BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU

630 SOUTH BERETANIA STREET

HONOLULU, HAWAII 96843

October 10, 1995

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

Dear Mr. Gill:

Subject: Negative Declaration for the Proposed Halawa Caprock Nonpotable Well, TMK: 9-9-03: 35, Halawa, Oahu, Hawaii

The Board of Water Supply has reviewed the comments received during the public comment period which began on May 8, 1995. We have determined that the environmental impacts of this exploratory well project have been adequately addressed as discussed in the final environmental assessment (EA) and are therefore, issuing a negative declaration. We request that our proposed well project be published in the next Office of Environmental Quality Control Bulletin as a Negative Declaration.

Attached are four (4) copies of the final EA for your review.

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

Very truly yours,

RAYMOND H. SATO
Manager and Chief Engineer

Attachment

cc: CH2M Hill

1995-11-08-OA-FEA - Halawa Caprock Nonpotable Well

FINAL ENVIRONMENTAL ASSESSMENT

HALAWA CAPROCK NONPOTABLE WELL

HALAWA, OAHU, HAWAII
TAX MAP KEY: 9–9–03:por. 35

PROPOSING AGENCY
CITY AND COUNTY OF HONOLULU
BOARD OF WATER SUPPLY

Submitted pursuant to Chapter 343, Hawaii Revised Statutes

OCTOBER 1995

CH2MHILL

Table of Contents

Table of Contents
(continued)

Table of Contents
(continued)

Figures

Appendices

Chapter 1
Executive Summary

1.1 Proposing Agency and Proposed Action

The City and County of Honolulu Board of Water Supply (BWS) proposes to drill and case a caprock nonpotable water well in Halawa within the H-1 Highway/Moanalua Road Interchange near the Aloha Stadium. The caprock nonpotable well is proposed within an existing grassed area within the highway interchange. The proposed well site is on lands under the jurisdiction of the State of Hawaii Department of Transportation (DOT).

The caprock nonpotable well is proposed within a nearly triangularly shaped site, which is surrounded on all sides by existing or proposed highway ramps. The west edge of the triangularly shaped site is bounded by the exit ramp for east bound traffic from Kamehameha Highway; the exit ramp skirts around the north and the east edge of Aloha Stadium before continuing southward into the H-1 Highway towards Honolulu International Airport. The northeast edge of the triangularly shaped site is bounded by an elevated ramp that takes the eastbound H-1 traffic into the Moanalua Road. The southeast edge of the triangularly-shaped site is bounded by a graded area that will be a future off-ramp for southbound traffic from the H-3 Highway. Halawa Stream, which is channelized in this vicinity, is located at the south corner of the proposed BWS site for the caprock non-potable well.

The site is located about 200 to 300 feet east of Aloha Stadium's parking area and about 50 feet north of the channelized Halawa Stream. The well is expected to be capable of yielding about 0.2 million gallons per day (mgd) of nonpotable water.

The drilling and casing of this caprock nonpotable well is the first step of a process that the BWS utilizes to obtain hydro-geological data on the potential of new nonpotable groundwater resources that could be used for irrigation purposes. Following the drilling and casing of the well, the well will be test pumped to determine if the quantity and quality of the water from the caprock nonpotable well are suitable. If the quantity and quality of the water are suitable, this caprock nonpotable well will be converted into a permanent nonpotable well and will be put into production. If the well is developed into a nonpotable water production well, a subsequent amendment to City and County of Honolulu Development Plan Public Facilities Map to include the project area as a "site determined nonpotable water well programmed for production within 6 years" would be required. However, if either the quantity or quality of the water proves to be unsuitable, the caprock nonpotable well will be sealed and/or capped.

This environmental assessment focuses on the drilling, casing, and testing of this caprock nonpotable well. The proposed action will also include the temporary installation of pumps, piping, and appurtenances, and if the pump tests are successful, this action will

include the permanent installation of pumps, piping, and appurtenances. All construction work will be within State of Hawaii property within the H-1 Highway/Moanalua Road interchange.

1.2 Purpose of this Environmental Assessment

This Environmental Assessment (EA) was prepared pursuant to Chapter 343, Hawaii Revised Statutes (HRS). Any project proposing the use of State of Hawaii or county lands or funds must comply with Chapter 343, HRS. Environmental compliance pursuant to Chapter 343, HRS, is required because the well will be located within property under the jurisdiction and ownership of the State of Hawaii DOT and will be constructed with BWS funds.

A Final Environmental Assessment and an accompanying Negative Declaration by the City and County of Honolulu BWS determining that the impacts of this project are not sufficient to require the preparation of an environmental impact statement (EIS) will satisfy the Chapter 343, HRS, requirements.

