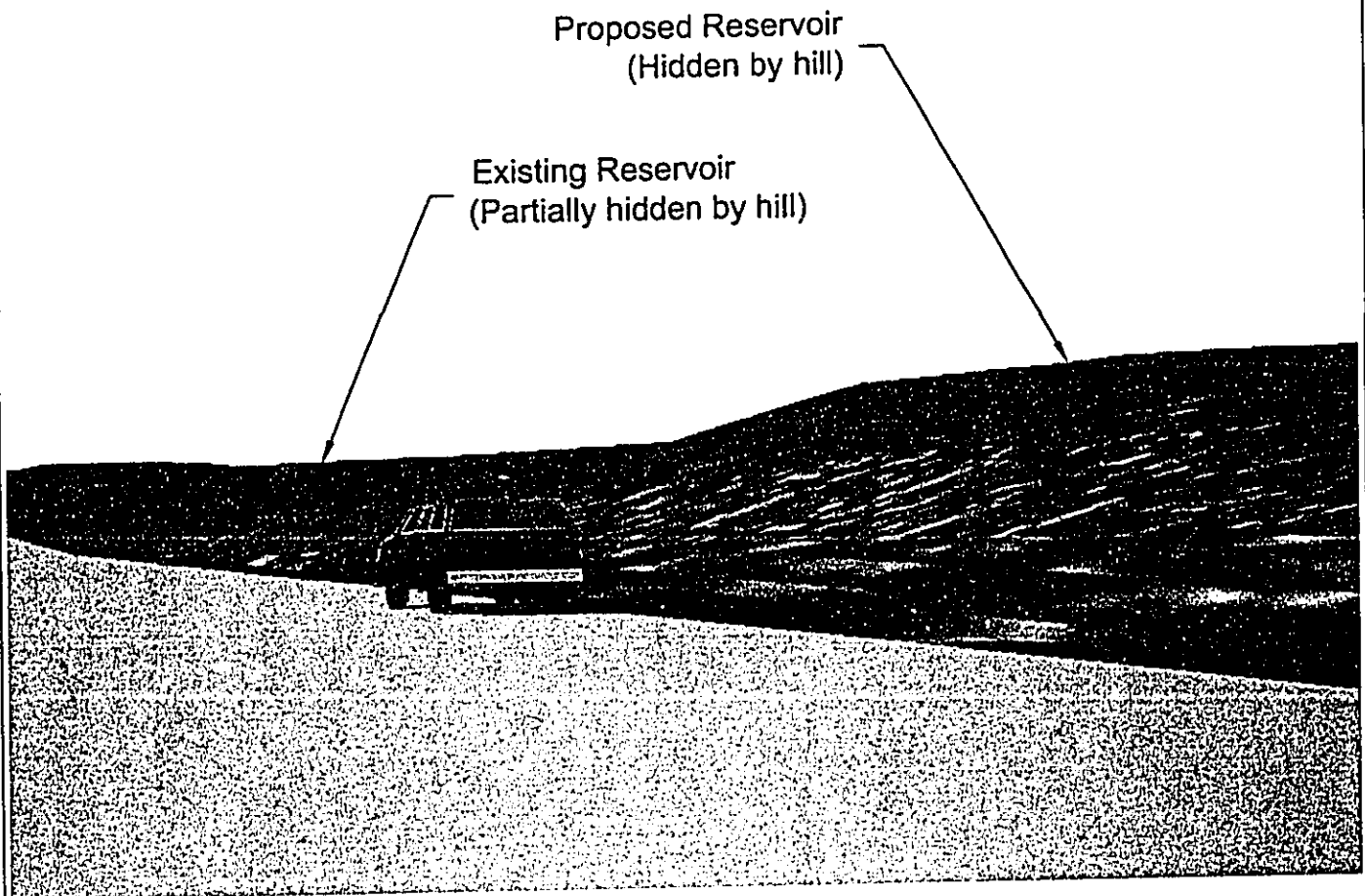
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Figure 5-1(b) Proposed Honouliuli Reservoir as viewed from H-1 Freeway and 1,875 feet away (West Bound)



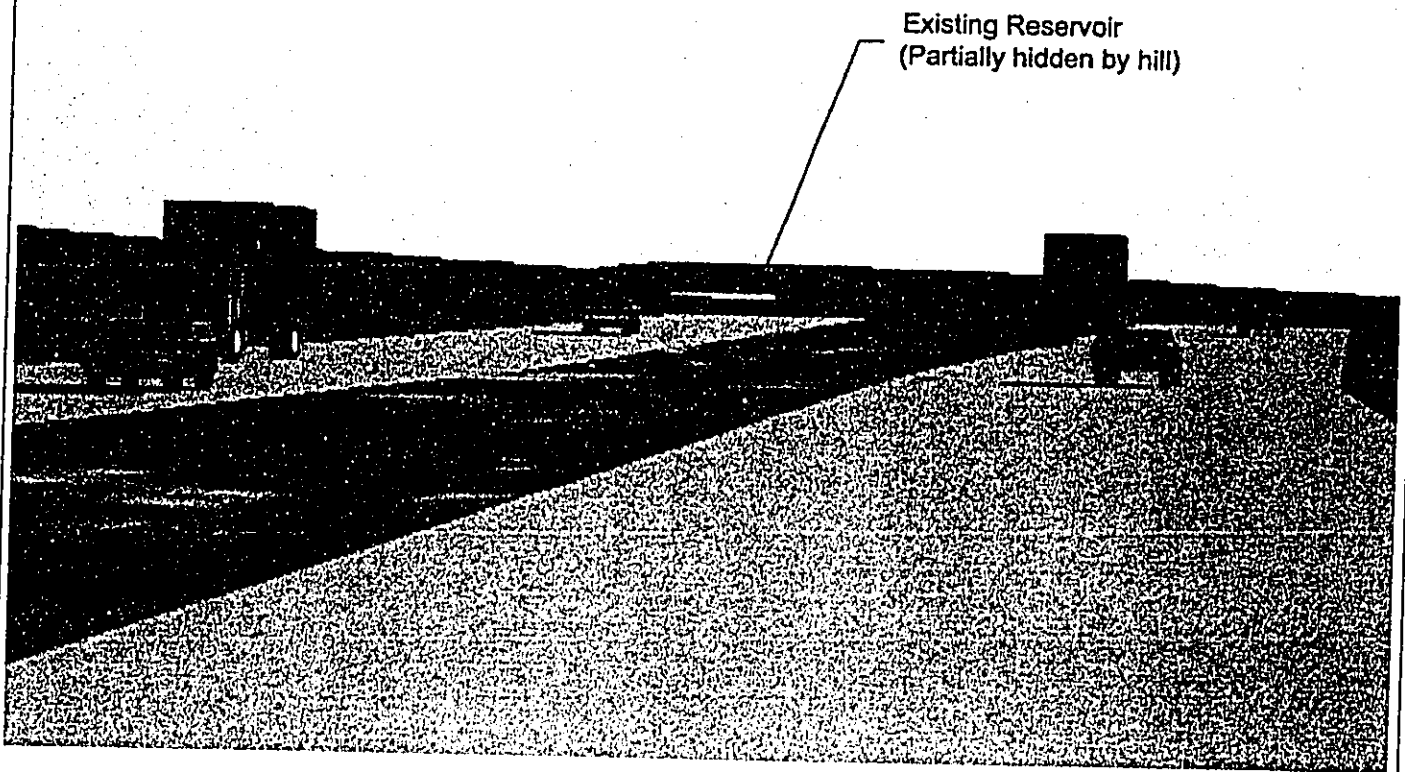
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Figure 5-2(a) Existing Honouliuli Reservoir as viewed from H-1 Freeway and 3,150 feet away (East Bound)



Existing Reservoir
(Partially hidden by hill)

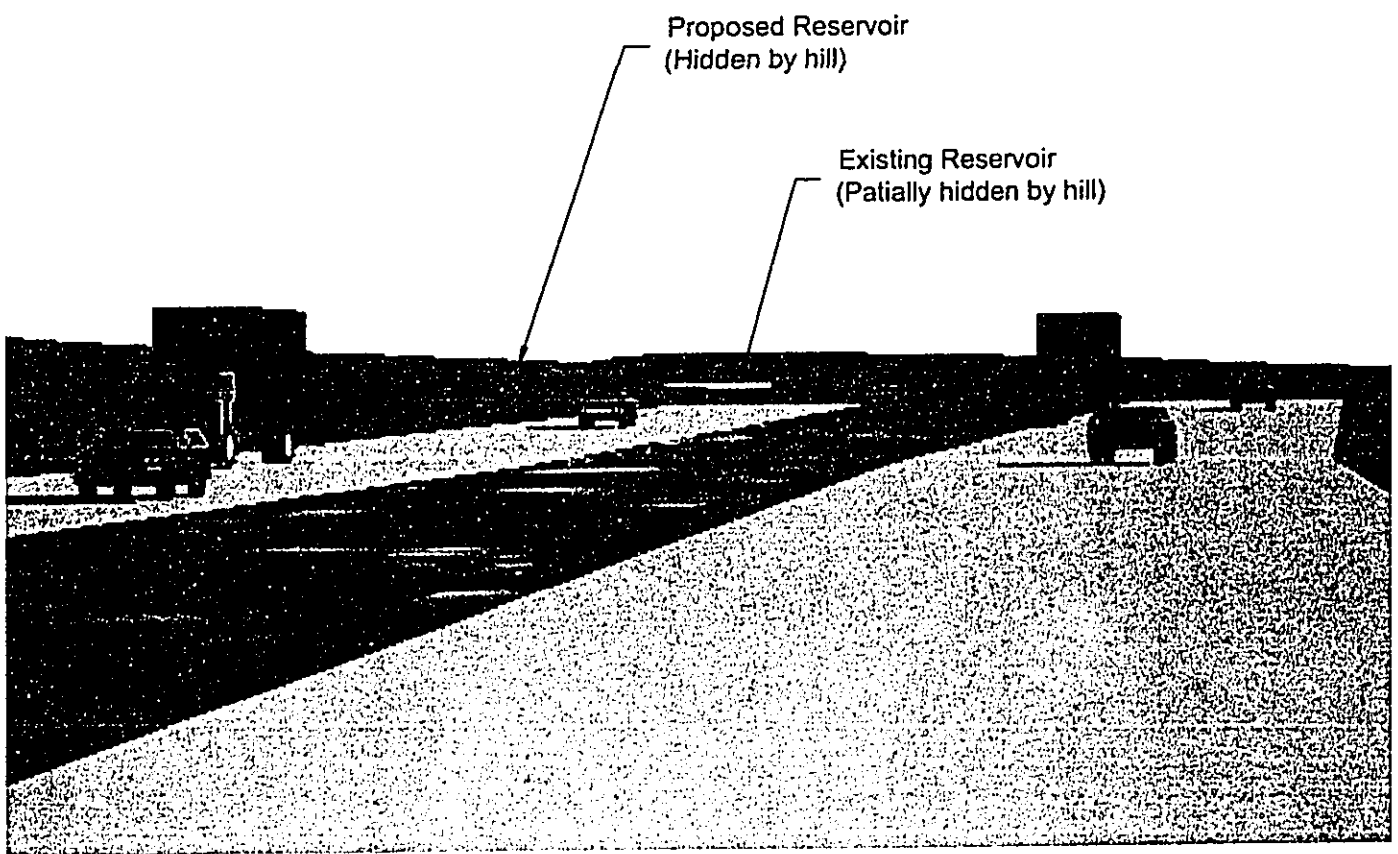
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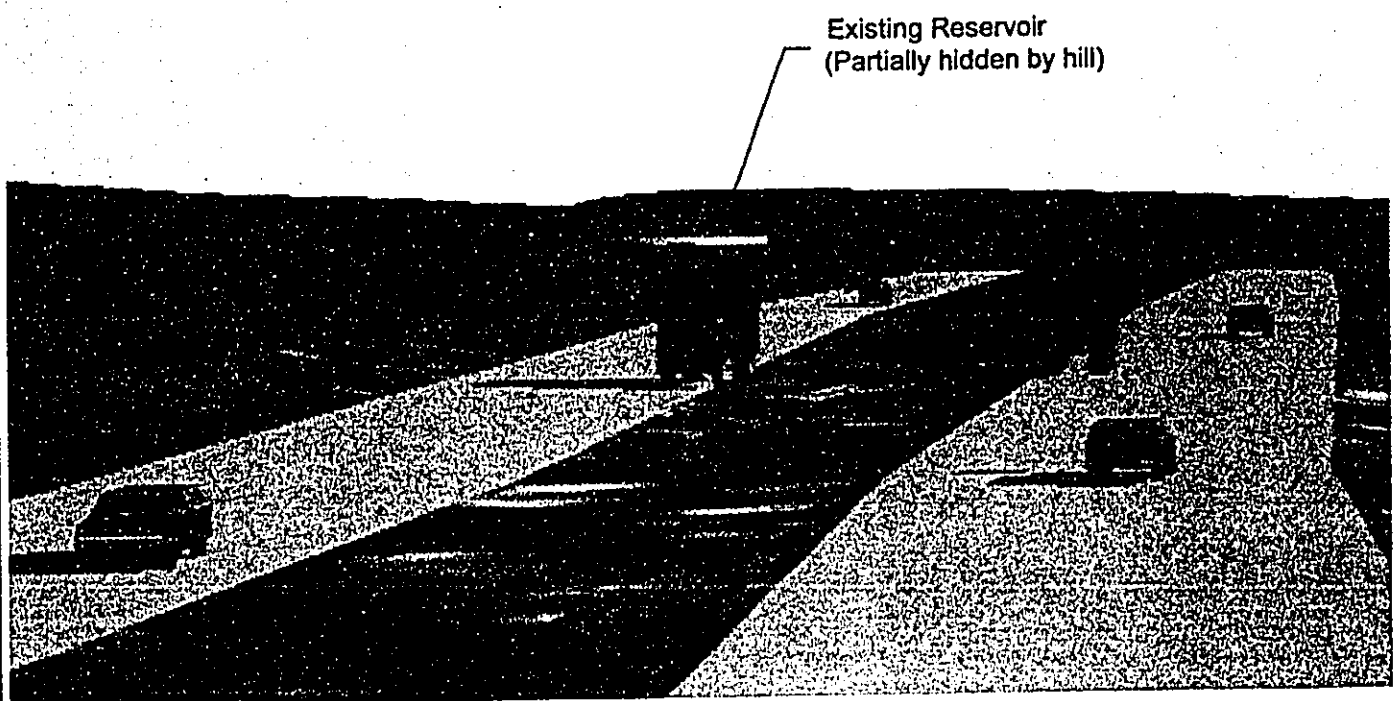
Figure 5-2(b) Proposed Honouliuli Reservoir as viewed from H-1 Freeway and 3,150 feet away (East Bound)



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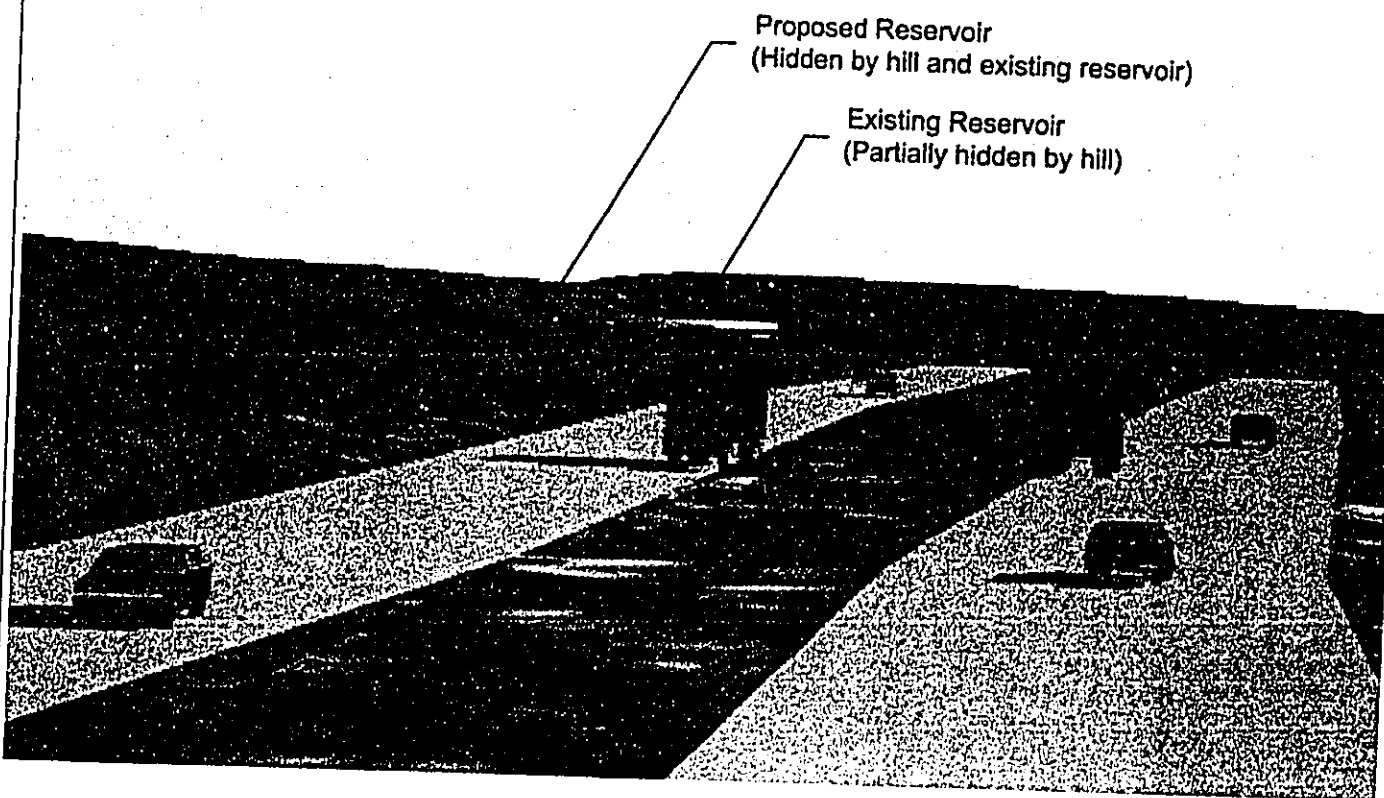
Figure 5-3(a) Existing Honouliuli Reservoir as viewed from 15 feet above H-1 Freeway and 3,150 feet away (East Bound)



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Figure 5-3(b) Proposed Honouliuli Reservoir as viewed from 15 feet above H-1 Freeway and 3,150 feet away (East Bound)



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Honouliuli Gulch, albeit a perennial drainage waterway, passes south of the site. The reservoir discharge, measured by overflow and blowoff rate, although very infrequent, amounts to discharge of the entire reservoir storage volume over 12 hours. For a six million gallon reservoir this rate is estimated at 1,039 cfs. The volume of run-off from the site, however, is very insignificant in comparison to potential flood flow in Honouliuli Gulch. At any rate, in neither situation will the quality of surface waters in the area be adversely impacted by occasional reservoir discharges or on-site storm run-off.

Noise and air pollution impacts associated with the project will be eliminated after the completion of the project.

5.2 Impacts on Community Setting

No long term impacts on the community setting are foreseen. The main benefit of the project is to provide adequate and reliable water storage for the Ewa area.

5.3 Impacts on Infrastructure

The proposed construction has no short-term or long term adverse impacts on the infrastructure in the area.

SECTION 6
IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS
OF RESOURCES AND UNRESOLVED ISSUES



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SECTION 6

**IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF
RESOURCES AND UNRESOLVED ISSUES**

The proposed reservoir construction project involves irreversible and irretrievable uses of energy, labor, materials, and capital funds by the City and County of Honolulu Board of Water Supply. Construction of the 6 MG reservoir will increase the storage capacity of the existing water supply to the residents of the Ewa Plains at both present and anticipated future population levels.

There are no unresolved issues for the proposed water reservoir project at the present time.

SECTION 7
LIST OF NECESSARY PERMITS AND APPROVALS



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SECTION 7

LIST OF NECESSARY PERMITS AND APPROVALS

Permits required in order to install the water system improvements are listed as follows:

<u>Permit</u>	<u>Approving Agencies</u>	<u>Approximate Processing Time</u>
NPDES: Hydrotesting Permit	Department of Health State of Hawaii Clean Water Branch	60 - 90 days
NPDES: Storm Water Runoff Permit	Department of Health State of Hawaii Clean Water Branch	60 - 90 days
Building Permit	Department of Planning and Permitting City and County of Honolulu	30 - 45 days
Grading Permit	Department of Planning and Permitting City and County of Honolulu	15 - 30 days

Note: The NPDES Storm Water Runoff Permit is the same as the general permit for construction activity in areas greater than 5 acres.

SECTION 8
ALTERNATIVES TO THE PROPOSED ACTION



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SECTION 8

ALTERNATIVES TO THE PROPOSED ACTION

The alternatives for the proposed project are "No action", "Delayed action" and "Alternative Sites". They are described as follows:

8.1 No Action

The "No Action" alternative means that no water reservoir will be constructed and as the population in the area increases, the water supply will become inadequate and unreliable for both residential consumption and fire protection. This alternative is unacceptable to the community, since water supply issues will remain unresolved.

8.2 Delayed Action

The "Delayed Action" alternative means that the water reservoir construction takes place at some time in the future. This alternative will postpone the resolution of water storage concerns in the area, causing continued potential water supply shortages due to inadequate supply. Furthermore, the delay of the water reservoir construction will also result in higher construction costs in the future due to inflation.

8.3 Alternative Sites

The "Alternative Sites" alternative means that the water reservoir will be constructed at a site other than the proposed site. In a feasibility study prepared by Marc M. Siah & Associates, Inc. for the Honolulu Board of Water Supply entitled "*Site Feasibility Study for Honouliuli 228' Reservoir No. 3 - Final Submittal*" (Reference No. 8), alternative sites were evaluated for optimum feasibility. The purpose of the study was to find the most feasible site for the new reservoir by assessing each alternative site on various criteria.

8.3.1 Alternative Site Identification

Initially, alternative sites were identified based on the following minimum conditions:

1. The proposed site has sufficient elevation to allow integration of the proposed reservoir into the 228' Water System.

**ALTERNATIVES TO THE PROPOSED ACTION
SECTION EIGHT**

2. The proposed site has adequate area sufficient for construction of multiple reservoirs in any combination of 4, 5, and 6 Million Gallons of storage capacity as well as for construction of screening berms.
3. Access to the proposed reservoir site is available for operational personnel and equipment.
4. The geological substrata at the proposed site is adequate to support the loads imposed by the reservoir.
5. Storm runoff from the proposed site can be readily discharged downstream without adverse impacts on adjacent property and/or the environment.

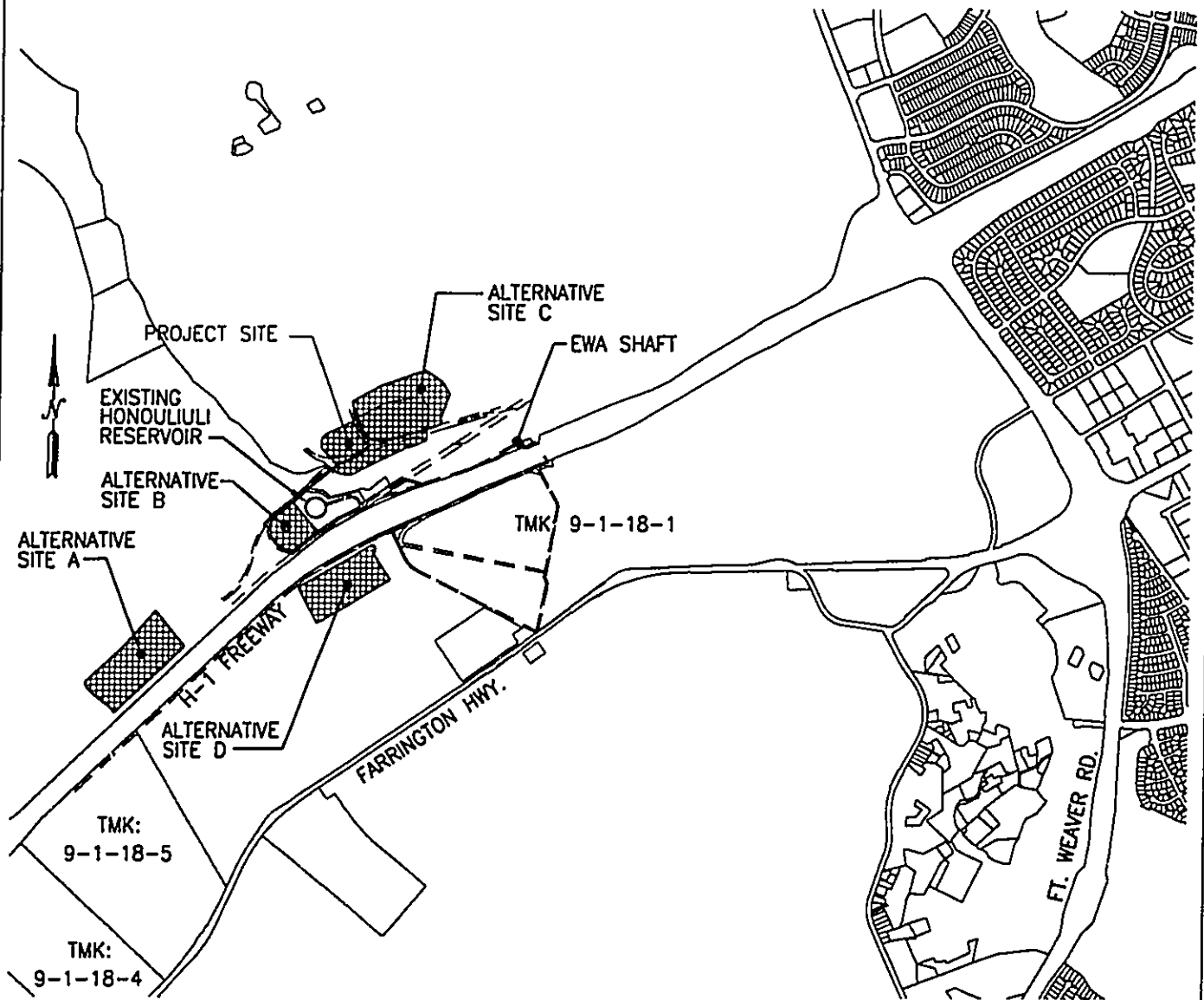
Other than the proposed reservoir site, four alternative sites were evaluated. Figure 8-1 shows the locations of the alternative sites, designated as sites A through D.

Alternative Site A is located mauka of the H-1 Freeway in formerly agricultural lands and west of the existing Honouliuli 228' reservoir. The site is a portion of a parcel of land identified by TMK 9-2-02-1. Alternative Site A is approximately 10.9 acres bounded on the south by an existing unimproved "black top" road which parallels the H-1 Freeway. The eastern boundary of the site is approximately 2,000 feet west of the existing Honouliuli reservoir facing fallow lands. In the north, the site borders vast expanse of former agricultural lands which are sparsely used by independent farmers. In the west, Kalo Gulch passes approximately 200 feet of the site. The dimensions of the proposed reservoir site which can house up to three reservoirs with the total storage capacity of fifteen million gallons, including appurtenant and ancillary facilities, are approximately 1,053 by 468 feet.

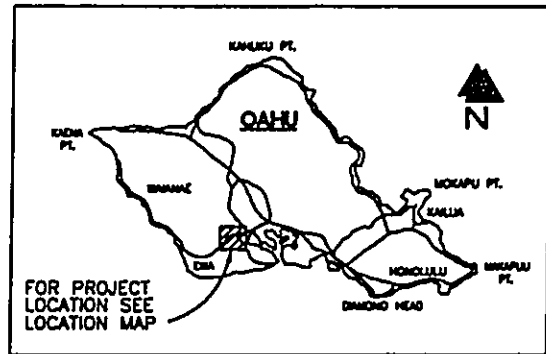
The Honouliuli 228' Reservoir site was originally designed and graded to house two 5 MG reservoirs. Alternative Site B refers to the western half of this site. The existing reservoir was built in 1988, while the other half has been vacant since then. The total land area of the reservoir facility is 7.31 acres, the unused area is slightly greater than 3 acres. This site is in the area identified by TMK 9-2-02-2. An overhead 44-KV power line runs along the mauka boundary of this site. Roadway easement "2367" envelops the western and northern sides of the reservoir facility.

Similar to alternative Sites A and B, Site C is also located mauka of the H-1 Freeway and on the northern bank of the Honouliuli gulch as it meanders past the existing Honouliuli reservoir site. The proposed site, which can house three reservoirs with total storage capacity of fifteen million gallons is approximately 1,716 feet northeast of the

Figure 8-1 Locations of Alternative Reservoir Sites



Vicinity Map



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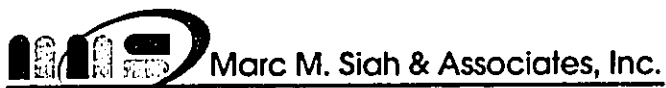
MMS Marc M. Siah & Associates, Inc.
 Consulting Civil, Structural, Environmental & Ocean Engineers
 810 Richards Street, Suite 888, Honolulu, Hawaii 96813

existing Honouliuli reservoir site. The parcel encompasses an 11.7-acre portion of the parcel with TMK 9-2-01-1. The site faces open agricultural land on the North. Honouliuli Gulch passes on the West and South sides of the site as it meanders its way to the H-1 Freeway crossing and ultimately the ocean. Alternative Site D is an 8.9-acre portion of lot identified by TMK 9-1-18-1 located makai of the H-1 Freeway. The property is relatively flat and currently used by independent farmers for growing vegetables and diversified agriculture. The parcel is currently zoned as Restricted Agricultural District, AG-1. The average grade of the site is a little less than 3 percent, and elevations range from 203 feet to 220 feet above Mean Sea Level.

8.3.2 Alternative Sites Summary

Based on an evaluation of the proposed site and alternative sites A through D, the "Alternative Sites" alternative would use a site for the 6 MG reservoir that would be less feasible than the proposed site in many ways. In general, an alternative location would lead to higher construction costs, higher maintenance requirements and more disruptive grading and drainage impacts to the area. The complete study of alternative sites can be found in the *"Site Feasibility Study for Honouliuli 228' Reservoir No. 3 - Prefinal Submittal"* (Reference No. 9), dated July 1999.

SECTION 9
FINDINGS AND NOTICE OF
ANTICIPATED DETERMINATION



Marc M. Siah & Associates, Inc.

Consulting Civil • Structural • Environmental & Ocean Engineers
810 Richards Street, Suite 888, Honolulu, Hawaii 96813

SECTION 9

FINDINGS AND NOTICE OF ANTICIPATED DETERMINATION

9.1 Significance Criteria

The proposed water reservoir construction project described in this environmental assessment involves the construction of a 6 million gallon (6 MG) reservoir in the Honouliuli area of the Ewa Plains. The reservoir will be located on a 14.3 acre portion of a lot identified by TMK: 9-2-01-1, mauka of the H-1 Freeway and owned by the Estate of James Campbell. The construction of this 6 MG reservoir will increase water storage capacity of the Ewa-Waipahu 228' Water System and will enhance the Honolulu Board of Water Supply's capability to provide potable water service and adequate fire protection to the Ewa area.

The proposed reservoir construction project would not have a significant impact on the environment. Therefore, an Environmental Impact Statement is not required for the project. Based on the "Significant Criteria" listed in Section 12 of the Hawaii Administrative Rules Title 11, Chapter 200, an applicant or agency must determine whether an action may have a significant impact on the environment, including all phases of the project, its expected consequences both primary and secondary, its cumulative impact with other projects, and its short and long term impacts. In making the determination, the "Significant Criteria" Rules are established as the basis for identifying whether the proposed project has significant environmental impacts. Based on the analysis, the following conclusions are reached:

1. *The reservoir construction would not result in irrevocable commitment to loss or destruction of any natural or cultural resources.* The proposed improvement would be on a site that has been determined to have no outstanding vegetative features and no proposed or listed, threatened or endangered species (see Appendix C). Furthermore, the State of Hawaii Department of Land and Natural Resources, Historic Preservation Division reported that no known historic sites are in the area of the proposed reservoir site, nor is it likely that any will be found (see Appendix D).
2. *The proposed project would not curtail the range of beneficial uses of the environment.* The proposed site will no longer be available for agricultural purposes. This loss will be permanent. However, ample land is available elsewhere on Oahu to easily accommodate any projected growth of diversified agriculture. In other words, this project will have little or no impact on agricultural activities since it is the size of the market and not the availability of land which defines the limits to the growth of diversified agriculture.
3. *The proposed project does not conflict with the state's long term environmental policies or goals and guidelines.* These policies, as set forth in Chapter 344, Hawaii Revised

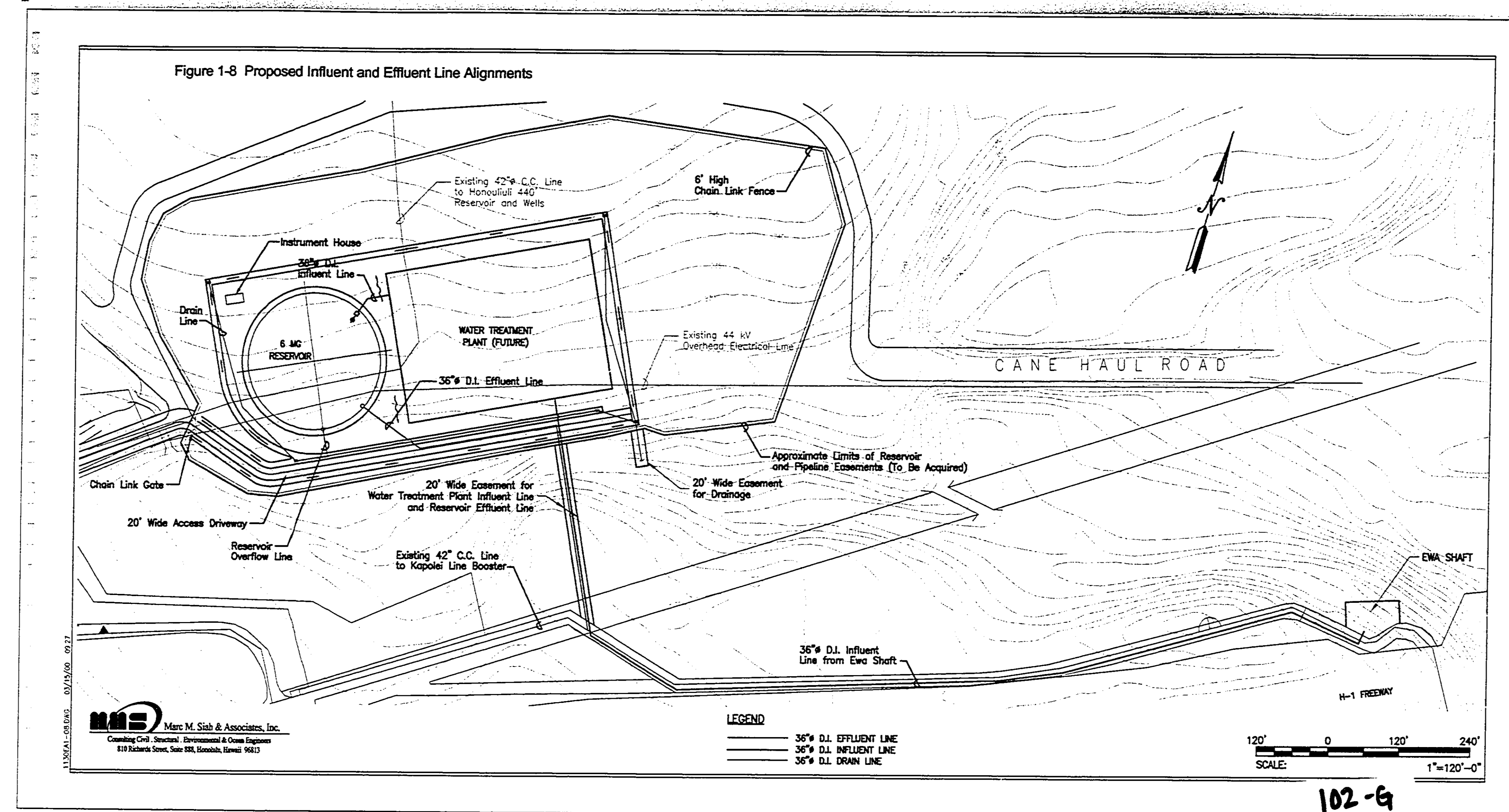
**FINDINGS AND NOTICE OF ANTICIPATED DETERMINATION
SECTION NINE**

Statutes, espouse conservation of natural resources and enhancement of the quality of life. The proposed project would not significantly impact natural resources due to the relatively small amount of land being used. Additionally, by improving water storage capacity, and therefore water service, it would promote general welfare, improve reliability and availability of water in the area and would enhance the Honolulu Board of Water Supply's capability to provide potable water service to the Ewa area.

4. *The economic or social welfare of the community or state would not be affected.* The proposed reservoir construction project would have a long term affect on the social welfare of the community and state in a positive way. Construction of the proposed reservoir would result in temporary economic benefits to the construction industry and indirectly to other economic sectors as well. It would also provide a valuable resource for future economic and social use. Short term negative impacts would occur during construction to include an increase in traffic and noise to the area.
5. *The proposed project would not substantially affect public health.* The project would improve reliability of the existing water system and would ensure an adequate supply of water for public consumption and fire protection.
6. *No substantial secondary impacts, such as population change, or effects, on public facilities are anticipated.* The proposed improvements are necessary to establish a reliable water supply system for the community. Due to its nature, it would not cause relocation and/or any changes in the population of the area. However, the proposed reservoir construction would aid in accommodating the inevitable population increases in the Ewa area.
7. *No substantial degradation of environmental quality is anticipated.* The project area is unremarkable in terms of environmental resources and standard mitigation measures would suffice to protect the ambient environmental quality. The project is not expected to result in concentrations of air or water pollutants exceeding state or federal standards at any time.
8. *The proposed action does not involve a commitment to larger actions, nor would its cumulative impacts result in considerable effects on the environment.* The proposed improvement is supplemental to the existing public water supply system and in no way implies a commitment for further upgrades or additions to the system. The project would help to provide a reliable, safe and efficient water supply system for the community.
9. *No rare, threatened or endangered species or their habitats would be affected.* No known endangered, threatened or candidate floral species would be affected by the

project. A botanical survey of the area under investigation was conducted by the Botanical Consultants, details of which are presented in Appendix C. The site has no outstanding vegetative features and no proposed or listed, threatened or endangered species were found during the field survey. The survey report further concludes that the proposed reservoir site is free of any significant and/or endangered species as set forth in the Endangered Species Act of 1973, and none were found during the survey.

10. *Air quality, water quality or ambient noise levels would not be detrimentally affected.* There are no significant air or water quality impacts anticipated for this project. Short term impacts from construction activity include increased noise levels, dust and exhaust from construction machinery. Implementation of proper mitigative measures such as silt fencing and mufflers for heavy machinery would ensure all compliance requirements.
11. *The project would not affect environmentally sensitive areas, such as flood plains, tsunami inundation zones, erosion-prone areas, geologically hazardous lands, fresh waters or coastal waters.* No environmentally sensitive areas would be affected by the project. The proposed project is well inland of the coast and outside of tsunami inundation zones, flood plains, and geologically hazardous lands. Seismic risks are also minimal. Furthermore, any discharge or drainage into Honouliuli Stream will comply with National Pollutant Discharge Elimination System (NPDES) permitting regulations.
12. *The proposed project would not substantially affect scenic vistas and view planes identified in county or state plans or studies.* There will be a minimal affect on the visual characteristics in the vicinity of the project site. In order to mitigate this impact on the visual resources of the area, a series of trees such as Geranium-leafed Aralia or Wiliwili (both of which can grow up to a 20-foot height) will be planted on the side of the reservoir facing the H-1 Freeway. These trees will screen the reservoir from view. Alternatively, any of the columnar coral tree family trees such as Erythrina Variegata, which grows to considerable heights, can be used to accomplish this screening. Further mitigation to impacts on visual resources includes grassing all areas cut away in order to accommodate construction.
13. *The proposed project would not require substantial energy consumption.* Construction of the reservoir would not require substantial energy consumption. Most of the work would be done manually or with machines. Electrical energy would be used minimally during construction and following construction the operation of reservoirs generally do not require constant use of energy.



9.2 Notice of Anticipated Determination

On the basis of the forgoing information, it is anticipated that the proposed water reservoir construction would not have significant impacts on the environment. As such, a notice of anticipated determination of *Findings of No Significant Impacts* for the proposed improvement is appropriate.

9.3 Reasons Supporting The Anticipated Determination

The nature and scale of the proposed improvement is such that no significant environmental impacts are anticipated. Potential impacts, if any, can be mitigated or minimized through sensitive site planning and engineering design, implementation of careful construction methods and compliance with all governmental requirements including those of the State Department of Health, the City and County of Honolulu's Department of Design and Construction and the City and County of Honolulu's Department of Planning and Permitting.

SECTION 10
AGENCIES AND BOARDS CONSULTED



Marc M. Siah & Associates, Inc.

Consulting Civil • Structural • Environmental & Ocean Engineers
810 Richards Street, Suite 888, Honolulu, Hawaii 96813

SECTION 10

AGENCIES AND BOARDS CONSULTED

10.1 Federal

U.S. Fish and Wildlife Service
United States Department of the Interior
Pacific Islands Ecoregion
P.O. Box 50088
Honolulu, HI 96850

National Resources Conservation Service
Department of Agriculture
P.O. Box 50004
300 Ala Moana Blvd.
Honolulu, HI 96850

10.2 State

State of Hawaii
Department of Land and Natural Resources
Division of Forestry and Wildlife
P.O. Box 621
Honolulu, Hawaii 96809

State Historic Preservation Division
Department of Land and Natural Resources
33 South King Street, 6th floor
Honolulu, Hawaii 96813

Hawaii State Department of Health - Clean Water Branch
NPDES Permitting, Room 301
919 Ala Moana Boulevard
Honolulu, Hawaii 96814

University of Hawaii - Manoa Campus
Environmental Center
2550 Campus Road, Crawford 317
Honolulu, HI 96822

Senator Brian Kanno, District 20
State Capitol
Room 202
415 South Beretania Street
Honolulu, Hawaii 96813

Representative Mark Moses, District 42
State Capitol
Room 310
415 South Beretania Street
Honolulu, Hawaii 96813

10.3 City and County

Department of Planning and Permitting
Zoning Division, Land Use
City and County of Honolulu
Attn: Randall Fujiki, AIA
650 South King Street
Honolulu, Hawaii 96813

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

Councilmember John DeSoto
City Hall
Room 202
530 South King Street
Honolulu, Hawaii 96813

Makakilo/Kapolei/Honokahale Neighborhood Board
c/o Neighborhood Commission
City Hall, Room 400
Honolulu, Hawaii 96813

10.4 Other Agencies

GTE Hawaiian Tel
P.O. Box 2200
Honolulu, Hawaii 96841

AGENCIES AND BOARDS CONSULTED
SECTION TEN

The Gas Company
515 Kamakee Street
Honolulu, Hawaii 96814

Hawaiian Electric Company, Inc.
P.O. Box 2750
Honolulu, Hawaii 96840

Hawaii's 1000 Friends
Phone No.: (808) 262-0682

Historic Hawaii Foundation
860 Iwilei Road, Suite 690
Honolulu, Hawaii 96817

The Nature Conservancy
1116 Smith Street, Suite 201
Honolulu, Hawaii 96817

Oceanic Cable
200 Akamainui Street
Honolulu, Hawaii 96789

The Outdoor Circle
1314 South King Street, Suite 306
Honolulu, Hawaii 96814

The Sierra Club
Hawaii Chapter
P.O. Box 2577
Honolulu, Hawaii 96803

SECTION 11
RESPONSES AND COMMENTS TO
DRAFT ENVIRONMENTAL ASSESSMENT



Consulting Civil • Structural • Environmental & Ocean Engineers
810 Richards Street, Suite 888, Honolulu, Hawaii 96813



August 23, 2000

Mr. Clifford S. Jamile
Manager and Chief Engineer
Board of Water Supply
630 South Beretania Street
Honolulu, Hawaii 96843

Attention: Mr. Michael Matsuo, P.E.
Planning and Engineering Division

Gentlemen:

Subject: Draft Environmental Assessment
Honouliuli 228' Reservoir No. 3
Honouliuli, Ewa, Oahu

Please be advised that The Gas Company does not currently have nor have any future plans to install any gas facilities in the project vicinity. Therefore, we do not need to be included in any future DEA reviews for this project.

Thank you for the opportunity to comment on the Draft Environmental Assessment. Should there be any questions, or if additional information is desired, please call me at 594-5570.

Very truly yours,

Charles E. Calvet, P.E.
Manager, Engineering

CEC:ln
00-104

cc: Mr. Kelly J. Chuck, Marc M. Siah & Associates, Inc.

THE GAS COMPANY
515 Kamae Street Honolulu Hawaii 96814
PO Box 3000 Honolulu Hawaii 96820 2000
Telephone 808 535 5600 Facsimile 808 584 5630 E-Mail

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



November 1, 2000

Mr. Charles E. Calvet, P.E.,
Manager, Engineering Division
The Gas Company
515 Kamae Street
Honolulu, Hawaii 96814

Dear Mr. Calvet:

Subject: Your Letter dated August 23, 2000 Regarding the Draft Environmental Assessment for the Honouliuli 228' Reservoir No. 3, Ewa, Oahu, Hawaii

Thank you for reviewing the environmental document for the proposed project. We acknowledge that you have no objections to the proposed project and will append your letter to the Final Environmental Assessment.

If you have any questions, please contact Mike Matsuo at 527-5121.

Very truly yours,

FOR CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: Kelly Chuck, Marc M. Siah & Associates, Inc.

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Manager and Chief Engineer

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Manager and Chief Engineer



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P.O. Box 2200 - Honolulu, HI 96841 - (808) 546-4511

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GTE Hawaiian Tel

Beyond the call

August 22, 2000

Mr. Clifford S. Jamile
Manager and Chief Engineer
Board of Water Supply
630 South Beretania Street
Honolulu, Hawaii 96843
Attention: Mr. Michael Matsuo, P.E.

Dear Mr. Michael Matsuo

Subject: DRAFT ENVIRONMENTAL ASSESSMENT FOR HONOLULU 228' RESERVOIR NO.3

Thank you for the opportunity to review and comment on the Board of Water Supply's Proposed Honolulu 228' Reservoir No.3. Upon review of the plan of the proposed Honolulu 228' Reservoir, it has been determined that GTE's telecommunications facilities currently serving the existing BMS Honolulu Reservoir No.2 traverses the proposed site along the existing east to west cane haul road will be impacted by the construction of the proposed reservoir.

If the temporary relocation and replacing to the original location of the existing telecommunications facilities along the east to west road are required during grading operations, GTE will require an AID TO CONSTRUCTION payment for this work to be done. An AID TO CONSTRUCTION payment will also be required if a permanent relocation is required due to insufficient vertical clearance for GTE facilities once the temporarily relocated pole line is restored to the original location.

GTE wishes to be a consulted party during the preparation of the Final Environmental Assessment and of any future electrical / telecommunications consultant plans that are produced for this project.

If you have any questions, please call Mahi Tsugawa at 840-5857.

Sincerely,

Llewellyn M. Tsugawa
Llewellyn H. Tsugawa
Designer-Access Design
Access Design & Construction

G:

Mr. Llewellyn M. Tsugawa
Designer-Access Design
Access Design & Construction
GTE Hawaiian Telephone Company, Inc.
P.O. Box 2200
Honolulu, Hawaii 96841

Dear Mr. Tsugawa:

Subject: Your Letter Dated August 22, 2000, Regarding the Draft Environmental Assessment for the Honolulu 228' Reservoir No.3, Ewa, Oahu, Hawaii

Thank you for reviewing the environmental document for the proposed project. In response to your comments, we offer the following:

During the design phase of the project, we will have our consultant review the existing location of your telecommunications facilities in relation to the proposed reservoir. We will also include a water note on the construction plans to indicate that any cost incurred by GTE to relocate and/or replace the facilities will be paid by the Board's contractor. Finally, we will include in the consultant's scope of work the requirement that construction plans be sent to all affected utilities for review and approval.

If you have any questions, please contact Mike Matsuo at 527-5121.

Very truly yours,

Clifford S. Jamile

FOR CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: Kelly Chuck, Marc M. Siah & Associates, Inc.

PHONE (808) 594-1888



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

August 21, 2000

Mr. Clifford S. Jamile, Manager and Chief Engineer
Board of Water Supply
630 South Beretania Street
Honolulu, Hawaii 96813
Attn: Mr. Michael Matsuo, P.E.
Planning and Engineering Division

Subject: Draft Environmental Assessment for the Honouliuli 228' Reservoir
No. 3, Honouliuli, Ewa, Oahu

Dear Mr. Matsuo,

Thank you for the opportunity to review and respond to the above-referenced document. As with any project, the Office of Hawaiian Affairs is concerned that subsurface archaeological, historical and cultural remains may be impacted as well as the cultural integrity of the land. To this effect, the Office of Hawaiian Affairs has no concerns at this time based upon the findings of the cultural and archaeological review.

We would, however, like to offer the following comment. In Figure 5-1(b) showing a computer rendering of the row of trees for screening out the proposed reservoir, we would like to suggest that the same procedure be done to the existing reservoir.

Should you have any questions, please contact Ken R. Salva Cruz, Policy Analyst, at 594-1847.

Sincerely,

Colin C. Kippen, Jr.