1.3 Subsequent Permits and Approvals Required

If the well is successful, pump installation and water use permits will be required from the Commission on Water Resource Management (CWRM), Department of Land and Natural Resources (DLNR).

A permit to perform work on a state highway will be required from the State of Hawaii, Department of Transportation, Highways Division.

A noise permit will be required from the State of Hawaii, Department of Health, Noise and Radiation Branch.

A building permit will be required from the City and County of Honolulu, Building Department.

If the well is developed into a nonpotable water production well, a subsequent amendment to City and County of Honolulu Development Plan Public Facilities Map to include the project area as a "site determined nonpotable water well programmed for production within 6 years" would first be required. A Development Plan Public Facilities Map amendment would require an application to the City and County of Honolulu, Planning Department, and approval by the City and County of Honolulu, City Council.

1.4 Benefits of this Project

The proposed caprock nonpotable well will furnish valuable data that will be added to Oahu's island-wide hydro-geological information base. This data will be valuable in estimating the quantity and quality and of the nonpotable caprock groundwater resources available at this site, and in combination with data from other potable and nonpotable wells, the data will ultimately be valuable for determining the water resources available for the entire island.

If the hydro-geological data shows that a nonpotable caprock groundwater source can be developed successfully at this site, this well may be converted to a permanent caprock nonpotable water well.

If the well is converted into a permanent caprock nonpotable production well, it would be integrated into a major existing nonpotable water system that presently connects a nonpotable water source at Kalauao Spring (near Pearlridge Shopping Center) to the Halawa Nonpotable Reservoir at the 245 foot elevation at Halawa Heights. This nonpotable water system is currently being used to irrigate highway landscaping. The existing nonpotable water system also extends from the vicinity of this proposed Halawa Caprock Nonpotable Well site southward within the H-1 Highway and then eastward into Nimitz Highway, the airport industrial areas, and Middle Street to Moanalua Road. The conversion of this well into a permanent well will provide an additional nonpotable groundwater source for this irrigation system.

The development of additional nonpotable water sources for irrigation purposes will allow an exchange or substitution of the existing potable irrigation groundwater that is being used for irrigation with lower-quality water. This saving of potable groundwater that would otherwise be used for irrigation for municipal use is necessary to accommodate the growing demand for potable water within the City and County of Honolulu.

1.5 Alternatives Considered

The no action alternative, the delayed action alternative, site alternatives, and source alternatives are discussed in this environmental assessment or were discussed in previous environmental analyses done by the BWS.

The no action alternative was not pursued because it would be contrary to the BWS's legal mandate to provide for the water needs of a growing population. The BWS is mandated to use nonpotable irrigation water for all existing and proposed large landscaped areas such as golf courses, parks, schools, cemeteries, and highways. This project is part of an overall nonpotable groundwater development program intended to exchange or substitute existing potable irrigation water with lower quality water for irrigation, which in turn will free nonpotable water to meet growing municipal water demands. If the BWS's nonpotable

water source development program is curtailed, the BWS would be hampered in providing adequately for the potable water needs of the future population of the island. This may result in restrictions in new development as well as regional water shortages. The delayed action alternative was not pursued because this alternative would delay the BWS's implementation schedule, would have substantially similar environmental outcomes, and higher development costs because of inflation.

This environmental assessment analyzes one of many possible nonpotable groundwater source sites in the Honolulu, Pearl Harbor, and Windward Sectors. The alternative sites offer opportunities as new nonpotable groundwater supply sources, but are considered by the BWS to be additions to, rather than alternatives to the proposed caprock nonpotable groundwater well testing at this Halawa site.

The BWS's 1984 study, *Regional Environmental Impact Assessment for Development of Wells, Reservoirs, Transmission Lines and Appurtenances at Honolulu, Hawaii*, evaluated the potential for 18 additional nonpotable groundwater well sites in the Honolulu area including the Halawa site. A 1992 BWS report, *Nonpotable Water Study*, evaluated the use of nonpotable water from Kalauao Spring for Blaisdell Park, from Kunawai Springs for Foster Gardens, from the existing Kapiolani Park brackish wells for Kapiolani Park and Honolulu Zoo, and from Waikele Stream for the Ted Makalena Golf Course. In addition to this, another BWS study, *Windward Oahu Nonpotable Water Study* in 1994 evaluated nonpotable well sources for irrigation for the following:

- the Olomana Golf links
- the Mid Pacific Country Club
- the Koolau Youth Correctional Facility and the Kawailoa Training School for Girls
- the Pali Golf Course, the Hawaii Pacific College-Hawaii Loa Campus, and the Hawaiian Memorial Park
- the Hawaii State Hospital
- the Kahuku Golf Course and the Kahuku District Park