Colin C. Kippen, Jr.
Deputy Administrator

cc: Board of Trustees
Kelly J. Chuck/Marc Siah & Associates
OEQC
File

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December 1, 2000

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 Dated August 21, 2000, Regarding the Draft Environmental Assessment for the Honouliuli 228' Reservoir No. 3, Ewa, Oahu, Hawaii

Thank you for reviewing the environmental document for the proposed project. We acknowledge that you have no concerns about the proposed reservoir impacting the cultural integrity of the land and the subsurface archaeological, historical and cultural remains.

Also, upon further examination of the existing topography of the area, the computer-generated images in Figures 5-1 (a) and 5-1 (b) are not correct; the visual impact of both reservoirs will not be as severe as portrayed. We will therefore be revising these figures to more accurately show the visual impact of the reservoirs. Please note that the Board of Water Supply recently approved the plans for another new reservoir that will be constructed adjacent to the existing reservoir by a private developer. The plans include landscaping that will screen both the existing and the new reservoirs. Thus, in response to your comment on Figure 5-1 (b), the landscaping around the existing reservoir will be portrayed in the revised figure.

If you have any questions, please contact Mike Matsuo at 527-5121.

Very truly yours,

Clifford S. Jamile

FOR CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: Kelly Chuck, Marc M. Siah & Associates, Inc.

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NOBS E. SAALUJALA, E-Office
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Manager and Chief Engineer

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P.O. Box 50004
Honolulu, HI
96850

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September 11, 2000

Mr. Clifford S Jamile
Manager and Chief Engineer
Board of Water Supply
630 South Beretania Street
Honolulu, Hawaii 96843
Attn: Mr. Michael Matsuo, P.E.
Planning and Engineering Division

Dear Mr. Matsuo:

Subject: Draft Environmental Assessment (DEA) - Honouliuli 228' Reservoir No. 3,
Honouliuli, Ewa, Oahu

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,

John T. Lynch
KENNETH M. KANESHIRO
State Conservationist

Cc:
Mr. Kelly J. Chuck, Marc M. Siab & Associates, Inc., 810 Richards Street, Suite 888,
Honolulu, Hawaii 96813

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

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CITY AND COUNTY OF HONOLULU
830 SOUTH BERETANIA STREET
HONOLULU, HI 96843



November 1, 2000

Mr. Kenneth M. Kaneshiro
State Conservationist
United States Department of Agriculture
Natural Resources Conservation Service
P.O. Box 50004
Honolulu, Hawaii 96850

Dear Mr. Kaneshiro:

Subject: Your Letter Dated September 11, 2000, Regarding the Draft Environmental
Assessment for the Honouliuli 228' Reservoir No. 3, Ewa, Oahu, Hawaii

Thank you for reviewing the environmental document for the proposed project. We
acknowledge that you have no comments on the proposed project and will append your letter to
the Final Environmental Assessment.

If you have any questions, please contact Mike Matsuo at 527-5121.

Very truly yours,

Clifford S. Jamile
FOR CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: Kelly Chuck, Marc M. Siab & Associates, Inc.

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Manager and Chief Engineer

Hawaiian Electric Company, Inc. - PO Box 2750 - Honolulu, HI 96840-0001

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ROSS S. SASAKAWA, Ex-Officio
CLIFFORD S. JAMILE
Manager and Chief Engineer

November 1, 2000

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September 15, 2000



Scott W.H. Seu, P.E.
Manager
Environmental Department

Mr. Scott Seu, Manager
Environmental Department
Hawaiian Electric Company, Inc.
P.O. Box 2750
Honolulu, Hawaii 96840-0001

Mr. Clifford S. Jamile
Manager and Chief Engineer
Board of Water Supply
630 South Beretania Street
Honolulu, Hawaii 96813

Attention: Mr. Michael Matsuo, P.E.

Subject: Honouliuli 228' Reservoir No. 3

Thank you for the opportunity to comment on your July 2000 Draft EA for the Honouliuli 228' Reservoir No. 3. We have reviewed the subject document and have the following comment:

The HECO 48 KV transmission line will have to be relocated around the facility. Electrical service could be taken off the existing 48 KV transformer serving the existing facility or if 3-phase power is required, service could be taken off the relocated sub transmission line.

Our point of contact for this project, and the originator of these comments, is Bill Muench (S-43-5657) senior customer engineer. I suggest your staff and consultants deal directly with Bill to coordinate HECO's continuing input on this project.

Sincerely,

Michael Matsuo
for Scott Seu

cc: W. Muench

OEOC

Mr. Kelly J. Chuck
Marc M. Siah & Associates



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Dear Mr. Seu:
Subject: Your Letter Dated September 15, 2000, Regarding the Draft Environmental Assessment for the Honouliuli 228' Reservoir No. 3, Ewa, Oahu, Hawaii

Thank you for reviewing the environmental document for the proposed project.

We will comply with relocating the existing HECO 46 kV transmission line and obtaining electrical service from the appropriate facilities. We will also instruct our consultant and contractor to coordinate this work with Bill Muench, your senior customer engineer, during the design phase of the project.

If you have any questions, please contact Mike Matsuo at 527-5121.

Very truly yours,

Clifford S. Jamile

FOR CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: Kelly Chuck, Marc M. Siah & Associates, Inc.

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JAN ALLY, J. III
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BARBARA KIM STANTON

KAZUHIYASHIDA, Esq.
ROSS S. SASAKAWA, Esq.
CLIFFORD S. JAMILE
Manager and Chief Engineer



November 1, 2000

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

September 13, 2000

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Mr. Clifford S. Jamile
Manager and Chief Engineer
Board of Water Supply
630 South Beretania Street
Honolulu, HI 96843
Attention: Mr. Michael Matsuo, P.E.
Planning and Engineering Division

Dear Mr. Jamile:

Draft Environmental Assessment (DEA) for the
Honouliuli Reservoir No. 3, Honouliuli, Ewa, Oahu

We have the following comments regarding the subject DEA:

1. The existing dirt roads in the vicinity of the reservoir site are currently used by Estate farmers to access their agricultural fields. There needs to be continuous access available to Campbell Estate farmers to reach their fields during construction of the reservoir.
2. Any excess excavation resulting from construction of the reservoir must be removed to insure that the existing drainage areas are not reduced or adversely impacted.

If you have any questions, please call Bert Hatton at 674-3232.

Very truly yours,

Donna B. Goth
Director, Hawaii Properties

21-01004600X10005

cc: Mr. Kelley J. Chuck
Marc M. Siah and Associates, Inc.
810 Richards Street, Suite 888
Honolulu, HI 96813

Ms. Donna B. Goth
Director, Hawaii Properties
Estate of James Campbell
1001 Kamokila Boulevard
Kapolei, Hawaii 96707

Dear Ms. Goth:

Subject: Your Letter Dated September 13, 2000, Regarding the Draft Environmental Assessment for the Honouliuli 228' Reservoir No. 3, Ewa, Oahu, Hawaii

Thank you for reviewing the environmental document for the proposed project. In response to your comments, we offer the following:

1. We will instruct our contractor to ensure that access be maintained to the existing dirt roads and fields in the area during construction.
2. Excess excavation from the construction of the reservoir will be removed from the site so that existing drainage areas are not reduced or adversely impacted. Also, best management practices will be used to minimize soil erosion and transport during construction.

If you have any questions, please contact Mike Matsuo at 527-5121.

Very truly yours,

FOR CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: Kelly Chuck, Marc M. Siah & Associates, Inc.

21-01004600 - WSP, i-f-o

for Mr. Hatton our limited need - use if useful

DEPARTMENT OF TRANSPORTATION SERVICES
CITY AND COUNTY OF HONOLULU
 BOARD OF WATER SUPPLY

PACIFIC PAPER PLANT • 311 HANOLANI BOULEVARD, SUITE 1300 • HONOLULU, HAWAII 96813
 PHONE: (808) 535-4810 • FAX: (808) 535-4730



JEREMY HARRIS
 11/20/00

PLN-126/00
 RECEIVED
 BOARD OF WATER SUPPLY

cc: *ejl* 10/25 1 25 PM '00
PE

CHERYL D. SOON
 DIRECTOR
 JOSEPH M. MAGALON, JR.
 DEPUTY DIRECTOR

TPS/00-03831R
 Oct 26 4 24 PM '00

October 20, 2000

MEMORANDUM

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

ATTN: MICHAEL MATSUO, P. E., PLANNING AND ENGINEERING DIVISION

FROM: CHERYL D. SOON, DIRECTOR

SUBJECT: HONOLULU 228 RESERVOIR NO. 3

In response to the August 9, 2000 letter from Marc M. Siah & Associates, Inc., the draft environmental assessment (EA) for the subject project was reviewed. The following comments are the result of this review:

1. The traffic impact on Farrington Highway during the construction phase is summarized in G. Probable Impacts on Page 6-2 of the draft EA. This section states that flagmen will be used to ensure smooth traffic flow along the highway. It is not clear whether traffic will need to be directed on any City street or intersection. If traffic needs to be directed on any City street or intersection, the use of police officers may be required because they are legally authorized to "direct" traffic flow on City streets. Flagmen are only allowed in cases where "stop and go" vehicular conditions exist.
2. The draft EA states that the project site is currently accessed by a dirt road which branches off from the main black-top road. It is also estimated that approximately 300,000 cubic yards of material will be excavated and hauled away from the site. In view of this, the draft EA should discuss what mitigative measures will be taken to minimize the possible tracking of mud/dirt along City streets.

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

cc: Mr. Kelly J. Chuck
 Marc M. Siah & Associates, Inc.

C Cheryl D. Soon
 CHERYL D. SOON

RECEIVED DEC 5 2000 1130 AM
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BOARD OF WATER SUPPLY
 CITY AND COUNTY OF HONOLULU
 830 SOUTH KERTANUA STREET
 HONOLULU, HAWAII 96843

November 24, 2000

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

FROM: FOR CLIFFORD S. JAMILE
C S Jamile

SUBJECT: YOUR MEMORANDUM DATED OCTOBER 20, 2000 REGARDING
 THE DRAFT ENVIRONMENTAL ASSESSMENT FOR THE
HONOLULU 228 RESERVOIR NO. 3, EWA OAHU, HAWAII

Thank you for reviewing the environmental document for the proposed project. We have the following responses to your comments:

1. Traffic will not need to be directed on to any City streets. The cane haul road that travels adjacent to the site is privately owned and the nearest public right-of-way is State owned.
2. Best Management Practices will be used to mitigate the possible tracking of mud/dirt along City streets. All unpaved ingresses and egresses will be graveled, and it will be the Contractor's responsibility to ensure that all vehicles leaving the construction site are free of mud.

If you have any questions, please contact Mike Matsuo at 527-5121.

cc: Kelly Chuck, Marc M. Siah & Associates, Inc.

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EDDIE FLORES, JR., Chairman
CHARLES A. STED, Vice-Chairman
JAN LILLY, JAMIE
HERBERT EK, KAPOLUA, SA
BARBARA DEL STANTON
KAZUO HAYASHIDA, E-OROE
ROSS E. SUGAMURA, E-OROE
CLIFFORD S. JAMILE
Manager and Chief Engineer



November 1, 2000

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

THOMAS E. JAMILE, CHAIRMAN
BOARD OF LAND AND NATURAL RESOURCES
SERVING
JANET T. LAMMERS
AQUATIC RESOURCES
SOUTH AND OCEANIC
CONSERVATION AND
DIVISION
QUALITY AND
POLICY AND
HISTORIC PRESERVATION
LAND
STATE PARKS
WATER RESOURCE MANAGEMENT



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
HISTORIC PRESERVATION DIVISION
401 South Beretania Street, Room 111
Honolulu, Hawaii 96813
(808) 551-2100

August 23, 2000

Mr. Clifford S. Jamile
Manager and Chief Engineer
Board of Water Supply
630 South Beretania Street
Honolulu, Hawaii 96843
Attn: Mr. Michael Matsuo, P. E.
Planning and Engineering Division

LOG NO: 26052 ✓
DOC NO: 0008EJ11

Dear Mr. Jamile:

SUBJECT: Chapter 6E-8 Historic Preservation Review - Draft Environmental Assessment (DEA) for the Honouliuli 228' Reservoir No. 3 Honouliuli, 'Ewa, O'ahu
TMFK: 9-2-001:001

Thank you for the opportunity to comment on the DEA for the new BWS reservoir in Honouliuli, 'Ewa, O'ahu. The DEA correctly incorporates our comments that this project will have "no effect" on historic sites. Our complete review comment is included in Appendix D of the DEA.

If you have any questions please call Elaine Jourdan at 692-8027.

Aloha,

DON HIBBARD, Administrator
State Historic Preservation Division

EJ:an

Cc: Mr. Kelly J. Chuck, Marc M. Siah & Associates, Inc., 810 Richards Street, City Center Building, Suite 888 Honolulu, Hawaii 96813

Mr. Don Hibbard, Administrator
Historic Preservation Division
Department of Land and Natural Resources
State of Hawaii
Kakuhikewa Building, Room 555
501 Kamehaha Boulevard
Kapolei, Hawaii 96707

Dear Mr. Hibbard:

Subject: Your Letter Dated August 23, 2000, Regarding the Draft Environmental Assessment for the Honouliuli 228' Reservoir No. 3, 'Ewa, Oahu, Hawaii

Thank you for reviewing the environmental document for the proposed project. We acknowledge your comments and will append your letter to the Final Environmental Assessment. If you have any questions, please contact Mike Matsuo at 577-5121.

Very truly yours,

FOR CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: Kelly Chuck, Marc M. Siah & Associates, Inc.

Aug 28 3 23 PM '00

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BD OF WATER SUPPLY
SEP 14 23 PM '00

DEPARTMENT OF DESIGN AND CONSTRUCTION
CITY AND COUNTY OF HONOLULU
610 SOUTH KING STREET, 11TH FLOOR
HONOLULU, HAWAII 96813
Phone: (808) 523-4184 Fax: (808) 523-4587
Website: www.dac.honolulu.gov

JEREMY HARRIS
MAYOR



August 31, 2000

WWDE.P 00-599

000795

PE

GARY Q.L. YEE, AIA
DIRECTOR
ROLAND D. LEBBY, JR., AIA
DEPUTY DIRECTOR

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



November 1, 2000

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JEREMY HARRIS, Mayor
EODE FLORES, Jr., Chairman
CHARLES A. FITZ, Vice-Chairman
JAMILLY, AIE
HERBERT B.K. SAOKUA, Sr.
BARBARA JOHNS STANTON
KAZU HAYASHIDA, Esq.
ROSS B. SAJAJURA, Esq.
CLIFFORD S. JAMILE
Manager and Chief Engineer

MEMORANDUM

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

ATTN: MR. MICHAEL MASTUO, PE

FROM: FOR GARY Q.L. YEE, AIA, DIRECTOR
DEPARTMENT OF DESIGN AND CONSTRUCTION

SUBJECT: DRAFT ENVIRONMENTAL ASSESSMENT FOR THE
HONOLULULI 228' RESERVOIR NO. 3, HONOLULULI, EWA, OAHU

The Wastewater Planning Branch has reviewed the Draft Environmental Assessment for the Honolululi 228' Reservoir No. 3, Honolululi, Ewa, Oahu.

The proposed action, as described in the DEA, has no near term or long-term impacts on the Honolululi Wastewater System. Therefore, we have no comments at this time.

Thank you for the opportunity to review the DEA for this project. If you have any questions, please contact Tim Steinberger at 527-5388.

TO: MR. GARY Q.L. YEE, AIA, DIRECTOR
DEPARTMENT OF DESIGN AND CONSTRUCTION

FROM: FOR CLIFFORD S. JAMILE

SUBJECT: YOUR MEMORANDUM DATED AUGUST 31, 2000, REGARDING
THE DRAFT ENVIRONMENTAL ASSESSMENT FOR THE
HONOLULULI 228' RESERVOIR NO. 3, HONOLULULI, EWA, OAHU

Thank you for reviewing the environmental document for the proposed project. We acknowledge that you have no comments to offer since the proposed facility will have no near or long term impacts on the Honolululi Wastewater system. We will append your letter to the Final Environmental Assessment.

If you have any questions, please contact Mike Matsuo at 527-5121.

cc: Kelly Chuck, Marc M. Siah & Associates, Inc.

11/30/01
8 2000

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BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96813

P-648/00
The Nature Conservancy of Hawaii

December 4, 2000

September 18, 2000

Mr. Clifford Jamille
Manager and Chief Engineer
Board of Water Supply
630 S. Beretania Street
Honolulu, HI 96813

Dear Mr. Jamille:

Thank you for the opportunity to comment on the Board of Water Supply's Draft Environmental Assessment (DEA) for the proposed Honouliuli 228' Reservoir No. 3. As you may be aware, The Nature Conservancy manages Honouliuli Preserve, a forest area in the southern Wai'anae mountains for biodiversity protection, located north of your project. Honouliuli Preserve is home to more than 70 species of rare and endangered plants and animals and several native natural communities.

The Board of Water Supply (BWS) has the opportunity to revegetate the area around the project site to mitigate impact on visual resources (page 3-2). We recommend that the BWS use native plants that may have once grown in the area. Please consult us regarding a list of species that would be suitable as well as the possibility of obtaining seeds or seedlings from us.

As expressed in our letter of April 13, 2000 regarding the proposed Ewa Shaft (which will provide water to the Honouliuli 228' reservoir), we are concerned about the potential impact of increased freshwater removal on the watershed. We request that your Draft Environmental Assessment (for both the Ewa Shaft and Honouliuli 228' reservoir) include discussion on this topic, including the role of native forests as a source of water for the project.

Thank you for your consideration of our comments. Please contact me at 677-1674 should you have any questions.

Aloha
Pauline M. Salo
Pauline M. Salo
Director, O'ahu Program

cc: Mr. Kelly Chuck

Ms. Pauline M. Salo
Director, O'ahu Program
The Nature Conservancy of Hawaii
923 Nu'uuanu Avenue
Honolulu, Hawaii 96817

Dear Ms. Salo:

Subject: Your Letter Dated September 18, 2000 Regarding the Draft Environmental Assessment for the Honouliuli 228' Reservoir No. 3, Ewa, Oahu, Hawaii

Thank you for reviewing the environmental document for the proposed project. In response to your comments, we offer the following:

1. We understand your concern about the Honouliuli watersheds and support your efforts to restore and protect the Honouliuli preserve in the upper Wai'anae mountains. As you may be aware, we are working with the State Department of Land and Natural Resources, Forestry and Wildlife Division, along with the Department of Agriculture, the military and the other County water departments to formulate a watershed protection board that will develop management plans for our watersheds that directly supply our high quality drinking water aquifers and streams. Forested watersheds retain rainfall runoff to allow deep percolation into the underlying aquifer.
2. We appreciate the offer of the Nature Conservancy to provide advice on the types of native plants used for landscaping the reservoir site. The intent of the reservation siting was to minimize visual impact and blend the site with the adjacent vegetation.
3. Based on current water use, the existing Ewa-Waipahu 228' system is short approximately 6 million gallons of storage capacity. Existing sources within this system currently supply the area's demands. Figure 3-10 in the Draft Environmental Assessment details the various sources and other components of this water system.

89 19 2 03 PM '00

Pauline M. Salo
Director, O'ahu Program
The Nature Conservancy of Hawaii
923 Nu'uuanu Avenue
Honolulu, HI 96817
Tel: (808) 535-4343
Fax: (808) 535-3897

Clifford Jamille
Manager and Chief Engineer
Board of Water Supply
630 S. Beretania Street
Honolulu, HI 96813
Tel: (808) 535-4343
Fax: (808) 535-3897

The Nature Conservancy
11 Dupont Circle, N.W.
Washington, D.C. 20036
Tel: (202) 462-6286
Fax: (202) 462-6287
www.nature.org

RECEIVED DEC 8 2000
11:30 AM
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December 4, 2000

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96813

P-648/00
The Nature Conservancy of Hawaii

September 18, 2000

Mr. Clifford Jamille
Manager and Chief Engineer
Board of Water Supply
630 S. Beretania Street
Honolulu, HI 96813

Dear Mr. Jamille:

Thank you for the opportunity to comment on the Board of Water Supply's Draft Environmental Assessment (DEA) for the proposed Honouliuli 228' Reservoir No. 3. As you may be aware, The Nature Conservancy manages Honouliuli Preserve, a forest area in the southern Wai'anae mountains for biodiversity protection, located north of your project. Honouliuli Preserve is home to more than 70 species of rare and endangered plants and animals and several native natural communities.

The Board of Water Supply (BWS) has the opportunity to revegetate the area around the project site to mitigate impact on visual resources (page 5-2). We recommend that the BWS use native plants that may have once grown in the area. Please consult us regarding a list of species that would be suitable as well as the possibility of obtaining seeds or seedlings from us.

As expressed in our letter of April 13, 2000 regarding the proposed Ewa Shaft (which will provide water to the Honouliuli 228' reservoir), we are concerned about the potential impact of increased freshwater removal on the watershed. We request that your Draft Environmental Assessments (for both the Ewa Shaft and Honouliuli 228' reservoir) include discussion on this topic, including the role of native forests as a source of water for the projects.

Thank you for your consideration of our comments. Please contact me at 677-1674 should you have any questions.

Aloha,
Pauline M. Sato
Pauline M. Sato
Director, O'ahu Program

cc: Mr. Kelly Chuck

Ms. Pauline M. Sato
Director, O'ahu Program
The Nature Conservancy of Hawaii
923 Nu'uuanu Avenue
Honolulu, Hawaii 96817

Dear Ms. Sato:

Subject: Your Letter Dated September 18, 2000 Regarding the Draft Environmental Assessment for the Honouliuli 228' Reservoir No. 3, Ewa, Oahu, Hawaii.

Thank you for reviewing the environmental document for the proposed project. In response to your comments, we offer the following:

1. We understand your concern about the Honouliuli watersheds and support your efforts to restore and protect the Honouliuli preserve in the upper Wai'anae mountains. As you may be aware, we are working with the State Department of Land and Natural Resources, Forestry and Wildlife Division, along with the Department of Agriculture, the military and the other County water departments to formulate a watershed protection board that will develop management plans for our watersheds that directly supply our high quality drinking water aquifers and streams. Forested watersheds retain rainfall runoff to allow deep percolation into the underlying aquifer.
2. We appreciate the offer of the Nature Conservancy to provide advice on the types of native plants used for landscaping the reservoir site. The intent of the reservation siting was to minimize visual impact and blend the site with the adjacent vegetation.
3. Based on current water use, the existing Ewa-Waipahu 228' system is short approximately 6 million gallons of storage capacity. Existing sources within this system currently supply the area's demands. Figure 3-10 in the Draft Environmental Assessment details the various sources and other components of this water system.

9 19 2 03 71 00


Pauline M. Sato
Director, O'ahu Program
The Nature Conservancy of Hawaii
923 Nu'uuanu Avenue
Honolulu, HI 96817
Phone: (808) 944-3000
Fax: (808) 944-3000
www.nature.org

Ms. Pauline M. Sato
December 4, 2000
Page 2

4. In our experience, the withdrawal of basal water sources does not impact forested waterbeds in the mountains. Additionally, the Ewa Shaft water source obtains water from the Koolau aquifer that overlies the Waianac aquifer and will not impact the Honoouliuli preserve. We generally find that dike sources that tap the high-level dike water supplies in the upper elevations of the mountains could impact these waterbeds. However, we do not have any dike sources in the upper Honoouliuli area.

If you have any questions, please contact Mike Matsuo at 527-5121.

Very truly yours,


FOR CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: Kelly Chuck, Marc M. Siab & Associates, Inc.

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RECEIVED DEC 4 2000

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

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SEP 15 12 25 PM '00



STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
235 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96813
TELEPHONE (808) 968-4198
FACSIMILE (808) 968-4198

September 11, 2000

Mr. Clifford S. Jamile, Manager & Chief Engineer
Board of Water Supply
630 South Beretania Street
Honolulu, Hawaii 96813

Dear Mr. Jamile:

Subject: Draft Environmental Assessment for the Honouliuli 228' Reservoir #3, Ewa, O'ahu
Thank you for the opportunity to review the subject project. We have the following comments.

1. To the extent possible, please disclose the impacts of the future water treatment plant.
2. Thank you for providing the computer generated photos of future conditions to disclose the visual impacts. We recommend providing a similar type of photo of the existing conditions as a comparison.
3. We support your proposal to screen the proposed reservoir with trees. We also recommend that the existing reservoir be screened with trees to minimize its visual impact.
4. Please disclose the approvals that would be required to build a reservoir on AG-1 lands.

Should you have any questions, please call Jeyan Thiruganum at 586-4185. Mahalo.

Sincerely,
Genevieve Salmonson
Genevieve Salmonson
Director

c: Marc M. Siah & Associates

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 Dated September 11, 2000, Regarding the Draft Environmental Assessment for the Honouliuli 228' Reservoir No. 3, Ewa, Oahu, Hawaii

Thank you for reviewing the environmental document for the proposed project. In response to your comments, we offer the following:

1. At this time, the Board of Water Supply (BWS) is not planning to construct the water treatment plant at the same time as the proposed reservoir. Therefore, the environmental impact of the plant is not addressed in the assessment. A separate Environmental Assessment will be prepared when a treatment facility near the reservoir becomes necessary.
2. Upon further examination of the existing topography of the area, the computer-generated images in Figures 5-1 (a) and 5-1 (b) are not correct; the visual impact of the reservoirs will not be as severe as portrayed. We will therefore revise the figures so that they more accurately portray the visual impact of the reservoirs and as requested, we will show the existing conditions in the revised figures for comparison.
3. The BWS has recently approved the plans of another new reservoir that will be constructed adjacent to the existing reservoir by a private developer and required them to include landscaping to screen both reservoirs.
4. The proposed reservoir is classified as a Type-A utility and is considered a permissible use for AG-1 lands. Therefore, no approvals are required to construct the proposed reservoir.

If you have any questions, please contact Mike Maisuo at 527-5121.

Very truly yours,
Clifford S. Jamile
FOR CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: Kelly Chuck, Marc M. Siah & Associates, Inc.



STATE OF HAWAII
DEPARTMENT OF HEALTH

P.O. BOX 3278
HONOLULU, HAWAII 96811-3278

March 29, 2000

INDUSTRIAL CERTIFIED
ENVELOPE

PROJECT ADDRESS: P.O. BOX 3278
HONOLULU, HI 96811

PERMIT NUMBER: 03070PKP.00

Mr. Kelly J. Chuck
March 29, 2000
Page 2

Mr. Kelly J. Chuck, P.E.
Project manager
Marc M. Siah and Associates, Inc.
810 Richards Street, Suite 888
Honolulu, Hawaii 96813

Dear Mr. Chuck:

Subject: **Honouliuli Reservoir No. 3**

The Department of Health has the following comments regarding the subject submittal dated March 15, 2000:

1. The Army Corps of Engineers should be contacted to identify whether a Federal permit (including a Department of Army permit) is required for this project. If it is determined that a Federal permit is required for the subject project, then a Section 401 Water Quality Certification would also be required from our office:
2. If the project involves any of the following discharges into State waters, a NPDES general permit is required for each activity:
 - a. Storm water runoff associated with construction activities, including clearing, grading, and excavation that result in the disturbance of equal to or greater than five (5) acres of total land area; and
 - b. Hydrotexing water.
3. The Department requires that Notice of Intent for NPDES general permits be submitted thirty days before the discharge is to occur.

Should you have any questions, please contact Ms. Kris Poenitz, Engineering Section of the Clean Water Branch, at 586-4309.

Sincerely,

DENIS R. LAU, P.E., CIIEEF
Clean Water Branch

KP:cr

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



November 1, 2000

Mr. Denis R. Lau, P.E., Chief
Clean Water Branch
Department of Health
State of Hawaii
P.O. Box 3378
Honolulu, Hawaii 96801-3378

Dear Mr. Lau:

Subject: Your Letter dated March 29, 2000, Regarding the Draft Environmental Assessment for the Honouliuli 228 Reservoir No. 3, Ewa, Oahu, Hawaii

Thank you for reviewing the environmental document for the proposed project.

As recommended, the Draft Environmental Assessment has identified all applicable permits, including those from the U.S. Army Corps of Engineers and the State Department of Health Clean Water Branch, that will need to be acquired prior to construction of the reservoir.

If you have any questions, please contact Mike Matrino at 527-5121.

Very truly yours,

FOR CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: Kelly Chuck, Marc M. Siah & Associates, Inc.

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JEREMY HARRIS, JAMES
EDGE FURUELL, JR., Chairman
CHARLES A. STEB, Vice-Chairman
JAN MULLY, ABE
HERBERT B.E. KACHULA, SR.
BARBARA ROSE STANTON
KAZUHIYASHIRO, Esq.-Clerk
ROSS E. SAUNDERS, Esq.-Clerk
CLIFFORD S. JAMILE
Manager and Chief Engineer



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET
HONOLULU, HAWAII 96813
August 14, 2000

THOMAS E. JONES
Chairman
Board of Land and Natural Resources
JAMES E. SAIVELD
Secretary

HONOLULU INCLUDES
PROCEDURES
ADULT RESOURCES
SOUTH PACIFIC REGIONAL
CONSTRUCTION AND
CONSTRUCTION AND
REDUCED IMPROVEMENT
CONTRACTS
LAND MANAGEMENT
LAND MANAGEMENT
STATE PLANNING
LAND DEVELOPMENT
LAND MANAGEMENT

Mr. Clifford S. Jamille
Manager and Chief Engineer
Attn: Mr. Michael Matsuo, P.E.
Planning and Engineering Division
Board of Water Supply
630 South Beretania Street
Honolulu, Hawaii 96843

Dear Mr. Jamille:

Subject: Draft Environmental Assessment (DEA) for the Honouliuli 228'
Reservoir No. 3, Honouliuli, Ewa, Oahu

We have reviewed the draft Environmental Assessment and related information as provided by your August 9, 2000, letter to the Department of Land and Natural Resources, Division of Forestry and Wildlife and we have no objections to your proposed construction of a 6 million gallon water reservoir in State Land Use District zoned Agriculture at Honouliuli, Ewa, Oahu. Thank you for the opportunity to comment on this draft Environmental Assessment.

Sincerely yours,

Michael G. Buck
Administrator

Copy: DOFAW, Oahu Branch
Kelly Chuck, Siah & Associates, Inc.

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STRENGTH COPY

EDDIE FLORES, JR., Chairman
CHARLES A. BITED, Vice-Chairman
JAN KELLY, At-Large
ROBERT E.K. KAOPIUA, SR.
BARBARA YAM STANTON

KAZU HAYASHIDA, E-ORIG
ROSS S. SAKAMURA, E-ORIG
CLIFFORD S. JAMILLE
Manager and Chief Engineer



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

November 1, 2000

Mr. Michael G. Buck, Administrator
Division of Forestry and Wildlife
Department of Land and Natural Resources
State of Hawaii
1151 Punchbowl Street
Honolulu, Hawaii 96813

Dear Mr. Buck:

Subject: Your Letter dated August 14, 2000, Regarding the Draft Environmental Assessment for the Honouliuli 228' Reservoir No. 3, Ewa, Oahu, Hawaii

Thank you for reviewing the environmental document for the proposed project. We acknowledge that you have no objections to the proposed project and will append your letter to the Final Environmental Assessment.

If you have any questions, please contact Mike Matsuo at 527-5121.

Very truly yours,

FOR CLIFFORD S. JAMILLE
Manager and Chief Engineer

cc: Kelly Chuck, Marc M. Siah & Associates, Inc.

NOV 21 05 AM '00

DEPARTMENT OF PLANNING AND PERMITTING

RECEIVED AND COUNTY OF HONOLULU

80 OF WATER SUPPLY, 850 SOUTH KING STREET • HONOLULU, HAWAII 96813

SEP 29 3 56 PM '00

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PE



RANDALL K. FUJIKI, AIA
DIRECTOR
LORETTA K.C. CHIE
DEPUTY DIRECTOR

2000/CLOG-4496(RY)

02 3 8 55 44 88

AGENCY ADDRESS
DATE/TIME

Clifford S. Jamile, Manager and Chief Engineer
Board of Water Supply
Page 2

MEMORANDUM

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

ATTN: MICHAEL MATSUO

FROM: RANDALL K. FUJIKI, AIA, DIRECTOR
DEPARTMENT OF PLANNING AND PERMITTING

SUBJECT: DRAFT ENVIRONMENTAL ASSESSMENT (DEA)
FOR HONOLULU 228' RESERVOIR NO. 3, HONOLULU, EWA
TAX MAP KEY: 2-2-1-POR-1

We have reviewed the above DEA and have the following comments:

Ewa Development Plan (DP)

The proposed project is consistent with the policies of the Ewa Development Plan for the provision of an adequate supply of water to support residential and commercial development in Ewa.

Ewa Public Infrastructure Map

The Ewa Public Infrastructure Map must be revised to include the proposal prior to the appropriation of land acquisition or construction funds.

Drainage Report

A drainage report to address any impact of the drainage system will be required when the grading/construction plans are submitted to the Department of Planning and Permitting for approval.

View Plans Analysis

The view plane analysis does not appear to represent existing conditions. We suggest that a photograph of the existing reservoir as seen from the view source depicted in Figures 5-1(a) be included for comparison. Also, please address any view impacts of the proposal on public views from Farrington Highway. Appropriate photographs of the existing reservoir should also be included.

Should you have any questions regarding the DP comments, please contact Raymond Young of our Community Action Plans Branch at 527-5839.

RKF:lh

cc: Kelly Chuck, Marc Siah & Associates

Doc 5490

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BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96813



JEREMY HARRIS, Director
EDDIE FLORES, Jr., Chairman
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BARBARA JOSE STANTON
KAZUHIYASHIMA, ES-ORCS
ROSS S. SALAMERA, ES-ORCS
CLIFFORD S. JAMILE
Manager and Chief Engineer

November 1, 2000

TO: MR. RANDALL K. FUJUKI, DIRECTOR
DEPARTMENT OF PLANNING AND PERMITTING

FROM: FOR CLIFFORD S. JAMILE

SUBJECT: YOUR MEMORANDUM DATED SEPTEMBER 29, 2000
REGARDING THE DRAFT ENVIRONMENTAL ASSESSMENT
FOR THE HONOLULU 228' RESERVOIR NO. 3, EWA OAHU, HAWAII

Thank you for reviewing the environmental document for the proposed project. We have the following responses to your comments:

1. We concur that the project is consistent with the Ewa Development Plan.
2. As requested, the Ewa Public Infrastructure Map will be revised as indicated to include the proposed reservoir prior to the appropriation of land acquisition and construction funds.
3. During the design phase of the project, we will have the consultant prepare a report to address the impacts of the reservoir's drainage system to the area. As directed, we will submit the report with the grading/construction plans to your department for review and approval.
4. Views of both the existing and proposed reservoirs from both Farrington Highway and the H-1 Freeway will be included in the Final Environmental Assessment (FEA). In addition, the visual impact of the proposed reservoir from Farrington Highway will be discussed in the FEA.

If you have any questions, please call Mike Masuo at 527-5121.

cc: Kelly Chuck, Marc M. Siah & Associates, Inc.

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BOARD OF WATER SUPPLY
SEP 1 10 45 AM '00



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

AUG 31 2000

IN REPLY REFER TO:
HWY-PS
2.9853

SEP 5 1 40 PM '00

KAZU HAYASHIDA
DIRECTOR
BOULEVARD DIRECTOR
BRYAN K. IRIKAWA
OLEIWAHIA, HAWAII

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU
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November 1, 2000

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KAZU HAYASHIDA, Esq.
ROSS E. SAJAJUMA, Esq.
CLIFFORD S. JAMILE
Manager and Chief Engineer

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

Dear Mr. Hayashida:

Subject: Your Letter Dated August 31, 2000, Regarding the Draft Environmental Assessment for the Honouliuli 228' Reservoir No. 3, Ewa, Oahu, Hawaii

Thank you for reviewing the environmental document for the proposed project.

We acknowledge that you have no objections to the proposed project and will append your letter to the Final Environmental Assessment. While we do not anticipate performing any work within the state right-of-way, we will coordinate with your department should our plans change.

If you have any questions, please contact Mike Matsuo at 527-5121.

Very truly yours,

FOR CLIFFORD S. JAMILE
FOR Manager and Chief Engineer

cc: Kelly Chuck, Marc M. Siah & Associates, Inc.

Mr. Clifford S. Jamile
Manager and Chief Engineer
Board of Water Supply
630 South Beretania Street
Honolulu, Hawaii 96843

Attention: Mr. Michael Matsuo

Dear Mr. Jamile:

Subject: Draft Environmental Assessment, Honouliuli 228' Reservoir No. 3, Honouliuli, Ewa, Oahu, TMK: 9-2-01; Por. 1

The proposed water reservoir facility will not impact our State highway facilities. We require the submittal of plans if there is any work to be done within our State highway right-of-way.

Very truly yours,

KAZU HAYASHIDA
Director of Transportation

cc: Marc M. Siah & Associates, Inc.
Attn: Kelly I. Chuck

Mr. Nelson Ayers
November 1, 2000
Page 2

bird found was the Zebra Dove (*Geopelia striata*). A single pair of House Sparrows or Feathered Mice (*Passer domesticus*) and a single Lesser Golden Plover (*Pirivalis dominica*) was also seen. The complete survey can be found in Appendix C of the DEA. A copy of the DEA can be found at the State of Hawaii's Office of Environmental Quality Control.

If you have any questions, please contact Mike Matsuo at 527-5121.

Very truly yours,



FOR CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: Kelly Chuck, Marc Siah & Associates, Inc.

REFERENCES



Marc M. Siah & Associates, Inc.

Consulting Civil • Structural • Environmental & Ocean Engineers
810 Richards Street, Suite 888, Honolulu, Hawaii 96813

REFERENCES

1. University of Hawaii, Department of Geography. *Atlas of Hawaii*, Second Edition. University of Hawaii Press. 1983.
2. State Department of Business, Economics Development & Tourism. *The State of Hawaii Data Book 1995*. State of Hawaii. 1995.
3. State Department of Business, Economic Development & Tourism. *State Land Use District Boundary Review*. State of Hawaii. 1992.
4. State Department of Business, Economic Development & Tourism. *State Land Use District Boundary Review. Executive Summary*. State of Hawaii. 1992.
5. U.S. Department of Agriculture, Soil Conservation Service. *Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii*. August 1972.
6. State Department of Land and Natural Resources, Division of Water and Land Development. *Rainfall Atlas of Hawaii, R76*. State of Hawaii. June 1986.
7. Macdonald, Gordon A., Abbott, Agatin T., and Peterson, Frank L. *Volcanoes in the Sea*. University of Hawaii Press. 1983.
8. Marc M. Siah & Associates, Inc. *Site Feasibility Study for Honouliuli 228' Reservoir No. 3*. Marc M. Siah & Associates, Inc. February 2000.
9. Marc M. Siah & Associates, Inc. *Draft Site Feasibility Study for Honouliuli 228' Reservoir No. 3*. Marc M. Siah & Associates, Inc. February 2000.
10. City and County of Honolulu, Neighborhood Commission. *Oahu's Neighborhood Board System Informational Boundary Maps*. City and County of Honolulu. June 1993.
11. Hawaii Cooperative Park Service Unit, Western Region National Resources and Research Division, National Park Service. *Hawaii Stream Assessment, A Preliminary Appraisal of Hawaii's Stream Resources, Report R84*. National Park Service. 1990.
12. Marc M. Siah & Associates, Inc. *Hydrologic Investigation - Drainage Study for Honouliuli Watershed, Oahu*. Marc M. Siah & Associates, Inc. February 2000.
13. PBR Hawaii. *East Kapolei Master Plan - Final Environmental Impact Statement*. PBR Hawaii. July 1998.

APPENDICES

Appendix A - Geotechnical Report



Marc M. Siah & Associates, Inc.

Consulting Civil • Structural • Environmental & Ocean Engineers
810 Richards Street, Suite 888, Honolulu, Hawaii 96813

**FEASIBILITY LEVEL
GEOTECHNICAL EXPLORATION REPORT
HONOULIULI 228-FEET RESERVOIR SITING STUDY
EWA, OAHU, HAWAII**

For

Marc M. Siah & Associates, Inc.
735 Bishop Street, Suite 312
Honolulu, Hawaii 96813

By:



*Geotechnical & Environmental Consultants
Construction Materials Testing Services*

HAWAII BRANCH OFFICE
94-547 Ukee Street, Suite 305
Waipahu, Hawaii 96797
Ph: (808) 676-1188 • Fax: (808) 676-1177

March 17, 1999

PSC Job No. 99603.10

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**FEASIBILITY LEVEL
GEOTECHNICAL EXPLORATION REPORT
HONOLULU 228-FEET RESERVOIR
EWA, OAHU, HAWAII**

March 17, 1999

PSC Job No. 99603.10

INTRODUCTION

This report presents the result of our limited geotechnical engineering exploration in support of the feasibility study for the proposed Honolulu 228-foot reservoir to be located in Ewa, Oahu, Hawaii. Our work was performed in accordance with the scope of work as outlined in our fee proposal dated October 19, 1997. The scope of this investigation included the following:

1. Scheduling the soil exploration;
2. Coordinating the drilling operations with the drilling contractor;
3. Drilling one boring to approximately 50 feet deep;
4. Providing a field engineer to monitor the drilling and sampling operations and to prepare log of the boring;
5. Reviewing available soils information of nearby sites;
6. Performing appropriate laboratory tests on selected soil samples to determine the relevant engineering characteristics of the soils encountered;
7. Analyzing the field and laboratory data and performing engineering analyses; and
8. Submitting a written report summarizing our feasibility level findings, conclusions and preliminary recommendations for the design and construction of the reservoir foundations and pavement sections, where appropriate.

The purpose of this exploration was to evaluate surface and subsurface soil/rock conditions at the site of the proposed facility to provide preliminary geotechnical information as part of the feasibility study for the construction of the reservoir. The recommendations and geotechnical design parameters for foundations and pavements provided in this report are based on the data and information obtained from our field exploration.



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Page 2

Our findings indicate that the proposed facility is feasible from a geotechnical engineering standpoint provided that the recommendations in this report are incorporated into the project plans and specifications.

PROJECT CONSIDERATIONS

The project site is located within a 530-acre parcel on the south side of H-1 Freeway in Ewa, Oahu, Hawaii. The location of the project site is shown on the Location Map on Plate No. 1.

The site is former sugar cane field that is currently being cultivated for various crops. From the information provided to this office, we understand that a feasibility study of the site is being done, and preliminary geotechnical information will be needed for the planning and siting of the proposed 6 MG reservoir for the Board of Water Supply.

The proposed reservoir will have a spillway elevation at 228 feet, a diameter of 100 feet and a height of approximately 20 feet.

FIELD EXPLORATION

DRILLING AND SOIL SAMPLING

Subsurface conditions at the project site were explored by drilling one boring to a depth of 50 feet. The approximate location of the boring is shown on Plate No. 2. The boring was advanced using a Mobile B-59 drill rig equipped with 6-inch hollow-stem augers and air-rotary drilling equipment. Samples were obtained at selected depths using a 2.4-inch I.D. by 3.0-inch O.D. split-barrel sampler and a 1.0-inch by 2.0-inch Standard Penetration Test (SPT) sampler driven with a 140-pound hammer falling 30 inches. Rock cores of 2 $\frac{3}{8}$ -inch diameter were obtained using an HQ-size core barrel.

During the drilling operations, our field engineer maintained a log of the soils encountered, obtained samples of the soils at selected depths, classified the soils by visual/manual methods and recorded the number of blows required to drive the sampler for each 6 inches of an 18-inch drive. The number of blows required to drive the sampler for the last 12-inches are presented on the boring logs. Sampling efforts were terminated when practical refusal was encountered.



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Page 3

A log of the boring is shown on Plate Nos. 3 and 4. Soils are classified in accordance with the Unified Soil Classification System as shown on Plate No. 5.

SUBSURFACE CONDITIONS

Our boring indicates that the subsurface soils within the proposed reservoir site consists of very stiff lean clay underlain by tuff rock (cemented volcanic ash). Numerous boulders and cobbles were encountered in the clay soil from about 7 feet to about 24 feet. Tuff exists below the clay soils to the depth explored at 50 feet. The tuff has a low to moderate hardness to about 35 feet. Below 35 feet, the tuff becomes friable and intensely fractured.

We recently performed an evaluation of the Ewa Shaft, which is located near the vicinity of the proposed reservoir site. The top of the Ewa Shaft is at about elevation 143, about 65 feet lower than the reservoir site level. Our review of the geology of the Ewa Shaft revealed that bedrock at the site consists of tholeiitic basalts and olivine basalt. Accordingly, it is possible that basalt rock may exist at a level below the bottom of the boring drilled at the reservoir site.

LABORATORY TESTING

The field classifications of the samples were visually verified in the laboratory. These classifications are presented on the boring logs.

MOISTURE CONTENT/DRY DENSITY

Moisture content and dry density determinations were performed on selected soil samples. The results were used to classify and evaluate the soil properties. Results of these tests are presented on the boring logs at the appropriate sample depths.

ATTERBERG LIMITS

The Atterberg Limits were determined on selected samples to classify the soil and to obtain an indication of the expansion and shrinkage potential of the soil with changes in moisture content. Results of these tests are shown on Plate No. 6.



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Page 4

TRIAXIAL COMPRESSION

Triaxial compression tests were performed on undisturbed samples to estimate the compressive strength of the in-situ soil from the depth where the sample was obtained. Results of the tests were used as an aid in determining the allowable bearing capacity for foundation design of the proposed structures. The results are shown on Plate No. 7.

COMPACTION

Compaction tests were performed in accordance with ASTM D-1557 to determine the maximum dry density and optimum moisture content of the soils to be compacted or used as compacted fill. Test results are presented on Plate No. 8.

CALIFORNIA BEARING RATIO

These tests were performed on soil samples obtained from the subgrade soils in planned pavement areas. The results were used to determine the recommended pavement section for the anticipated traffic and loading conditions. Results of the tests are shown on Plate No. 9.

CONCLUSIONS AND RECOMMENDATIONS

GENERAL

From a geotechnical engineering standpoint, the subject site is suitable for construction for the proposed reservoir structures and pavement areas. Our preliminary conclusions and recommendations for the feasibility study are based upon the assumption that the soil conditions are relatively consistent with the conditions observed and/or described in this report. Therefore, this report does not reflect variations in the subsurface conditions in the areas that were not explored. Should such variations be revealed during design level investigation, the preliminary recommendations contained in this report would need to be re-evaluated by PSC Associates, Inc. (PSC). We should be advised of any alterations of the proposed development so that we may review such changes and, if necessary, provide additional recommendations.



SITE GRADING

At the time of writing this report, the amount of cut and fill have not yet been determined.

Site grading operations should be observed by a representative of PSC to verify anticipated soil conditions and to evaluate any undesirable material encountered during excavation and scarifying of the surface soils .

SITE PREPARATION

At the on-set of earthwork, all areas within the contract grading limits should be cleared and grubbed. All vegetation, debris and other deleterious materials should be removed and disposed of offsite. We anticipate the near surface material at the site to contain significant amounts of organics and debris. On-site soils containing such materials are unsuitable for use as fill beneath structures, pavements or slabs but may be suitable for use in landscape or non-structural areas.

In areas that are to receive engineered fills, the exposed subgrade should be scarified to at least 6 inches, moisture-conditioned to near optimum moisture content, and compacted to at least 90 percent relative compaction as determined by ASTM D-1557. Cut areas should be proof-rolled to provide a firm, unyielding surface.

Soft or loose soils that do not readily compact should be removed to firm ground and replaced by an approved engineered fill.

FILLS AND BACKFILLS

Engineered fill should be placed in lifts of not more than 8 inches in loose thickness, moisture-conditioned, and compacted to at least 90 percent of maximum dry density as determined by ASTM D1557.

The on-site soils may be used as fill and backfill where structural fills are not specifically required, provided that it does not contain organics, debris, and other deleterious materials. The on-site fill soils should not contain particles greater than 3 inches in maximum dimension.



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Page 6

Imported material, if needed, should meet the above requirements for fill material and have a plasticity index of not more than 30 and no particles greater than 3 inches in maximum dimension. We recommend that imported soils should be tested and approved by PSC prior to delivery to the job site.

Fill and backfill material should be placed in level lifts of not more than 8 inches in loose thickness and moisture-conditioned to within 2 percent wet of optimum moisture content. Fine-grained soils should be compacted to at least 90 percent relative compaction and granular soils should be compacted to at least 95 percent relative compaction, determined in accordance with ASTM D1557, as indicated above.

Waterlines and other utility lines should be bedded in at least 6 inches of clean granular material, such as sand or fine gravel, that extends to at least 12 inches above the pipe or conduit. Hand-operated mechanical compactors should be used for compaction of bedding material, including under and around utility pipes. Thereafter, the trenches should be backfilled with approved materials. Trench backfill should be placed in loose lifts of not more than 8 inches in loose thickness, moisture-conditioned to about 2 percent wet of optimum moisture content, and compacted to at least 90 percent of maximum dry density. The uppermost 1 foot of trench backfill under pavements should be compacted to at least 95 percent of the maximum dry density.

FOUNDATIONS

Footings bearing directly on the firm, proof-rolled in-situ soil or on approved engineered fill, may be designed for an allowable bearing pressure of 2,500 pounds per square foot. The allowable bearing pressure is for dead plus long-term live loads. The allowable bearing pressure may be increased to $\frac{1}{3}$ for transient loads including wind and seismic. A modulus of subgrade reaction (K_v) of 150 tons per cubic foot (pcf) may be used for the foundation pad design.

Where concrete pads cross the cut fill daylight line, the cut portion should be undercut by 2 feet and replaced with engineered fill, compacted in thin lifts as recommended in this report.

The perimeter foundations for the proposed reservoir should have an embedment depth of at least 24 inches below lowest adjacent grade. A cushion of at least 6 inches of crushed rock, such as No. 3B Fine gravel should be placed between the prepared subgrade and the slab.



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Page 7

Footings located adjacent to below-grade structures or utilities shall be deepened such that the structures or utilities will be above a plane extending downward at 45 degrees from the bottom edge of the nearest footing. This will mitigate the potential of surcharging adjacent below-grade structures or utilities with additional structural loads and reduce the potential for foundation settlement.

Anticipated settlement of foundations is less than 1 inch. Differential settlements are anticipated to be less than $\frac{3}{4}$ of an inch.

The bottom of the foundation excavations should be firm and unyielding. If soft and/or loose soils are encountered at the bottom of the foundation excavations, they should be over-excavated to expose competent in-situ material and replaced with select granular material compacted to minimum of 95 percent relative compaction.

LATERAL RESISTANCE

Lateral loads acting on the structure may be resisted by frictional resistance between the footing and the bearing material and by passive earth pressure developed against the nearest vertical faces of the embedded portion of the foundations. A coefficient of friction of 0.3 may be used for the friction between the foundation and the bearing subgrade soils. Resistance due to passive pressure may be calculated using an equivalent fluid pressure of 300 pounds per cubic foot. These values assume that the concrete for the foundations is cast directly against the foundation excavations or, for formed foundations, the space between the wall of the foundation excavation and the foundation pad is backfilled with approved engineered fill. Lateral resistance in the upper 12 inches below the finished grade should be neglected unless confined by pavements or slabs.

RETAINING WALLS

Unsurcharged, drained retaining walls that are free to rotate may be designed using an active lateral earth pressure of 40 pounds per cubic foot (pcf) equivalent fluid pressure. This value assumes that suitable on-site soils are used as backfill, that suitable drainage is incorporated, and they are compacted in accordance with our recommendations.



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Surcharge stresses due to traffic, areal surcharges, line loads, and point loads within a horizontal distance equal to the height of the wall should be considered for design. For uniform surcharge stresses imposed on the loaded side of the wall, a rectangular distribution with a uniform pressure equal to 30 percent of the surcharge pressure acting on the entire height of the wall may be used in the design when select granular material is used to backfill the soil. For backfill other than select granular material, a rectangular distribution with a uniform pressure equal to 40 percent of the surcharge pressure acting on the entire height of the wall should be used in the design.

Wall foundations bearing on the very stiff native soils should be designed with a maximum allowable bearing capacity of 2,500 pounds per square foot (psf). This bearing value can be increased by $\frac{1}{3}$ for total loads including wind or seismic. A minimum footing embedment of 24 inches below the lowest adjacent finished grade is recommended. For sliding resistance, a friction factor of 0.30 may be used for wall foundations bearing on the stiff on-site soils.

A passive pressure of 300 pcf equivalent fluid pressure may be used for embedded footings with a maximum pressure of 3,000 psf. The passive resistance within the upper 12 inches below the lowest adjacent finished grade should be neglected unless confined by pavements or slabs. When combining passive earth pressure and friction for lateral resistance, the passive component should be reduced by $\frac{1}{2}$.

Retaining walls should be provided with horizontally continuous backdrains or weepholes to prevent the building up of hydrostatic pressure. Backdrain material should consist of an 18-inch wide zone of permeable material such as No. 3B Fine gravel (ASTM C33, No. 67), immediately adjacent to the wall. A geotextile fabric such as Mirafi 140N or equivalent, should extend from the base of the wall to a height of about 12 inches below the top of the wall. The remaining 12 inches of backfill should consist of a capping of impermeable soil with a low expansion potential.

Backfill placed behind the wall should be compacted to 90 percent of maximum dry density as determined by ASTM D1557. Over-compaction of the backfill material should be avoided so as not to create excessive lateral pressures against the wall.

PAVEMENTS

We anticipate that a flexible pavement will be used for roadways at this facility and vehicles will primarily consist of light trucks, passenger cars and occasional heavy trucks. On the basis of a California Bearing Ratio (CBR) value of 4 for the on-site soils, we recommend a pavement section in cut areas consisting of 2½ inches of asphaltic concrete underlain by 6 inches of aggregate base



Marc M. Siah & Associates, Inc.
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Page 9

course and 14 inches of select borrow subbase. To determine the appropriate pavement sections in filled areas, we should determine the CBR values of the fill materials prior to construction of the pavements. The finished subgrade should be scarified, moisture-conditioned, and compacted to at least 95 percent relative compaction to a depth of at least 6 inches. Soft or yielding areas exposed during proof-rolling should be excavated and replaced with compacted fill as described previously in this report.

Paved areas should be graded to drain surface water away from the site. Surface water should not be allowed to pond anywhere on the site.

CONSULTATION, PLAN REVIEW, AND SERVICES DURING CONSTRUCTION

Prior to construction, we should be retained to review the pre-final plans and specifications to verify for conformance with the intent of our recommendations.

Services during construction are not part of our scope of services for this project. We recommend that we be retained to observe the site preparation and grading; check the quality of the materials that will be used as fill and backfill; observe the placement and compaction of fills and backfills; observe the preparation of foundation and pavement subgrades; check the compaction of the subgrade, base course, and select borrow subbase course for pavements field density tests; and provide additional geotechnical consultation, as appropriate.

LIMITATIONS

The preliminary analyses and recommendations submitted in this report are based in part, upon the information obtained from the field boring. Variations of subsoil conditions may occur, and the nature and extent of these variations may not become evident until construction is underway. If variations then appear evident, it will be necessary to re-evaluate the recommendations provided in this report.

The location of the field boring indicated in this report is approximate. The physical location of the boring should be considered accurate only to the degree implied by the methods used. The stratification lines shown on graphic representation of the boring depict the approximate boundaries between soil types and, as such, may denote a gradual transition.



Marc M. Siah & Associates, Inc.
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March 17, 1999
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This report has been prepared for the exclusive use of Marc M. Siah & Associates, Inc. and their project consultants for specific application to the proposed Honouliuli 228-foot Reservoir Siting Study project, in accordance with currently accepted geotechnical engineering principles and practices. No other warranty is expressed or implied.

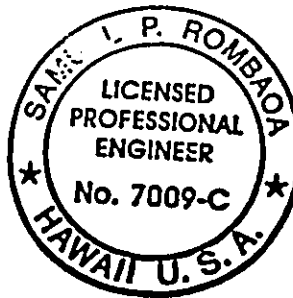
This report has been prepared solely for the purpose of assisting the architect/engineer in the preliminary design evaluation of the proposed project. Therefore, this report may not contain sufficient data, or the proper information, to serve as the basis for preparation of construction cost estimates. A design level investigation should be performed prior to construction, when more specific design information and structural loading is available.

Very truly yours,

PSC ASSOCIATES, INC.

Samuel P. Rombaoa

Samuel P. Rombaoa, P.E.
Project Manager



Reviewed by:

Peter S. Chan

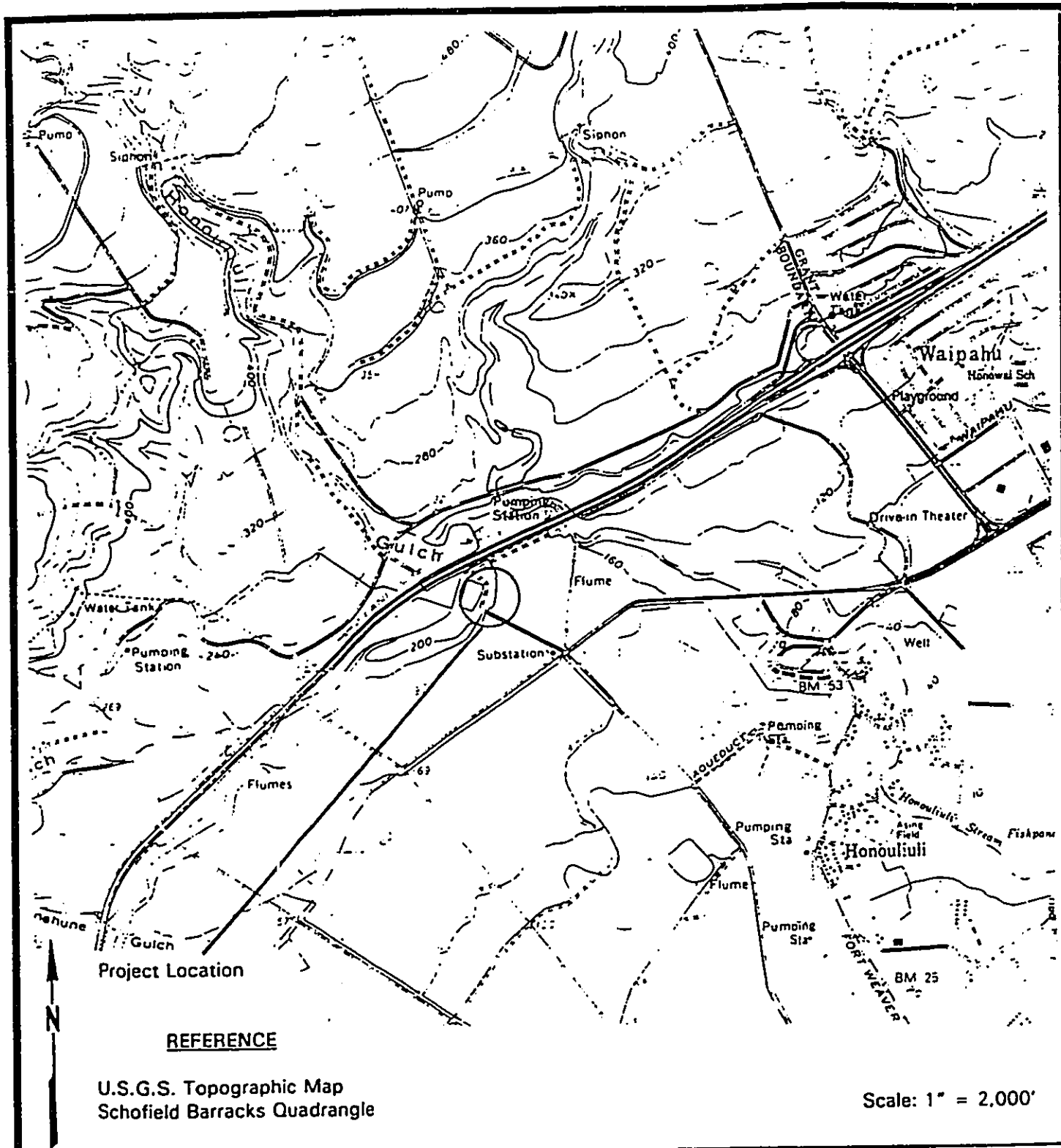
Peter S. Chan
President

SPR:PSC:nt

Enc.: Plate No. 1	Project Location Map
Plate No. 2	Site Plan
Plate No. 3 and 4	Log of Boring (Boring No. B-1)
Plate No. 5	Unified Soil Classification System
Plate No. 6	Atterberg Limits Test Data
Plate No. 7	Triaxial Strength Test Results
Plate No. 8	Compaction Test Data
Plate No. 9	California Bearing Ratio Test Data

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REFERENCE

U.S.G.S. Topographic Map
Schofield Barracks Quadrangle

Scale: 1" = 2,000'

PROJECT LOCATION MAP

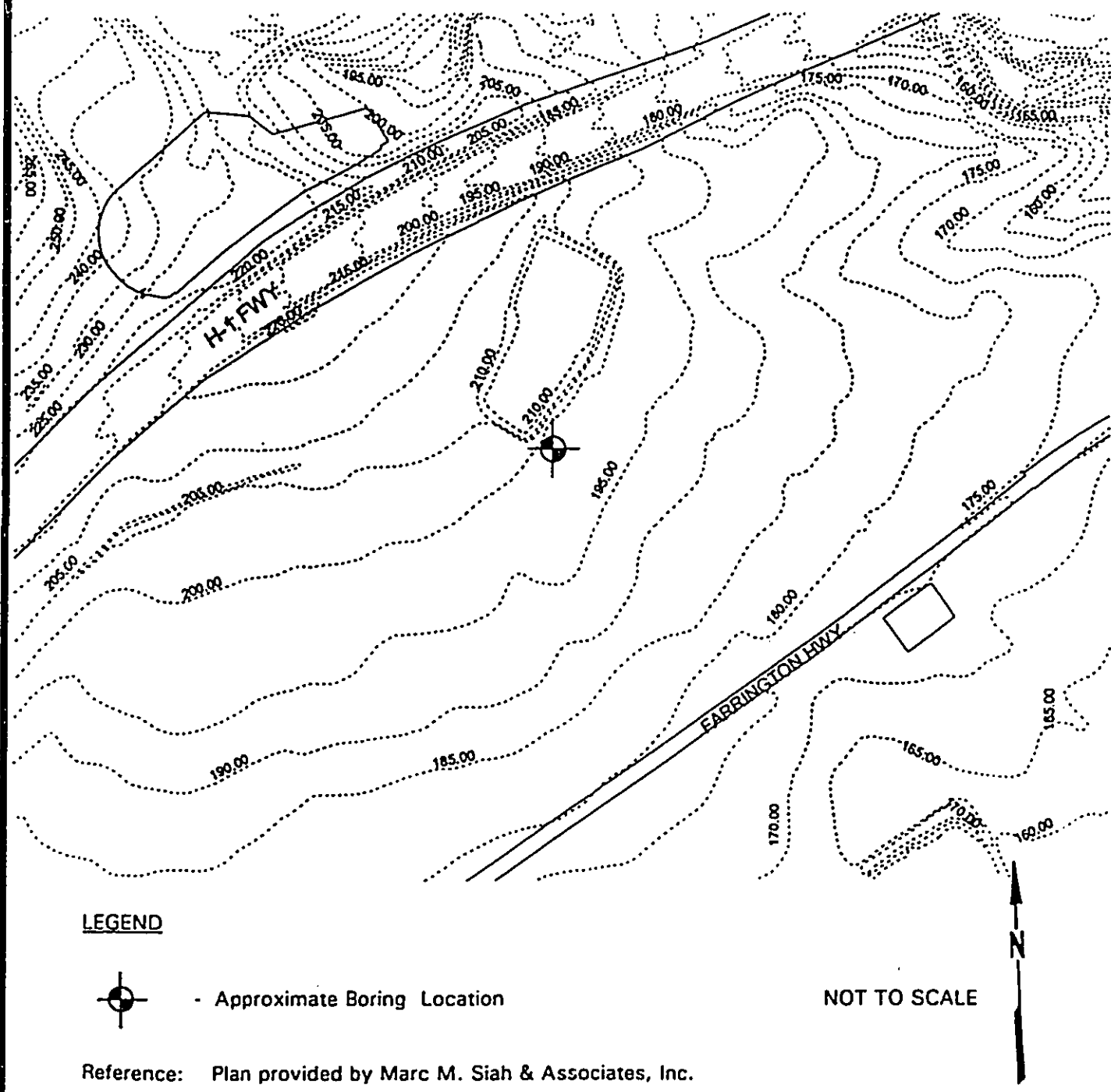
PSC ASSOCIATES, INC.
SOILS, FOUNDATION, AND GEOLOGICAL ENGINEERS

Honouliuli 228-foot Reservoir Siting Study
Ewa, Oahu, Hawaii

DATE: March, 1999

PROJECT NO. 99603.10

Honouliuli 228' Reservoir, No. 3, Site



LEGEND

- Approximate Boring Location

NOT TO SCALE

Reference: Plan provided by Marc M. Siah & Associates, Inc.

SITE PLAN

PSC ASSOCIATES, INC.

SOILS, FOUNDATION, AND GEOLOGICAL ENGINEERS





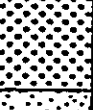
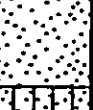









Honouliuli 228-foot Reservoir Siting Study
Ewa, Oahu, Hawaii

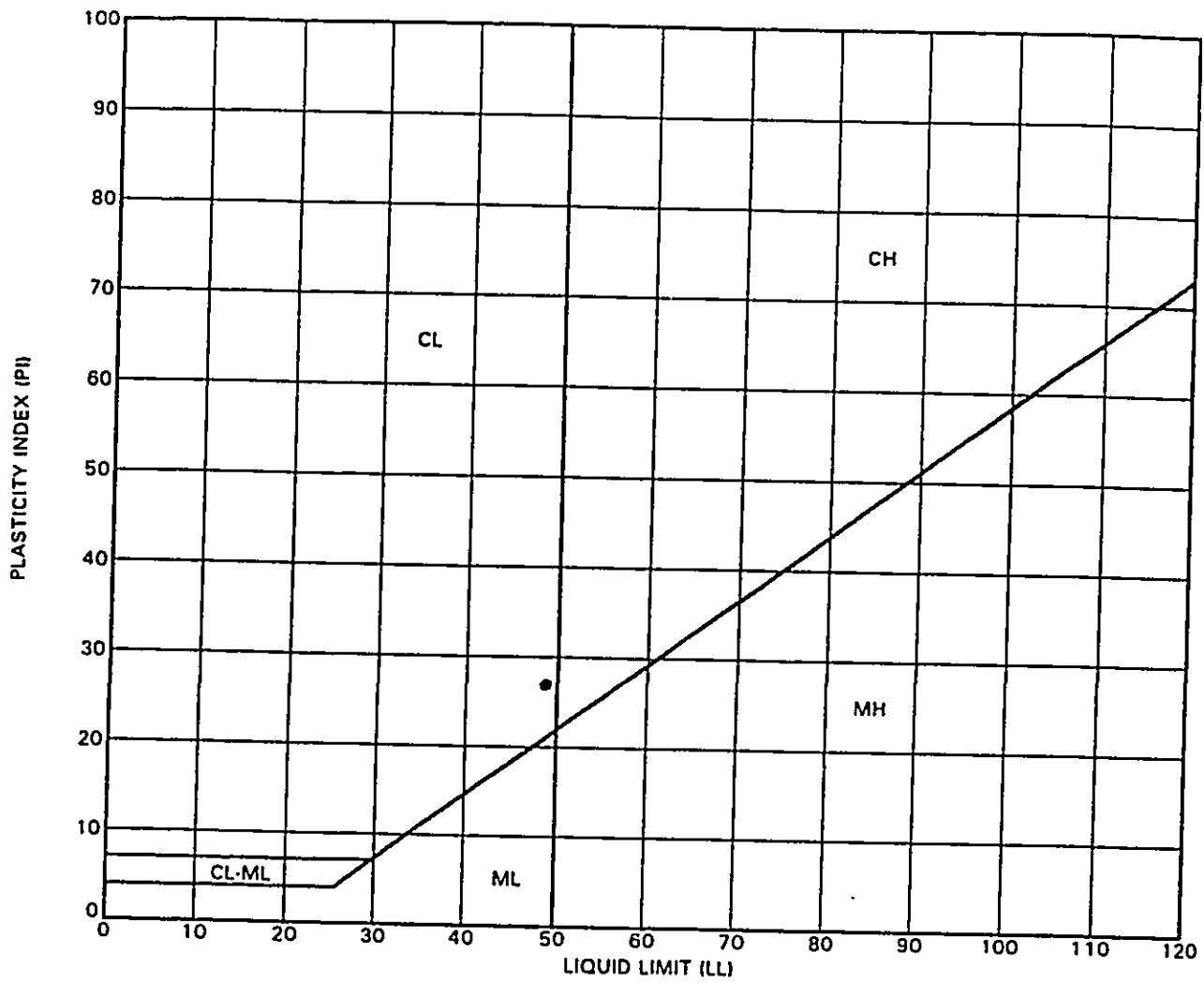
DATE: March, 1999

PROJECT NO. 99603.10

BORING LOCATION: See Site Plan					DRILLER: Valley Well Drilling			BORING NO. B-1		
BORING ELEVATION: ---					LOGGED BY: Marlo Garcia					
DATE(S) DRILLED: 02/27/99					TYPE RIG: Mobile B-59					
OTHER LAB TESTS	DRY UNIT WEIGHT (pcf)	MOISTURE CONTENT (%)	CORE RECOVERY (%)	R.Q.D (%)	NUMBER OF BLOWS/12"	SAMPLE TYPE AND NUMBER	DEPTH IN FEET	GRAPHIC SYMBOL	U.S.C.S	GEOTECHNICAL DESCRIPTION
PR CBR MD	84	22.5			60	BK-1 DM-1	0		CL	LEAN CLAY, red brown, moist, hard to very hard
TX	95	22.5			42	DM-2	5			---grades to dark brown and, very stiff to hard, trace sand and gravel
MD PI	95	23.7			73/11.5 Bounce	DM-3	10			---with boulders, cobbles, and gravel
M		19.4			85/8" Bounce	DM-4	15			
TX	97	27.7			46/9" Bounce	DM-5	20			
M		17.9	42	23	35/3" Bounce	SPT-1 CB-1	25			TUFF, dark brown, low to moderate hardness, friable to moderately strong, deeply weathered, closely to intensely fractured.
M		17.9	80	67	32/7.5 Bounce	SPT-2 CB-2	30			
SAMPLE TYPE						OTHER LABORATORY TESTS				
BK - Bulk		SPT- Std. Penetration Test		MD - Moisture/Density		TX - Triaxial Compression				
CB - Core Barrel		ST - Shelby Tube		CON- Consolidation Test		PR - Proctor				
MC - Modified California		NR - No Recovery		PI - Atterberg Limits		CBR- Calif. Bearing Ratio				
LOG OF BORING										
PSC ASSOCIATES, INC.						Honouliuli 228-ft. Reservoir Siting Study Ewa, Oahu, Hawaii				
						SOILS, FOUNDATION, AND GEOLOGICAL ENGINEERS			DATE: March, 1999	

BORING LOCATION: See Site Plan				DRILLER: Valley Well Drilling				BORING NO. B-1		
BORING ELEVATION: ...				LOGGED BY: Marlo Garcia						
DATE(S) DRILLED: 02/27/99				TYPE RIG: Mobile B-59						
OTHER LAB TESTS	DRY UNIT WEIGHT (pcf)	MOISTURE CONTENT (%)	CORE RECOVERY (%)	R.Q.D (%)	NUMBER OF BLOWS/12"	SAMPLE TYPE AND NUMBER	DEPTH IN FEET	GRAPHIC SYMBOL	U.S.C.S	GEOTECHNICAL DESCRIPTION
			67	25		CB-3	35	▨		<p>TUFF, dark brown, low to moderate hardness, friable to moderately strong, deeply weathered, closely to intensely fractured</p> <p>---some rounded basalt gravel ---becomes intensely fractured</p>
			38	7		CB-4	40	▨		
			40	8		CB-5	45	▨		
			64	0		CB-6	50	▨		
							55	▨		<p>End of Boring at 50.0 feet No Groundwater Encountered</p>
							60	▨		
SAMPLE TYPE					OTHER LABORATORY TESTS					
BK - Bulk		SPT- Std. Penetration Test		MD- Moisture/Density		TX - Triaxial Compression				
CB - Core Barrel		ST - Shelby Tube		CON- Consolidation Test		PR - Proctor				
MC - Modified California		NR - No Recovery		PI - Atterberg Limits		CBR- Calif. Bearing Ratio				
LOG OF BORING										
PSC ASSOCIATES, INC. SOILS, FOUNDATION, AND GEOLOGICAL ENGINEERS					Honouliuli 228-ft. Reservoir Siting Study Ewa, Oahu, Hawaii					
					DATE: March, 1999			PROJECT NO. 99603.10		

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS	
			ICON	CODE		
COARSE-GRAINED SOILS More than 50% of material is larger than No. 200 Sieve size	GRAVEL AND GRAVELLY SOILS Less than 50% of coarse fraction passes the No. 4 Sieve	CLEAN GRAVELS Less than 12% of fine fraction passes the No. 200 Sieve		GW	Well-graded gravels, gravel - sand mixtures, little or no fines	
		SILT OR CLAYEY GRAVELS At least 12% of fine fraction passes the No. 200 Sieve		GP	Poorly-graded gravels, gravel - sand mixtures, little or no fines	
		SILTY OR CLAYEY GRAVELS At least 12% of fine fraction passes the No. 200 Sieve		GM	Silty gravels, gravel - sand - silt mixtures	
		CLAYEY GRAVELS At least 12% of fine fraction passes the No. 200 Sieve		GC	Clayey gravels, gravel - sand - clay mixtures	
	SAND AND SANDY SOILS At least 50% of coarse fraction passes the No. 4 Sieve	CLEAN SANDS Less than 12% of fine fraction passes the No. 200 Sieve		SW	Well-graded sands, gravelly sands, little or no fines	
		POORLY-GRADED SANDS Less than 12% of fine fraction passes the No. 200 Sieve		SP	Poorly-graded sands, gravelly sands, little or no fines	
		SILTY OR CLAYEY SANDS At least 12% of fine fraction passes the No. 200 Sieve		SM	Silty sands, sand - silt mixtures	
		CLAYEY SANDS At least 12% of fine fraction passes the No. 200 Sieve		SC	Clayey sands, sand - clay mixtures	
		SILTS AND CLAYS Liquid limit is less than 50	Plasticity index is above "A" Line		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
			Plasticity index is below "A" Line		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity
SILTS AND CLAYS Liquid limit is greater than 50	Plasticity index is above "A" Line		OL	Organic silts and organic silty clays of low plasticity		
	Plasticity index is above "A" Line		CH	Inorganic clays of high plasticity		
	Plasticity index is below "A" Line		MH	Inorganic silts, micaceous or diatomaceous fine sand or silty soils		
			OH	Organic clays of medium to high plasticity, organic silts		
HIGHLY ORGANIC SOILS				Pt	Peat, humus, swamp soils with high organic contents	
UNIFIED SOIL CLASSIFICATION SYSTEM						
PSC ASSOCIATES, INC. SOILS, FOUNDATION, AND GEOLOGICAL ENGINEERS						



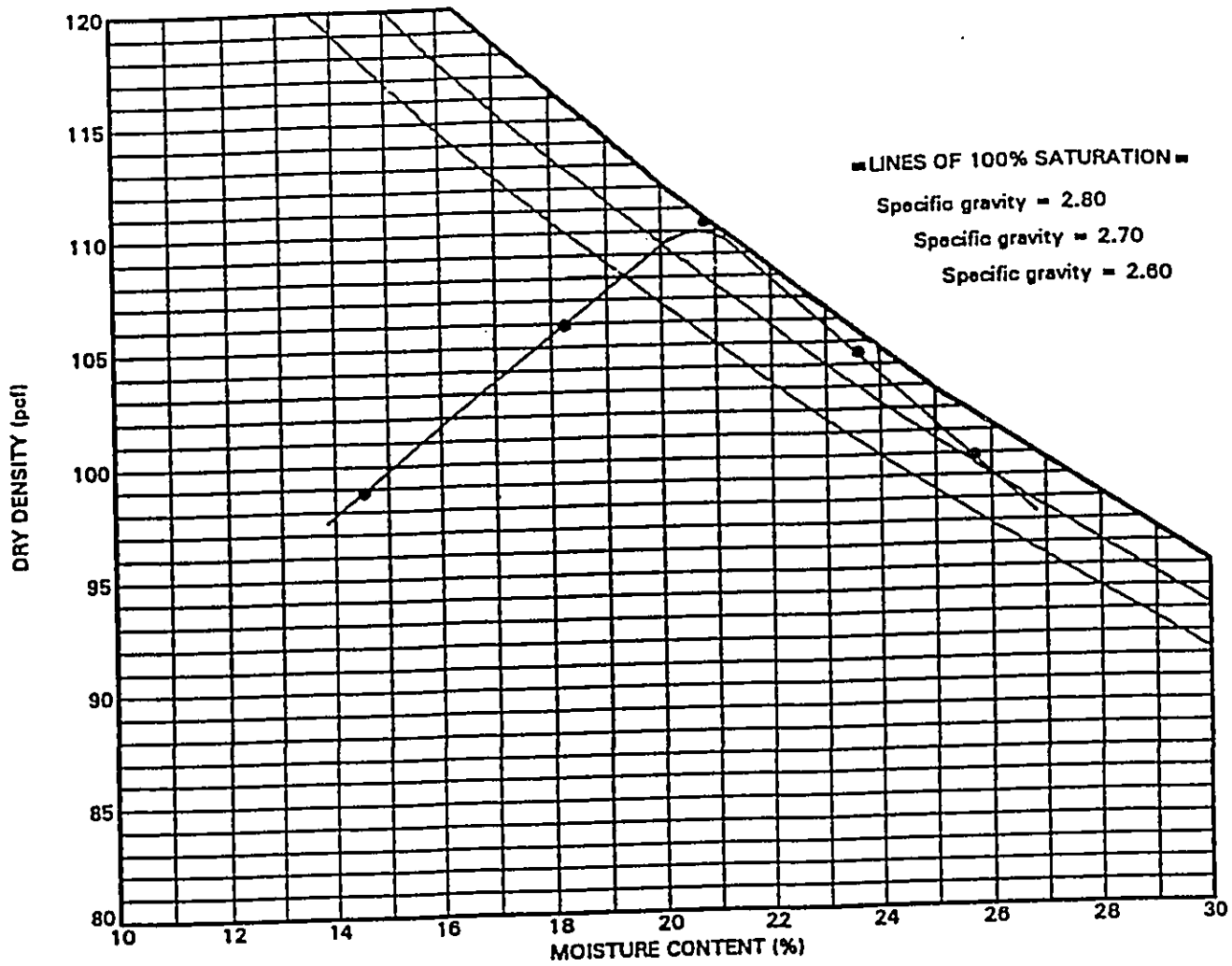
Point Code	Boring Number	Sample Type and Number	Sample Depth (feet)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index	Unified Soil Classification
•	B-1	DM-3	6.0	49	22	27	CL

ATTERBERG LIMITS TEST DATA

PSC ASSOCIATES, INC. SOILS, FOUNDATION, AND GEOLOGICAL ENGINEERS	Honouliuli 228-ft. Reservoir Siting Study Ewa, Oahu, Hawaii	
	DATE: March, 1999	PROJECT NO. 99603.10

TRIAXIAL STRENGTH TEST RESULTS						
Boring No.	Sample Depth (ft.)	Sample Height (in.)	Shear Strength (psf)	Confining Pressure (psf)	Strain at Failure (%)	Strain Rate (in./min)
B-1	4.5	5.81	2221	432	5.5	0.036
B-1	17.5	5.94	1974	1728	6.06	0.0457

TRIAXIAL STRENGTH TEST RESULTS	
PSC ASSOCIATES, INC. SOILS, FOUNDATION, AND GEOLOGICAL ENGINEERS	Honouliuli 228-ft. Reservoir Siting Study Ewa, Oahu, Hawaii
	DATE: March, 1999 PROJECT NO. 99603.10



Sample I.D. SHO	Sample Location	Type of Test	Maximum Dry Density (pcf)	Optimum Moisture Content (%)
B-1	Surface Bulk Sample	ASTM D1557-91 A	110	20.5

COMPACTION TEST DATA

PSC ASSOCIATES, INC.

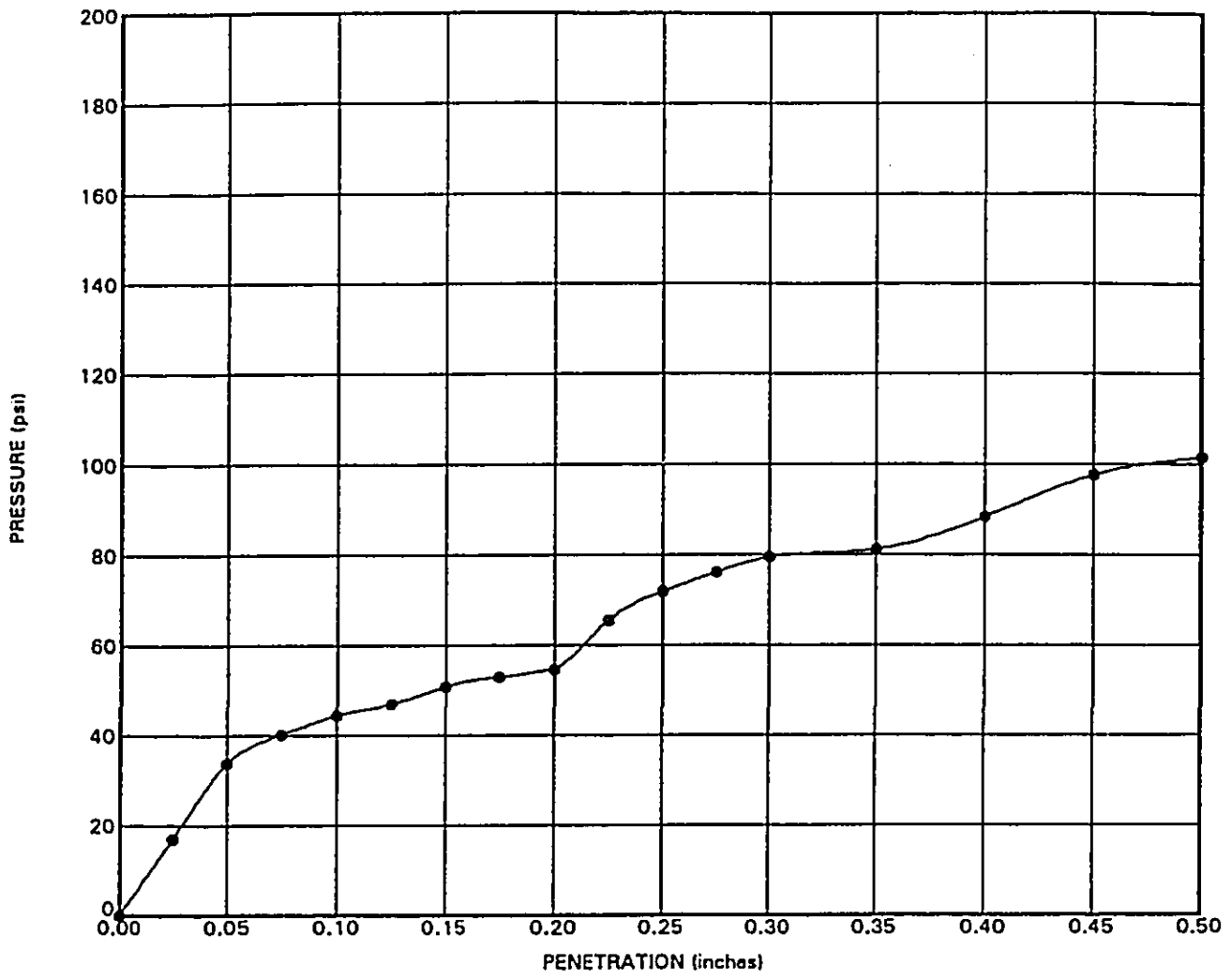
SOILS, FOUNDATION, AND GEOLOGICAL ENGINEERS

Honouliuli 228-ft. Reservoir Siting Study
Ewa, Oahu, Hawaii

DATE: March, 1999

PROJECT NO. 99603.10

PLATE NO. 8



Sample I. D.	Sample Location	Plasticity Index (%)	Relative Compaction (%)	Swell (%)	C B R Value
B-1	Surface Bulk Sample	--	90	1.4	4.4

CALIFORNIA BEARING RATIO TEST DATA

<p>PSC ASSOCIATES, INC. SOILS, FOUNDATION, AND GEOLOGICAL ENGINEERS</p>	<p>Honouliuli 228-ft. Reservoir Siting Study Ewa, Oahu, Hawaii</p>	
	DATE: March, 1999	PROJECT NO. 99603.10

Appendix B - Construction Cost Estimates



Marc M. Siah & Associates, Inc.

Consulting Civil • Structural • Environmental & Ocean Engineers
810 Richards Street, Suite 888, Honolulu, Hawaii 96813

PRELIMINARY CONSTRUCTION COST ESTIMATE FOR HONOLULU 228' RESERVOIR NO. 3

Marc M. Siah & Associates, Inc.		Job Number: 1130		Sheet No. 1 of 1	
Project: Honolulu 228' Reservoir No. 3		Estimated By: LJK			
Date: November 21, 1999		Checked By: MMS			
Item	Unit	Price	Quantity	Cost	
Site Work:					
Excavation & Mass Grading	CY	\$ 42.5	147442	6,266,285.00	
Backfill	CY	\$ 30.0	385	11,550.00	
Clearing & Grubbing	AC	\$ 3,000.0	14.3	42,900.00	
6' Height Fence	LF	\$ 20.0	3371	67,420.00	
Drain ---- 36" Main in Place Complete	LF	\$ 180.0	1345	242,100.00	
Drain ---- 36" Lateral	LF	\$ 180.0	100	18,000.00	
Earth Swale	LF	\$ 60.0	2040	122,400.00	
Inlet	Unit	\$ 2,000.0	5	10,000.00	
Manhole	Unit	\$ 6,000.0	5	30,000.00	
36" Influent Line in Place Complete	LF	\$ 320.0	250	80,000.00	
36" Effluent Line in Place Complete	LF	\$ 320.0	695	222,400.00	
Retaining Wall	LF	\$ 180.0	140	25,200.00	
Access Roadway	LF	\$ 200.0	2152	430,400.00	
Parking (2" AC Pavement, 6" Basecourse)	SY	\$ 90.0	178	16,020.00	
Landscaping	Site	\$ 60,000.0	1	60,000.00	
Subtotal Site Work			Subtotal	7,644,675.00	
Reservoir:					
6 M. G. and Mechanical Equipment				6,630,000.00	
Electrical for 6 M. G.	Lump Sum			270,000.00	
Subtotal Reservoir				6,900,000.00	
Subtotal				14,544,675.00	
Contingency @20%				2,908,935.00	
Total				17,453,610.00	

Appendix C - Biological Resources Survey



Marc M. Siah & Associates, Inc.

Consulting Civil • Structural • Environmental & Ocean Engineers
810 Richards Street, Suite 888, Honolulu, Hawaii 96813

BIOLOGICAL RESOURCES SURVEY REPORT FOR FOUR ALTERNATIVE
RESERVOIR SITES FOR HONOULIULI 228 FOOT RESERVOIR SITE NUMBER 3
KAPOLEI, OAHU, HAWAII

FOR
MARC M. SIAH & ASSOCIATES
810 RICHARDS STREET, SUITE 888
HONOLULU, HAWAII 96813

BY
EVANGELINE J. FUNK, PH.D.
BOTANICAL CONSULTANTS
HONOLULU, HAWAII
MARCH 1999

INTRODUCTION

A field survey to assess the biological resources of a proposed four tank site in KAPOLEI, Oahu, Hawaii was carried out in March, 1999. One four hectare site is located south of H-1 and north of Farrington Highway (Figure 1). The remaining three similar sized sites are located north of H-1 near the proposed site for the new University of Hawaii Campus (Figure 1). Data were collected on both the flora and fauna. The results of this survey are presented here.

FAUNA - INTRODUCTION AND METHODS

Although several environmental impact statements have been prepared for projects in the Kapolei, Oahu area, nothing has been published on either the birds or the mammals of the region. The standard references for the birds of Hawaii (Munro 1944, Berger 1981, Hawaii Audubon Society 1984, Pratt et al. 1987) do not specify the area in their distribution of species.

Circular plot censuses were conducted around proposed tank sites 1,2, and 3. Tank site 4 is surrounded by a high fence so the census was carried out along three sides of the site. Fixed station observation points of thirty minutes each were carried out during the cool, early morning hours when both birds and mammals are more active.

RESULTS

By March 1999, the island of Oahu was still awaiting the wet season rains. The Kapolei area was very dry and the usual weed crop had failed. Many of the usual seed bearing weeds and grasses had dried up before making seed. As a result the usual compliment of seed-eating birds that inhabit the area was missing. In addition, Tank Site

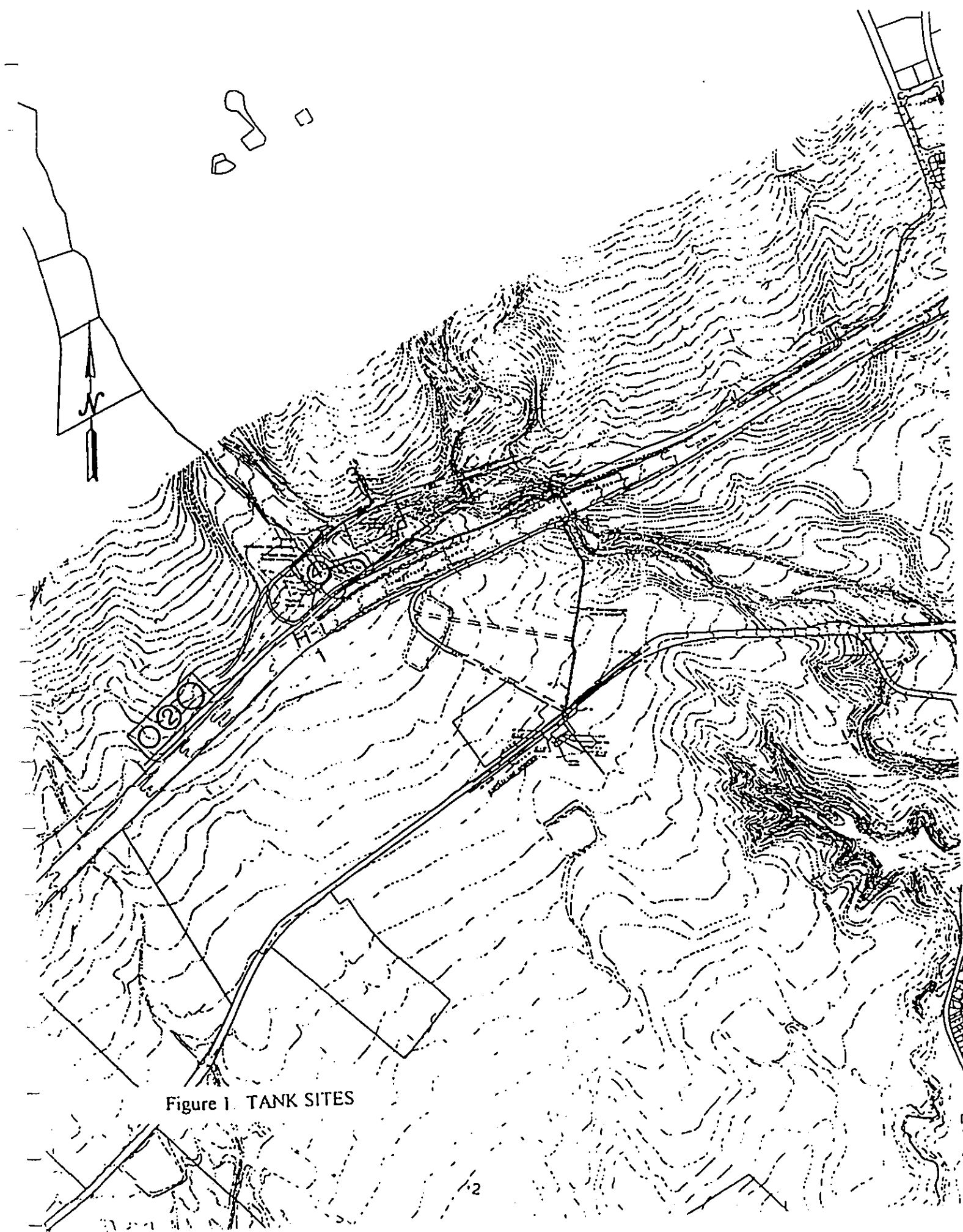


Figure 1. TANK SITES

1 (Figure 1) was a newly plowed, fallow field, Tank Site 2 (Figure 1) was covered with dry koa haole and guinea grass, Tank Site 3 (Figure 1) is also a cultivated field, and Tank Site 4 (Figure 1) is also covered with dry koa haole and grasses without seed heads. This highly modified study site has almost no value as habitat for native birds and in its present state there is very little in the area for introduced birds either.

MAMMALS

Although no mongoose, rats, or mice were seen during the survey it can be assumed that they are present on the study site. The Indian mongoose (*Herpestes auropunctatus auropunctatus*) is a small, grayish brown to golden mammal. It weighs from 450 grams to 1350 grams (1 to 3 pounds) and is a member of the cat family. Because of the food (rats and mice) and water (from drip irrigation) are available on the site, the mongoose can be expected to inhabit the area.

The house mouse (*Mus musculus*) is usually twelve to fifteen centimeters long, including its tail, and weighs approximately twenty-eight to thirty grams. It varies in color depending on its home location.

The black rat (*Rattus rattus*) is presumed to be present on this site due to the many food sources such as cultivated watermelons, corn, tomatoes and wild ivy gourd.

AVIFAUNA

The bird population of this site consisted of only four introduced species, none in large numbers.

Family Pycnonotidae - Bulbuls

Pycnonotus cafer (Red-vented bulbul)

Two of the large, raucous, red-vented bulbuls were seen in Tank Site 3 near a fence covered with ivy gourd vines.

Family Columbidae – Pigeons and Doves

Streptopelia chinensis (Spotted Dove)

Individual spotted doves were seen on the ground in Tank Site 1 and on the fence in Tank Site 4. Spotted doves are rather large birds. They are gray brown with rosy blushed breast feathers. At the sides and back of the neck is a patch of black with white spots. Usually they are found in large numbers in dry, wastelands such as the tank sites.

Geopelia striata (Zebra Dove)

Zebra doves are the only birds found in significant numbers on this site. A small flock of fifteen to twenty birds were seen on the dirt road leading to Tank Site 1. Here again, these ground dwelling birds are usually seen in large numbers.

Family Sturnidae – Starlings and Mynas

Mynas are plump, brown birds with black heads and tails. They have a white belly, tail, and wing patches, and bright yellow legs, feet, bill, and eye liners. Three individuals were seen in a plowed under tomato patch in Tank Site 1. Mynas are usually seen in large numbers.

BOTANICAL SURVEY REPORT – INTRODUCTION AND METHODS

A botanical survey of the four proposed tank sites was completed in March 1999.

The purpose of this survey was threefold: one, to describe the vegetation of the sites, two, to record all taxa found on the sites, and three, to determine if proposed or listed threatened or endangered plant species are found on these sites.

The walk-through method was used by a two person team to collect the above mentioned data. All parts of proposed Tank Sites 1, 2, and 3 were visited. Tank Site 4 is surrounded by a chain link fence and is occupied by a large tank, however, the vegetation inside the fence is clearly visible and a visual survey was possible.

RESULTS

Proposed Tank Site 1 is located within an agricultural field that had been newly plowed. The only vegetation was a fringe of koa haole (*Leucaena leucocephala* (Lam.) deWit) and Guinea grass (*Panicum maximum* Jacq.). In the field itself there were a few scattered individuals of spiny amaranth (*Amaranthus spinosus* L.), some rattlepod (*Crotalaria incana* L.), and Johnson grass (*Sorghum halpense* L.).

Proposed Tank Site 2 is the westernmost study area and it was the most heavily vegetated with dry koa haole, klu (*Acacia farnesiana* (L.) Willd.), Guinea grass, buffelgrass (*Cenchrus ciliaris* L.), castor bean (*Ricinus communis* L.), and one Formosa

koa (*Acacia confusa* Merr.). All the vegetation of this site consisted of introduced, weedy species.

Proposed Tank Site 3 is also located in an agricultural field (Figure 1). Here again the weedy fringe consisted of koa haole, Guinea grass, spiny amaranth, Mexican poppy (*Argemone mexicana* L.), two species of *Chamaesyce*, and several mixed grasses.

Tank Site 4 contains a large tank surrounded by a flat area vegetated by dry, low growing mixed, grasses. Sourgrass and natal red top (*Digitaria insularis* (L.) Mez ex Ekman and *Rhynchelytrum repens* (Willd.) Hubb.) are the most common. On the surrounding slopes above the tank there are scattered koa haole shrub, dead Guinea and buffelgrass, some sourbush (*Pluchea symphytifolia* (Mill.) Gillis) and 'uhaloa (*Waltheria indica* L.).

CONCLUSIONS

No significant vegetation exists on Tank Sites 1 and 3 and the vegetation of Tank Sites 2 and 4 consists of introduced, weedy plants that can be found on the leeward side of most Hawaiian Islands. The destruction of this vegetation will not seriously impact the vegetation of the area.

ENDANGERED SPECIES

No candidate, proposed, or listed threatened or endangered species as set forth in the Endangered Species Act of 1973, as amended (16 U.S.C. 1531-1543) are known from along this portion of the Ewa plain and none were found during this survey.

SPECIES LIST OF PLANTS FOUND ON FOUR ALTERNATIVE
RESERVOIR SITES FOR HONOULIULI 228 FOOT RESERVOIR SITE NUMBER 3
KAPOLEI, OAHU, HAWAII

The plant families in the following species list have been alphabetically arranged within two groups, Monocotyledons, and Dicotyledons. The genera and species are arranged alphabetically within families. The taxonomy and nomenclature follow that of Wagner, Herbst, and Sohmer (1990). For each taxon the following information is provided:

1. An asterisk before the plant name indicates a plant introduced to the Hawaiian Islands since Cook or by the aborigines.
2. The scientific name of the plant.
3. The Hawaiian name or the most widely used common name of the plant.
4. Abundance ratings are for this site only and they have the following meanings:
 - Uncommon = a plant that was found less than five times.
 - Occasional = a plant that was found between five and ten times.
 - Common = a plant considered an important part of the vegetation.
 - Locally abundant = plants found in large numbers over a limited area. For example the plants found in grassy patches.

This species list is the result of an extensive survey of this site during a very dry winter season (March 1999) and it reflects the vegetation composition of the flora during a single season. Minor changes in the vegetation will occur due to introductions and losses and a different species list would result from a survey conducted during a different growing season.

MONOCOTYLEDONS

Scientific Name	Common Name	Abundance	Site Found
CYPERACEAE - Sedge Family			
* <i>Cyperus rotundus</i> L.	Nut grass	Locally abundant	1 & 3
POACEAE - Grass Family			
* <i>Bothriochloa pertusa</i> (L.) A. Camus	Pitted beardgrass	Locally abundant	4
* <i>Cenchrus ciliaris</i> L.	Buffelgrass	Common	1,2,3,4
* <i>Chloris barbata</i> (L.) Sw.	Swollen fingergrass	Common	1,2,3,4
* <i>Chloris divaricata</i> R. Br.	Star grass	Locally abundant	1,2,3,4
* <i>Cynodon dactylon</i> (L.) Pers.	Bermuda grass	Common	2 & 3
* <i>Digitaria ciliaris</i> (Retz.) Koeler	Henry's crabgrass	Uncommon	4
* <i>Digitaria insularis</i> Mez ex Ekman	Sourgrass	Locally abundant	4
* <i>Eleusine indica</i> (L.) Gaertn.	Wiregrass	Occasional	3
* <i>Panicum maximum</i> Jacq.	Guinea grass	Common	1,2,3,4
* <i>Rhynchelytrum repens</i> (Willd.) Hubb.	Natal redtop	Occasional	2,3,4
* <i>Sorghum halpense</i> (L.) Pers.	Johnson grass	Uncommon	1

DICOTYLEDONS

ACANTHACEAE - Acanthus Family			
* <i>Asystasia gangetica</i> (L.) T. Anderson	Chinese violet	Locally abundant	1,2,3
AMARANTHACEAE - Amaranth Family			
* <i>Alternanthera pungens</i> Kunth	Khaki weed	Uncommon	3
* <i>Amaranthus spinosus</i> L.	Spiny amaranth	Occasional	1,2,3,4
* <i>Amaranthus viridis</i> L.	Slender amaranth	Occasional	1,3
ANACARDIACEAE - Mango Family			
* <i>Schinus terebinthifolius</i> Raddi	Christmas berry	Uncommon	2,3
ASTERACEAE - Sunflower Family			
* <i>Bidens alba</i> (L.) DC		Occasional	3,4
* <i>Calyptocarpus vialis</i> Less.		Common	2
* <i>Emilia sonchifolia</i> (L.) DC	Flora's paintbrush	Uncommon	2

Scientific Name	Common Name	Abundance	Site Found
ASTERACEAE – Sunflower Family con't			
* <i>Pluchea symphytifolia</i> (Mill.) Gillis	Sourbush	Common	2,3,4
* <i>Sonchus oleraceus</i> L.	Pualele	Occasional	1,3,4
* <i>Tripsax procumbens</i> L.	Coat buttons	Common	1,2,3
* <i>Verbesina encelioides</i> Benth. & Hook.	Golden crown-beard	Occasional	2,3,4
CHENOPODIACEAE – Goosefoot Family			
* <i>Atriplex semibaccata</i> R. Br.	Australian saltbush	Occasional	3,4
* <i>Chenopodium murale</i> L.	'Aheahea	Uncommon	2
CONVOLVULACEAE – Morning glory Family			
* <i>Ipomoea triloba</i> L.	Little bell	Common	2,3,4
* <i>Ipomoea obscura</i> (L.) Ker-Gawl.		Uncommon	2
CUCURBITACEAE – Gourd Family			
* <i>Coccoloba grandis</i> (L.) Voight	Ivy gourd	Locally abundant	3
EUPHORBIACEAE – Spurge Family			
* <i>Chamaesyce hirta</i> (L.) Millsp.	Hairy spurge	Common	2,3
* <i>Chamaesyce hypericifolia</i> L.	Graceful spurge	Occasional	3
* <i>Chamaesyce prostrata</i> Small	Prostrate spurge	Occasional	3
* <i>Ricinus communis</i> L.	Castor bean	Occasional	2,3
FABACEAE – Bean Family			
* <i>Acaçia confusa</i> Merr.	Formosa koa	Uncommon	2
* <i>Acaçia farnesiana</i> (L.) Willd.	Klu	Occasional	2,4
* <i>Crotalaria incana</i> L.	Fuzzy rattlepod	Occasional	1,2,3
* <i>Desmanthus virgatus</i> (L.) Willd.	Slender mimosa	Uncommon	2,3,4
* <i>Desmodium incanum</i> L.	Spanish clover	Uncommon	3
* <i>Glycine wightii</i> Verdc.		Locally abundant	1
* <i>Indigofera spicata</i> Forssk.	Creeping indigo	Common	3
* <i>Leucaena leucocephala</i> (Lam.) de Wit	koa haole	Common	1,2,3,4
* <i>Prosopis pallida</i> Kunth	Kiawe	Common	2,4

Scientific Name	Common Name	Abundance	Site Found
LAMIACEAE – Mint Family			
* <i>Leonotis nepetifolia</i> (L.) R. Br.	Lion's ear	Occasional	2,4
MALVACEAE – Mallow Family			
* <i>Malva parviflora</i> L.	Cheese weed	Uncommon	3
* <i>Malvastrum coromandelianum</i> Garcke	False mallow	Occasional	3
* <i>Sida rhombifolia</i> L.		Occasional	2,3
* <i>Sida spinosa</i> L.	Prickly sida	Occasional	2,3
NYCTAGINACEAE – Four-o'clock Family			
* <i>Boerhavia coccinea</i> Mill.		Uncommon	2,3
PAPAVERACEAE – Poppy Family			
* <i>Argemone mexicana</i> L.	Mexican poppy	Uncommon	3
POLYGONACEAE – Buckwheat Family			
* <i>Emex spinosa</i> (L.) Campd.		Locally abundant	1
PORTULACACEAE – PURSLANE Family			
* <i>Portulaca oleracea</i> L.	Pigweed	Common	1,2,3
SOLANACEAE – Nightshade Family			
* <i>Lycopersicon pimpinellifolium</i> Mill.	Currant tomato	Uncommon	1,3
* <i>Nicandra physalodes</i> Gaertn.	Apple of Peru		2
STERCULIACEAE Cacao Family			
<i>Waltheria indica</i> L.	'Uhaloa	Common	1,3,4
VERBENACEAE – Verbena Family			
* <i>Lantana camara</i> L.	Lantana	Common	2,4
* <i>Stachytarpheta dichotoma</i> (Ruiz & Pav.) Vahl	Owi	Common	

BIBLIOGRAPHY

- Gagne', W. C. and L. W. Cuddihy. 1990 (In) Wagner, W.L., D. R. Herbst and S. H. Sohmer. Manual of the Flowering Plants of Hawaii. Bishop Museum Special Publication #83. Univ. of Hawaii Press. Vol.1.
- Haselwood, E. L. and G. G. Motter. (eds.) 1976. Handbook of Hawaiian Weeds. Lyon Arboretum Association.
- Hillebrand, W. 1888. Flora of the Hawaiian Islands. Hafner Publ. Co. New York.
- Neal, M. C. 1965. In Gardens of Hawaii. Bishop Museum Special Publication #65. Bis. Mus. Press.
- Ripperton, J.C. and E. Y. Hosaka. 1942. Vegetation Zones of Hawaii. Hawaii Agricultural Experiment Station Bulletin Number 89. Univ. of Hawaii.
- Wagner, W. L., D. R. Herbst, & S. H. Sohmer. 1990. Manual of the Flowering Plants of Hawaii. Bishop Museum Special Publication #83. Univ. Of Hawaii Press. Vols 1 & 2.

Appendix D - Historic Preservation Review



Marc M. Siah & Associates, Inc.
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BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII



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

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Kakuhikawa Building, Room 555
601 Kamokila Boulevard
Kapolei, Hawaii 96707

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

December 17, 1999

Marc M. Siah, Ph. D., President
Marc M. Siah & Associates, Inc.
810 Richards Street
City Center Building, Suite 888
Honolulu, Hawaii 96813

LOG NO: 24564 ✓
DOC NO: 9912EJ04

Dear Dr. Siah:

SUBJECT: Chapter 6E-8 Historic Preservation Review -- Request for Cultural and Archaeological Information on Proposed New Board of Water Supply (BWS) Reservoir Land Parcel in Honouliuli, 'Ewa, O'ahu
TMK: 9-2-001:001

Thank you for the opportunity to review this project which proposes the construction of a new BWS reservoir in Honouliuli, 'Ewa, O'ahu. A review of our records shows that there are no known historic sites at the project location. These lands were commercially cultivated with sugar cane which altered the land for many years. The depth of cane cultivation exceeded the expected depth of historic sites in the area, based on site patterns in similar environmental contexts. Thus, it is unlikely that significant historic sites will be found in the project area. Therefore, we believe that this project will have "no effect" on such sites.

If you have any questions please call Elaine Jourdane at 692-8027.

Aloha,


Don Hibbard, Administrator
State Historic Preservation Division

EJ:jk

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII



STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

HISTORIC PRESERVATION DIVISION
Kakuhikawa Building, Room 555
801 Kamehaha Boulevard
Kapolee, Hawaii 96707

January 21, 1999

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTIES
GILBERT COLOMA-AGARAN
TIMOTHY E. JOHNS

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES

ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND
STATE PARKS
WATER RESOURCE MANAGEMENT

Marc M. Siah
Marc M. Siah & Associates, Inc.
735 Bishop Street, Suite 323
Honolulu, Hawaii 96813

LOG NO: 22791 ✓
DOC NO: 9901EJ06

Dear Mr. Siah:

**SUBJECT: Chapter 6E-8 Historic Preservation Review -- Preparation of an Environmental Assessment for a New Reservoir Site at Honouliuli Honouliuli, 'Ewa, O'ahu
TMK: 9-1-18, 9-2-02**

Thank you for the opportunity to provide comment during the preparation of the feasibility study and EA for the new reservoir site. A review of our records shows that there are no known historic sites at either of the proposed locations. These lands were commercially cultivated with sugar cane which altered the land for many years. The depth of cane cultivation exceeded the expected depth of historic sites in the area, based on site patterns in similar environmental contexts. Thus, it is unlikely that significant historic sites will be found in these areas. Therefore, we believe that this project will have "no effect" on such sites.

If you have any questions please call Elaine Jourdane at 692-8027.

Aloha,

A handwritten signature in black ink, appearing to read "Don Hibbard".

Don Hibbard
Deputy State Historic Preservation Officer

EJ:jk

Appendix E - Correspondence



Marc M. Siah & Associates, Inc.

Consulting Civil • Structural • Environmental & Ocean Engineers
810 Richards Street, Suite 888, Honolulu, Hawaii 96813

RECEIVED APR 11 2000

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Marc M. Siah & Associates, Inc.
Engineering & Science of the Environment

MMS
Consulting Engineers

April 7, 2000

March 15, 2000

The Gas Company
515 Kamehame Street
Honolulu, Hawaii 96814

RE: HONOULIULI 228' RESERVOIR NO. 3

To Whom It May Concern:

On behalf of the Board of Water Supply (BWS), City and County of Honolulu, we are enclosing a location map, site layout plan and profile and a brief description of the BWS's proposed reservoir construction project in Honolulu (aka of the H-1 Freeway). The BWS is proposing to construct a 6 million gallon reservoir on a vacant site adjacent to the Ewa Shaft and existing Honoiliuli reservoir in order to meet the growing water storage demands in the Ewa area.

If you wish to provide preliminary comments on the project at this time or be a consulted party during the preparation of the project's Environmental Assessment, please review the enclosed material and submit your written response to the address below by April 15, 2000. Comments received will be considered in the preparation of the Draft Environmental Assessment. When the draft is completed, a copy will be sent to you upon request for your review and comment.

Thank you for your interest and participation.

Sincerely,
Marc M. Siah and Associates, Inc.

Kelly J. Chuck
Kelly J. Chuck, P.E.
Project Manager

Enclosure:
Location Map
Site Layout Plan
Site Layout Profile
Project Summary

Marc M. Siah & Associates, Inc.
810 Richards Street, Suite 888
Honolulu, HI 96813

Attention: Mr. Kelly Chuck, P.E.
Project Manager

Gentlemen:

Subject: Draft Environmental Assessment
Honouliuli 228' Reservoir No. 3

Please be advised that The Gas Company does not have any underground utility gas mains in the project vicinity. Therefore, we have no comments at this time and will not need to be a consulted party during the preparation of the project's Environmental Assessment.

Thank you for the opportunity to comment on the Draft Environmental Assessment. Should there be any questions, or if additional information is desired, please call me at 594-5570.

Very truly yours,

Charles E. Calvet

Charles E. Calvet, P.E.
Manager, Engineering

CEC:cm
00-123

515 Kamehame Street Honolulu Hawaii 96814
PO Box 3000 Honolulu Hawaii 96822-3000
Telephone 808 535 9600 Facsimile 808 536 5000

THE GAS COMPANY
515 Kamehame Street Honolulu Hawaii 96814
PO Box 3000 Honolulu Hawaii 96822-3000
Telephone 808 535 9600 Facsimile 808 536 5000

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RECEIVED APR 5 2000 ✓

GTE Hawaiian Telephone Company
PROJECT 2200 - HONOLULU, HI 96841 - (808) 546-4515

GTE Hawaiian Tel
Beyond the call

Marc M. Siah & Associates, Inc.
Engineering & Science of the Environment

MEAS
Consulting Engineers

April 3, 2000

Attention: Kelly J. Chuck
Marc M. Siah and Associates, Inc.
810 Richards Street, Suite 888
Honolulu, Hawaii 96813

Dear Mr. Kelly J. Chuck

Subject: HONOLULULI 228' RESERVOIR NO.3

Thank you for the opportunity to review and comment on the Board or Water Supply's proposed Honouliuli 228' Reservoir No.3. Upon review of the plan of the proposed Honouliuli 228' Reservoir, it has been determined that GTE's telecommunications facilities currently serving the existing BHS Honouliuli Reservoir No.2 traverses the proposed site along the existing east to west cane haul road will be impacted by the construction of the proposed reservoir.

If the temporary relocation and replacing to the original location of the existing telecommunications facilities along the east to west road are required during grading operations, GTE will require an AID TO CONSTRUCTION payment for this work to be done. An AID TO CONSTRUCTION payment will also be required if a permanent relocation is required due to insufficient vertical clearance for GTE facilities once the pole line is restored to the original location.

GTE wishes to be a consulted party during the preparation of the project's Environmental Assessment and any future electrical / telecommunications consultant plans that are produced for this project.

If you have any questions, please call Mahi Tsugawa at 840-5857.

Sincerely,

Mahii Tsugawa
Mahii M. Tsugawa
Designer-Access Design
Access Design & Construction

C:

March 15, 2000

GTE Hawaiian Tel
P.O. Box 2200
Honolulu, Hawaii 96841

RE: HONOLULULI 228' RESERVOIR NO.3

To Whom It May Concern:

On behalf of the Board of Water Supply (BWS), City and County of Honolulu, we are enclosing a location map, site layout plan and profile and a brief description of the BWS's proposed reservoir construction project in Honouliuli makai of the H-1 Freeway. The BWS is proposing to construct a 6 million gallon reservoir on a vacant site adjacent to the Ewa Shaft and existing Honouliuli reservoir in order to meet the growing water storage demands in the Ewa area.

If you wish to provide preliminary comments on the project at this time or be a consulted party during the preparation of the project's Environmental Assessment, please review the enclosed material and submit your written response to the address below by April 15, 2000. Comments received will be considered in the preparation of the Draft Environmental Assessment. When the draft is completed, a copy will be sent to you upon request for your review and comment.

Thank you for your interest and participation.

Sincerely,
Marc M. Siah and Associates, Inc.

Kelly J. Chuck
Kelly J. Chuck, P.E.
Project Manager

Enclosures:
Location Map
Site Layout Plan
Site Layout Profile
Project Summary

810 Richards Street • City Center Building • Suite 888 • Honolulu, HI 96813 • Project: (808) 536-7190 • Fax: (808) 578-4337 • Email: mtsiah@gte.com

DOCUMENT CAPTURED AS RECEIVED

RECEIVED APR 14 2000

DEPARTMENT OF PLANNING AND PERMITTING
CITY AND COUNTY OF HONOLULU

180 SOUTH KING STREET • HONOLULU, HAWAII 96813
TELEPHONE (808) 527-4410 • FAX (808) 527-6742

11/10
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RANDALL K. FURUKI, AIA
DIRECTOR

LORETTA K. CHOE
MANAGER

2000/CLOG-1802 (DT)

April 13, 2000

Mr. Kelly J. Chuck, P.E.
Project Manager
Marc M. Siah & Associates, Inc.
810 Richards Street
City Center Building, Suite 888
Honolulu, Hawaii 96813

Dear Mr. Chuck:

Preliminary Review
Honouliuli 228' Reservoir No. 3
Tax Map Key: 9-2-1: DOR. 1

We have reviewed the above proposal and offer the following comments:

Ewa Development Plan (DP)

1. The Environmental Assessment (EA) for the project should discuss its relationship to the Ewa Development Plan (DP). With respect to the Ewa DP, the project is located outside of the Urban Growth Boundary in areas which the Plan indicates should be in Agricultural or Preservation uses. However, the facility is considered a public use and structure under the Land Use Ordinance, and it is permitted in both preservation and agricultural zoning districts.
2. The site is also within a significant panoramic view plane identified in Table 3.1 and shown on Exhibit 3.2 and the Open Space map in Appendix A of the Ewa DP. Accordingly, the draft EA should contain a visual impact analysis, including renderings and/or photos with the proposed facility superimposed, and a discussion of how the project will carry out the DP policies to retain mauka and other public views.
3. We suggest that, at a minimum, the visual impact analysis address impacts to views of the Waianae Mountains from both directions along the H-1 Freeway, and from public vantage points along Farrington Highway, makai of H-1. The treatment



Marc M. Siah & Associates, Inc.
Engineering & Science of the Environment

March 15, 2000

City & County of Honolulu, Dept. of Planning and Permitting
Zoning Division, Land Use
650 South King Street
Honolulu, Hawaii 96813
ATTENTION: RANDALL FURUKI, AIA

RE: HONOLULUI 228' RESERVOIR NO. 3

Dear Mr. Fujiki:

On behalf of the Board of Water Supply (BWS), City and County of Honolulu, we are enclosing a location map, site layout plan and profile and a brief description of the BWS's proposed reservoir construction project in Honouliuli makai of the H-1 Freeway. The BWS is proposing to construct a 6 million gallon reservoir on a vacant site adjacent to the Ewa Shaft and existing Honouliuli reservoir in order to meet the growing water storage demands in the Ewa area.

If you wish to provide preliminary comments on the project at this time or be a consulted party during the preparation of the project's Environmental Assessment, please review the enclosed material and submit your written response to the address below by April 15, 2000. Comments received will be considered in the preparation of the Draft Environmental Assessment. When the draft is completed, a copy will be sent to you upon request for your review and comment.

Thank you for your interest and participation.

Sincerely,
Marc M. Siah and Associates, Inc.

Kelly J. Chuck
Kelly J. Chuck, P.E.
Project Manager

Enclosures: Location Map
Site Layout Plan
Site Layout Profile
Project Summary

Mr. Kelly J. Chuck, P.E.
Page 2
April 13, 2000

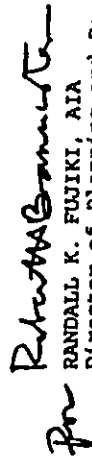
facility height, bulk, and color should be shown in the view plane analysis. If warranted, mitigation measures should be included in the draft EA.

4. The EA should discuss the requirements for the project to be placed on the Ewa Public Infrastructure Map (PIM) since the facility is to be publicly funded.

Due to reorganization, three additional functions (Wastewater, Traffic, and Civil Engineering) have merged with our department. In the future, please send four copies of the preliminary assessment and/or draft environmental assessment to our department.

Should you have any questions regarding the DP comments, please contact Raymond Young of our Community Action Plans Branch at 527-5839. If you have any other questions, please call Ms. Dana Tezamoto of our staff at 523-4648.

Sincerely yours,


RANDALL K. FUJIKI, AIA
Director of Planning and Permitting

RKF:fm
b2:bhmo:djc

00399 document no. 32038

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

March 29, 2000 ✓

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

03070PKP.00

Marc M. Siah & Associates, Inc.
Engineering & Science of the Environment



March 15, 2000

Hawaii State Department of Health
NPDES Permitting
Kinai Hille
1250 Punchbowl Street
Honolulu, Hawaii 96813

RZ: HONOLULU 22F RESERVOIR NO. 3

To Whom It May Concern:

On behalf of the Board of Water Supply (BWS), City and County of Honolulu, we are enclosing a location map, site layout plan and profile and a brief description of the BWS's proposed reservoir construction project in Honolulu maui of the H-1 Freeway. The BWS is proposing to construct a 6 million gallon reservoir on a vacant site adjacent to the Ewa Shaft and existing Honolulu reservoir in order to meet the growing water storage demands in the Ewa area.

If you wish to provide preliminary comments on the project at this time or be a consulted party during the preparation of the project's Environmental Assessment, please review the enclosed material and submit your written response to the address below by April 15, 2000. Comments received will be considered in the preparation of the Draft Environmental Assessment. When the draft is completed, a copy will be sent to you upon request for your review and comment.

Thank you for your interest and participation.

Sincerely,
Marc M. Siah and Associates, Inc.

Kelly J. Chuck
Kelly J. Chuck, P.E.
Project Manager

Enclosures:
Location Map
Site Layout Plan
Site Layout Profile
Project Summary

Mr. Kelly J. Chuck, P.E.
Project manager

Marc M. Siah and Associates, Inc.
810 Richards Street, Suite 888
Honolulu, Hawaii 96813

Dear Mr. Chuck:

Subject: Honouliuli Reservoir No. 3

The Department of Health has the following comments regarding the subject submittal dated March 15, 2000:

1. The Army Corps of Engineers should be contacted to identify whether a Federal permit (including a Department of Army permit) is required for this project. If it is determined that a Federal permit is required for the subject project, then a Section 401 Water Quality Certification would also be required from our office;
 - a. Storm water runoff associated with construction activities, including clearing, grading, and excavation that result in the disturbance of equal to or greater than five (5) acres of total land area; and
 - b. Hydrotesting water.
2. If the project involves any of the following discharges into State waters, a NPDES general permit is required for each activity:
 - a. Storm water runoff associated with construction activities, including clearing, grading, and excavation that result in the disturbance of equal to or greater than five (5) acres of total land area; and
 - b. Hydrotesting water.
3. The Department requires that Notice of Intent for NPDES general permits be submitted thirty days before the discharge is to occur.

Mr. Kelly J. Chuck
March 29, 2000
Page 2

Should you have any questions, please contact Ms. Kris Pochtis, Engineering Section of the
Clean Water Branch, at 586-4309.

Sincerely,



DENIS R. LAU, P.E., CHIEF
Clean Water Branch

KP:cr

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200 Alamaulani Street • Maunaloa, Hawaii 96709-3999 • Telephone: (808) 625-2100



Marc M. Siah & Associates, Inc.
Engineering & Science of the Environment

March 15, 2000

Oceanic Cable
200 Alamaulani Street
Honolulu, Hawaii 96789

RE: HONOLULU 225' RESERVOIR NO. 3

To Whom It May Concern:

On behalf of the Board of Water Supply (BWS), City and County of Honolulu, we are enclosing a location map, site layout plan and profile and a brief description of the BWS's proposed reservoir construction project in Honolulu makai of the H-1 Freeway. The BWS is proposing to construct a 6 million gallon reservoir on a vacant site adjacent to the Ewa Shaft and existing Honolulu reservoir in order to meet the growing water storage demands in the Ewa area.

If you wish to provide preliminary comments on the project at this time or be a consulted party during the preparation of the project's Environmental Assessment, please review the enclosed material and submit your written response to the address below by April 15, 2000. Comments received will be considered in the preparation of the Draft Environmental Assessment. When the draft is completed, a copy will be sent to you upon request for your review and comment.

Thank you for your interest and participation.

Sincerely,
Marc M. Siah and Associates, Inc.

Kelly J. Chuck
Kelly J. Chuck, P.E.
Project Manager

Enclosures:
Location Map
Site Layout Plan
Site Layout Profile
Project Summary

March 28, 2000

Marc M. Siah and Associates, Inc.
810 Richards St.
City Center Building
Suite 888
Honolulu, HI. 96813

Attention: Kelly J. Chuck

Subject: Honouliuli Reservoir #3

Dear Mr. Chuck,

Thank you for including us in the review of this project.

At this time we have no comments or concerns as we have no cable facilities in the project area.

If you have further questions please feel free to contact me at 625-8347.

Sincerely,
Kyle Guglielmino

Kyle Guglielmino



Marc M. Siah & Associates, Inc.
Engineering & Science of the Environment

MILLAR & CARTER
CONSULTING ENGINEERS



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 KUMUHONOA STREET
HONOLULU, HAWAII 96813

March 15, 2000

Division of Forestry and Wildlife
State of Hawaii
Department of Land and Natural Resources
P.O. Box 621
Honolulu, Hawaii 96809

RE: HONOLULULI 228' RESERVOIR NO. 3

To Whom It May Concern:

On behalf of the Board of Water Supply (BWS), City and County of Honolulu, we are enclosing a location map, site layout plan and profile and a brief description of the BWS's proposed reservoir construction project in Honolulu makai of the H-1 Freeway. The BWS is proposing to construct a 6 million gallon reservoir on a vacant site adjacent to the Ewa Shaft and existing Honolulu reservoir in order to meet the growing water storage demands in the Ewa area.

If you wish to provide preliminary comments on the project at this time or be a consulted party during the preparation of the project's Environmental Assessment, please review the enclosed material and submit your written response to the address below by April 15, 2000. Comments received will be considered in the preparation of the Draft Environmental Assessment. When the draft is completed, a copy will be sent to you upon request for your review and comment.

Thank you for your interest and participation.

Sincerely,
Marc M. Siah and Associates, Inc.

Kelly J. Chuck
Kelly J. Chuck, P.E.
Project Manager

Enclosure:
Location Map
Site Layout Plan
Site Layout Profile
Project Summary

610 Kalia Road • City Center Building • Suite 608 • Honolulu, HI 96813 • Phone: (808) 538-7190 • Fax: (808) 538-4332 • Email: mms@hawaii.net

1130
TIMOTHY E. JONES
Consultant
BOARD OF LAND AND NATURAL RESOURCES
JANET E. BARFIELD
MEMBER

ADJACENT DEVELOPMENT
PROGRAMS
PLANNING
SOUTH AND WEST SIDE
CONSTRUCTION AND
DEVELOPMENT, AT LOTS
CONSTRUCTION AND
CONSTRUCTION
PROPERTY AND WITH A
METHOD OF CONSTRUCTION
AND CONSTRUCTION
WITH LAND AND CONSTRUCTION
WITH RESOURCE MANAGEMENT

April 3, 2000

Mr. Kelly J. Chuck, P.E.
Project Manager
Marc M. Siah & Associates, Inc.
810 Richards Street, Suite 888
Honolulu, Hawaii 96813

Dear Mr. Chuck:

RE: Honouliuli 228' Reservoir No. 3 by Board of Water Supply, City and County of Honolulu.

We have reviewed the above referenced documents and provide the following comments to your request. The Ewa plain area has recently experienced much growth. For example, the North-South Road project and an application by Cutter Management Company in Kapolei are projects where evidence of the "endangered" plant *Abutilon merziesii* is known to be present in these areas. To avoid a similar situation currently being mitigated for the East Kapolei Master Plan and North-South Road Project, we strongly recommend that a survey for the *Abutilon merziesii* be done for this project. It will help mitigate impacts that the applicant will need to consider while constructing the 6-million gallon reservoir. Please call Ms. Vickie Caraway, DOFAW State Botanist at 587-4180, if you have further questions regarding this plant. During the construction phase, DOFAW is always concerned about fire, especially during the dry season. Thank you for the opportunity to comment on this project.

Sincerely,

Michael G. Buck

Michael G. Buck
Administrator

C: Oahu DOFAW Branch
Vickie Caraway, DOFAW Administration



Marc M. Siah & Associates, Inc.
Engineering & Science of the Environment

March 15, 2000

U.S. Fish and Wildlife Service
United States Department of the Interior
Pacific Islands Ecoregion
P.O. Box 50083
Honolulu, Hawaii 96850

RE: HONOLULULI 228' RESERVOIR NO. 3

To Whom It May Concern:

On behalf of the Board of Water Supply (BWS), City and County of Honolulu, we are enclosing a location map, site layout plan and profile and a brief description of the BWS's proposed reservoir construction project in Honolulu makai of the H-1 Freeway. The BWS is proposing to construct a 6 million gallon reservoir on a vacant site adjacent to the Ewa Shaft and existing Honolulu reservoir in order to meet the growing water storage demands in the Ewa area.

If you wish to provide preliminary comments on the project at this time or be a consulted party during the preparation of the project's Environmental Assessment, please review the enclosed material and submit your written response to the address below by April 15, 2000. Comments received will be considered in the preparation of the Draft Environmental Assessment. When the draft is completed, a copy will be sent to you upon request for your review and comment.

Thank you for your interest and participation.

Sincerely,
Marc M. Siah and Associates, Inc.

Kelly J. Chack

Kelly J. Chack, P.E.
Project Manager

Enclosures: Location Map
Site Layout Plan
Site Layout Profile
Project Summary



Marc M. Siah & Associates, Inc.
Engineering & Science of the Environment

March 15, 2000

Hawaiian Electric Company, Inc.
P.O. Box 2750
Honolulu, Hawaii 96840

RE: HONOLULULI 228' RESERVOIR NO. 3

To Whom It May Concern:

On behalf of the Board of Water Supply (BWS), City and County of Honolulu, we are enclosing a location map, site layout plan and profile and a brief description of the BWS's proposed reservoir construction project in Honolulu makai of the H-1 Freeway. The BWS is proposing to construct a 6 million gallon reservoir on a vacant site adjacent to the Ewa Shaft and existing Honolulu reservoir in order to meet the growing water storage demands in the Ewa area.

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Thank you for your interest and participation.

Sincerely,
Marc M. Siah and Associates, Inc.

Kelly J. Chack

Kelly J. Chack, P.E.
Project Manager

Enclosures: Location Map
Site Layout Plan
Site Layout Profile
Project Summary



Marc M. Siah & Associates, Inc.
Engineering & Science of the Environment

March 15, 2000

Councilmember John DeSoto
City Hall, Room 202
570 South King Street
Honolulu, Hawaii 96813

RE: HONOLULU 22F RESERVOIR NO. 3

Dear Councilmember DeSoto:

On behalf of the Board of Water Supply (BWS), City and County of Honolulu, we are enclosing a location map, site layout plan and profile and a brief description of the BWS's proposed reservoir construction project in Honolulu makai of the H-1 Freeway. The BWS is proposing to construct a 6 million gallon reservoir on a vacant site adjacent to the Ewa Shaft and existing Honolulu reservoir in order to meet the growing water storage demands in the Ewa area.

If you wish to provide preliminary comments on the project at this time or be a consulted party during the preparation of the project's Environmental Assessment, please review the enclosed material and submit your written response to the address below by April 15, 2000. Comments received will be considered in the preparation of the Draft Environmental Assessment. When the draft is completed, a copy will be sent to you upon request for your review and comment.

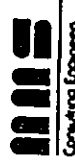
Thank you for your interest and participation.

Sincerely,
Marc M. Siah and Associates, Inc.

Kelly J. Chuck

Kelly J. Chuck, P.E.
Project Manager

Enclosures:
Location Map
Site Layout Plan
Site Layout Profile
Project Summary



Marc M. Siah & Associates, Inc.
Engineering & Science of the Environment

March 15, 2000

Makalo/Kapolei/Honokahale Neighborhood Board
c/o Neighborhood Commission Office
City Hall, Room 400
Honolulu, Hawaii 96813

RE: HONOLULU 22F RESERVOIR NO. 3

Dear Neighborhood Commission Members:

On behalf of the Board of Water Supply (BWS), City and County of Honolulu, we are enclosing a location map, site layout plan and profile and a brief description of the BWS's proposed reservoir construction project in Honolulu makai of the H-1 Freeway. The BWS is proposing to construct a 6 million gallon reservoir on a vacant site adjacent to the Ewa Shaft and existing Honolulu reservoir in order to meet the growing water storage demands in the Ewa area.

If you wish to provide preliminary comments on the project at this time or be a consulted party during the preparation of the project's Environmental Assessment, please review the enclosed material and submit your written response to the address below by April 15, 2000. Comments received will be considered in the preparation of the Draft Environmental Assessment. When the draft is completed, a copy will be sent to you upon request for your review and comment.

Thank you for your interest and participation.

Sincerely,
Marc M. Siah and Associates, Inc.

Kelly J. Chuck

Kelly J. Chuck, P.E.
Project Manager

Enclosures:
Location Map
Site Layout Plan
Site Layout Profile
Project Summary



Marc M. Siah & Associates, Inc.
Engineering & Science of the Environment

March 15, 2000

The Sierra Club
Hawaii Chapter
P.O. Box 2377
Honolulu, Hawaii 96803

RE: HONOLULU 228' RESERVOIR NO. 3

To Whom It May Concern:

On behalf of the Board of Water Supply (BWS), City and County of Honolulu, we are enclosing a location map, site layout plan and profile and a brief description of the BWS's proposed reservoir construction project in Honolulu makai of the H-1 Freeway. The BWS is proposing to construct a 6 million gallon reservoir on a vacant site adjacent to the Ewa Shaft and existing Honolulu reservoir in order to meet the growing water storage demands in the Ewa area.

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Thank you for your interest and participation.

Sincerely,
Marc M. Siah and Associates, Inc.

Kelly J. Chuck

Kelly J. Chuck, P.E.
Project Manager

Enclosures: Location Map
Site Layout Plan
Site Layout Profile
Project Summary



Marc M. Siah & Associates, Inc.
Engineering & Science of the Environment

March 15, 2000

The Outdoor Circle
1314 South King Street, Suite 306
Honolulu, Hawaii 96814

RE: HONOLULU 228' RESERVOIR NO. 3

To Whom It May Concern:

On behalf of the Board of Water Supply (BWS), City and County of Honolulu, we are enclosing a location map, site layout plan and profile and a brief description of the BWS's proposed reservoir construction project in Honolulu makai of the H-1 Freeway. The BWS is proposing to construct a 6 million gallon reservoir on a vacant site adjacent to the Ewa Shaft and existing Honolulu reservoir in order to meet the growing water storage demands in the Ewa area.

If you wish to provide preliminary comments on the project at this time or be a consulted party during the preparation of the project's Environmental Assessment, please review the enclosed material and submit your written response to the address below by April 15, 2000. Comments received will be considered in the preparation of the Draft Environmental Assessment. When the draft is completed, a copy will be sent to you upon request for your review and comment.

Thank you for your interest and participation.

Sincerely,
Marc M. Siah and Associates, Inc.

Kelly J. Chuck

Kelly J. Chuck, P.E.
Project Manager

Enclosures: Location Map
Site Layout Plan
Site Layout Profile
Project Summary



Marc M. Siah & Associates, Inc.
Engineering & Science of the Environment

March 15, 2000

Hawaii's 1000 Friends
305 Hahani St. #282
Kailua, Hawaii 96734

RE: HONOULULU 228' RESERVOIR NO. 3

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On behalf of the Board of Water Supply (BWS), City and County of Honolulu, we are enclosing a location map, site layout plan and profile and a brief description of the BWS's proposed reservoir construction project in Honolulu makai of the H-1 Freeway. The BWS is proposing to construct a 6 million gallon reservoir on a vacant site adjacent to the Ewa Shaft and existing Honoouliuli reservoir in order to meet the growing water storage demands in the Ewa area.

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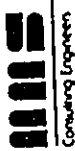
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Kelly J. Chuck

Kelly J. Chuck, P.E.
Project Manager

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Marc M. Siah & Associates, Inc.
Engineering & Science of the Environment

March 15, 2000

Historic Hawaii Foundation
860 Iwilei Road, Suite 690
Honolulu, Hawaii 96817

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Kelly J. Chuck

Kelly J. Chuck, P.E.
Project Manager

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Consulting Engineers

Marc M. Siah & Associates, Inc.

Engineering & Science of the Environment

March 15, 2000

Representative Mark Moses, District 42
State Capitol
Room 310
415 South Beretania Street
Honolulu, Hawaii 96813

RE: HONOLULULI 228' RESERVOIR NO. 3

Dear Representative Moses:

On behalf of the Board of Water Supply (BWS), City and County of Honolulu, we are enclosing a location map, site layout plan and profile and a brief description of the BWS's proposed reservoir construction project in Honolulu makai of the H-1 Freeway. The BWS is proposing to construct a 6 million gallon reservoir on a vacant site adjacent to the Ewa Shaft and existing Honouliuli reservoir in order to meet the growing water storage demands in the Ewa area.

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Kelly J. Chuck, P.E.
Project Manager

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Consulting Engineers

Marc M. Siah & Associates, Inc.

Engineering & Science of the Environment

March 15, 2000

Senator Brian Kanno, District 20
State Capitol
Room 202
415 South Beretania Street
Honolulu, Hawaii 96813

RE: HONOLULULI 228' RESERVOIR NO. 3

Dear Senator Kanno:

On behalf of the Board of Water Supply (BWS), City and County of Honolulu, we are enclosing a location map, site layout plan and profile and a brief description of the BWS's proposed reservoir construction project in Honolulu makai of the H-1 Freeway. The BWS is proposing to construct a 6 million gallon reservoir on a vacant site adjacent to the Ewa Shaft and existing Honouliuli reservoir in order to meet the growing water storage demands in the Ewa area.

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Marc M. Siah and Associates, Inc.

Kelly J. Chuck, P.E.
Project Manager

Enclosures: Location Map
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Marc M. Sih & Associates, Inc.
Engineering & Science of the Environment

March 15, 2000

University of Hawaii - Manoa Campus
Environmental Center
2550 Campus Road, Crawford 317
Honolulu, HI 96822

RE: HONOULULU 22F RESERVOIR NO. 3

To Whom It May Concern:

On behalf of the Board of Water Supply (BWS), City and County of Honolulu, we are enclosing a location map, site layout plan and profile and a brief description of the BWS's proposed reservoir construction project in Honolulu makai of the H-1 Freeway. The BWS is proposing to construct a 6 million gallon reservoir on a vacant site adjacent to the Ewa Shaft and existing Honoouliuli reservoir in order to meet the growing water storage demands in the Ewa area.

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Marc M. Sih and Associates, Inc.

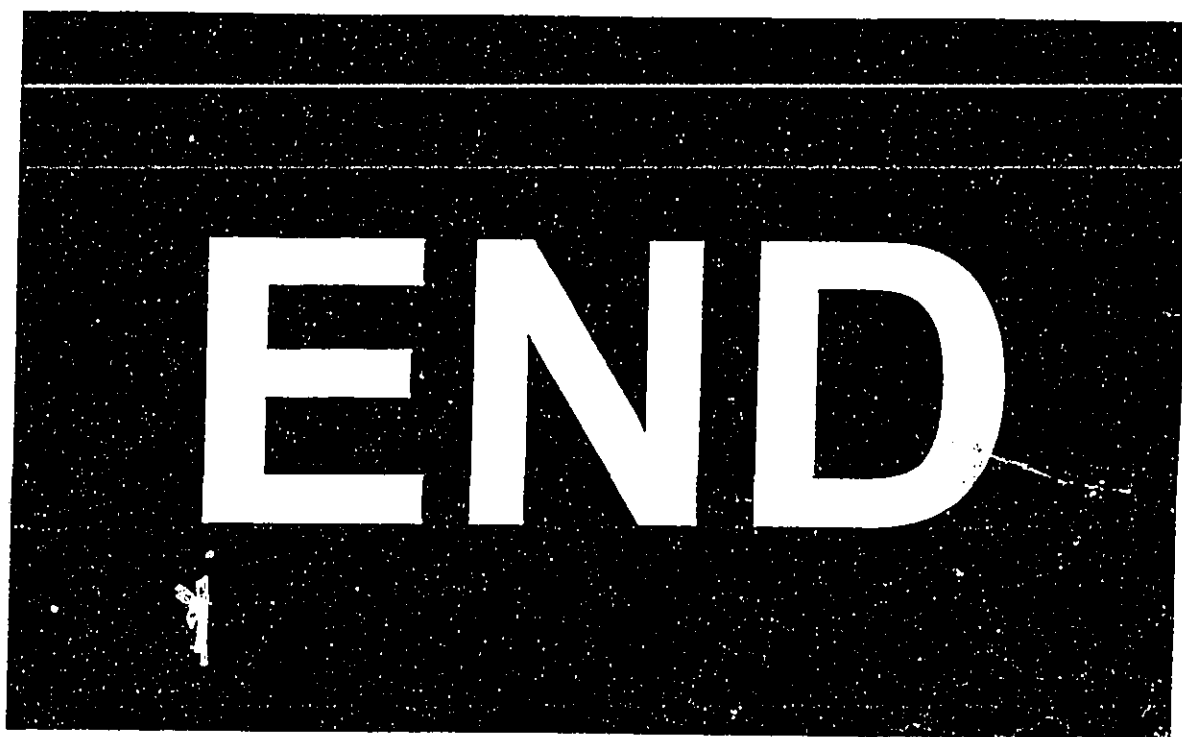
Kelly J. Chuck
Kelly J. Chuck, P.E.
Project Manager

Enclosures: Location Map
Site Layout Plan
Site Layout Profile
Project Summary



Marc M. Siah & Associates, Inc.

Consulting Civil • Structural • Environmental & Ocean Engineers
810 Richards Street, Suite 888, Honolulu, Hawaii 96813



CERTIFICATION

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

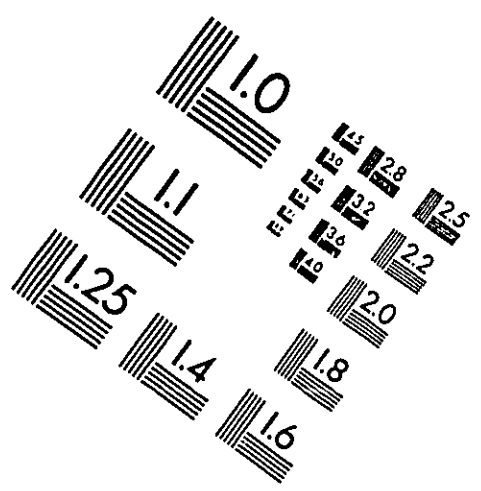
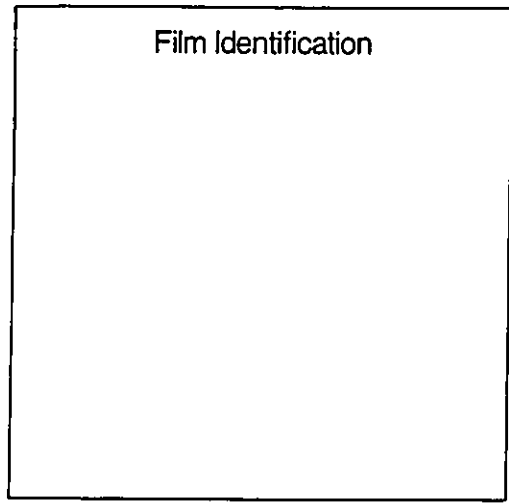
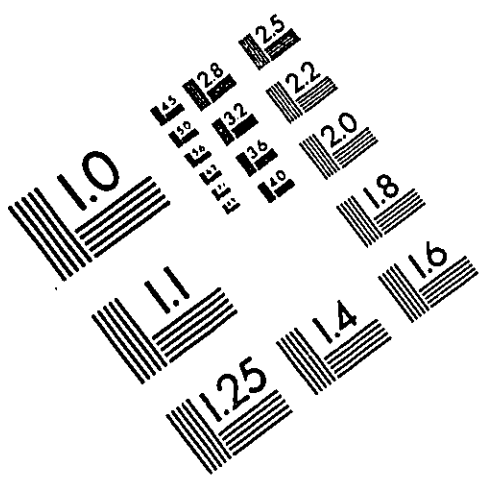
2004

DATE

Jelle Kadi

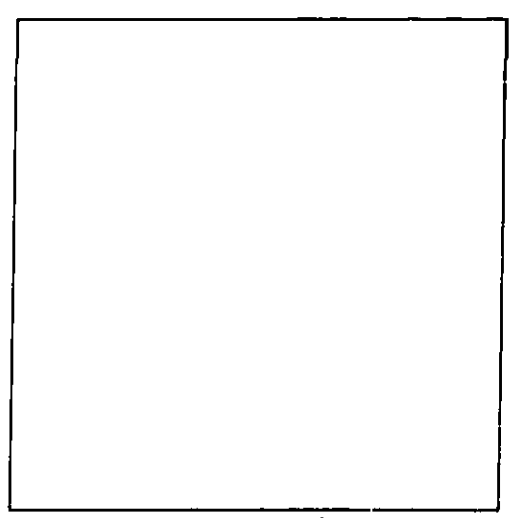
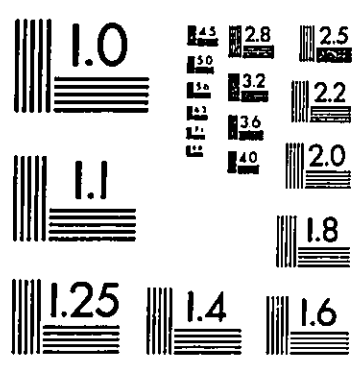
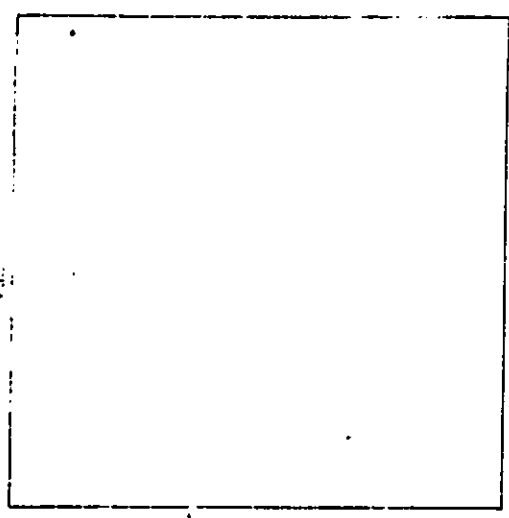
SIGNATURE OF OPERATOR

TOP

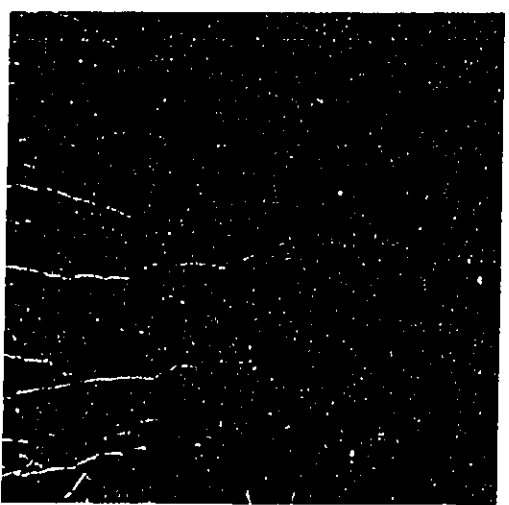
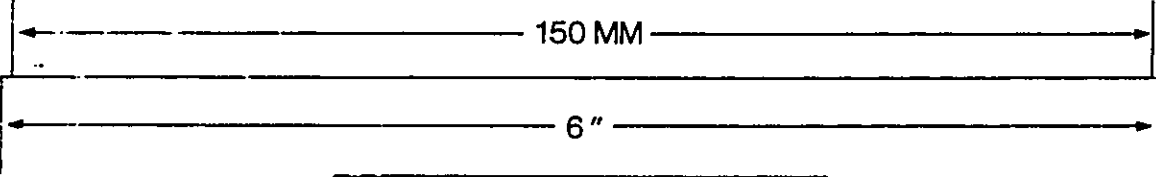


A & P International
612/854-0088 FAX 612/854-0482
8030 Old Cedar Ave. So., Ste. #215
Bloomington, MN 55425

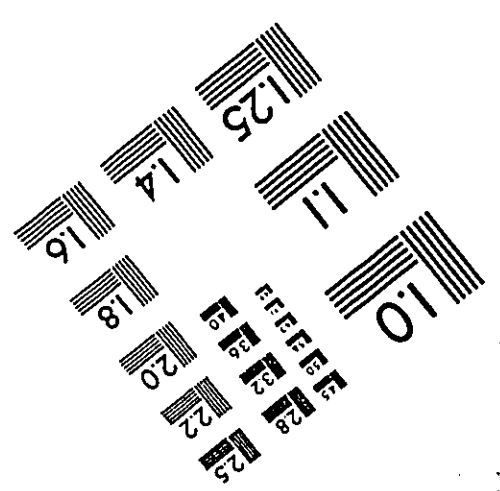
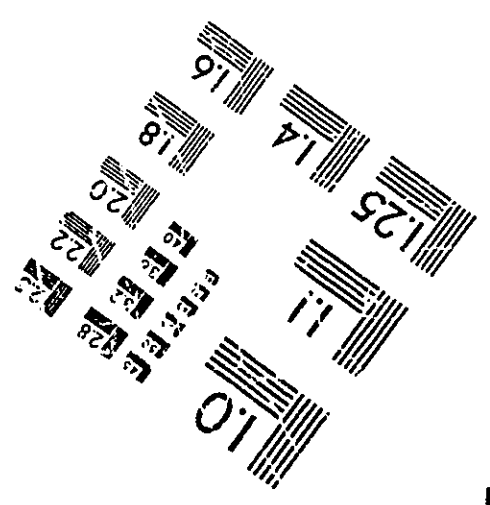
PRECISIONSM RESOLUTION TARGETS



RIGHT



FL-3 8 1/2"x11" PAPER PRINTED GENERAL TARGET



DENSITY TARGET



ADVANCED MICRO-IMAGE SYSTEMS HAWAII