The most recent BWS nonpotable water study was completed in July 1994 and is entitled *Nonpotable Water Sources and Possible Usage Sites, Volume II, Pearl Harbor District, Halawa Stream to Waiawa Stream.* This study evaluated four nonpotable water sources in the Pearl Harbor area including the proposed Halawa Nonpotable Well site. The four sites evaluated were:

- Waiawa Stream-Spring at H-1 Freeway
- HECO Tunnel-Waiau
- Waiawa Springs outlet
- Halawa Valley

The development of nonpotable groundwater sources is considered as an alternative to development of potable groundwater sources, and was analyzed by the BWS in *Regional Environmental Impact Assessment for Development of Wells, Reservoirs, Transmission Lines and Appurtenances at Honolulu, Hawaii.* In this study, nonpotable water from three different sources (caprock springs, caprock, and alluvium) were evaluated.

The development of potential nonpotable water from surface water sources was also evaluated in *Nonpotable Water Study*, including the possible use of surface water from Kunawai Springs for Foster Gardens, and Waikele Stream for the Ted Makalena Golf Course. Typically, the lower water quality of these alternative surface and groundwater sources is not suitable for use as potable water sources, but may be suitable for use as irrigation water for the landscaped areas of golf courses, parks, schools, and highways.

The 1984 study briefly mentioned the use of recycling treated wastewater. However, the recycling of treated wastewater has considerably higher costs and technical challenges even if it is to be used as irrigation water. Also, recycling of treated wastewater for irrigation use has a higher potential for health and safety problems, and would require installation of a costly water treatment plant. Further, the nearest sources of wastewater that could possibly be treated and used for irrigation are located at Honouliuli and Sand Island, which are both too far away to be practical for use at this site. The recycling of treated wastewater as an alternative nonpotable water source for irrigation use in this area was not considered as feasible as the development of groundwater sources for this project.

If the exploratory nonpotable water well site as proposed proves to be unfeasible, a future alternative location for an exploratory nonpotable water well site, located a few hundred feet to the west of the proposed exploratory nonpotable water well site may be possible. This future alternative location for an exploratory nonpotable water well site could be located in the grassy strip separating the highway off-ramp and the Aloha Stadium parking lot. The grassy strip between the highway off-ramp and the Aloha Stadium parking lots does not contain any particular cultural/archaeological, botanical, or faunal (bird and mammal) characteristics that would be an impediment to the development of an exploratory nonpotable water well or permanent production nonpotable well in this area.

The grassy strip separating the highway off-ramp and the Aloha Stadium parking lot has been extensively modified with the construction of the highway and Aloha Stadium; this extensive modification has obliterated any sites of cultural or archaeological significance. The present vegetation in this grassy strip is typical of vegetation planted within landscaped highway areas, and does not include any listed, proposed, or candidate threatened and endangered plant species. Like the other areas near this highway interchange and Aloha Stadium, no native birds, and no endangered or threatened birds would be expected at this location between the highway off-ramp and the Aloha Stadium parking lot.

1.6 Potential Impacts of this Project and Mitigation Measures

Construction work, primarily the drilling of the well, will cause minor short-term noise and air pollution impacts. Noise and air pollution impacts from this project will be minimal to the closest residences located in the Crosspointe residential area at Kahuapaani Street about 500 feet across the highway interchange to the southeast, the Halawa Valley Estates residential area about 600 feet to the southwest, and at the nearest school, Aiea Elementary School, located across the highway interchange about 1,200 feet to the northwest. All government rules and regulations concerning noise and air pollution will be followed during construction to minimize these minor short-term noise and air pollution impacts.

Contractors will comply with all of the conditions of the required noise permit. Mufflers will be required for all construction equipment. All noise attenuating equipment will be maintained in proper operation condition and will be repaired or replaced as needed. For the drilling operation, the rotary drill method will be used, and drilling operations will be restricted to the hours of 7:30 am to 3:30 pm on weekdays and will exclude state holidays. To reduce pump noise levels, a surface pump may be installed with mutes, or a submersible pump, which will considerably reduce pump noise levels, may be installed.

To mitigate the effects of the construction activities, dust control measures, such as water sprinkling, may be implemented by the contractor to reduce dust levels, as necessary. Further, the contractor will properly maintain its internal combustion equipment to minimize exhaust emissions, and will comply with the Hawaii Department of Health Rules Title 11, Chapter 59 and 60 regarding Air Pollution Control.

Traffic impacts will be minimal. The contractor will schedule the movement of heavy trucks and vehicles to or from the site after 8:00 am and before 3:00 pm to avoid the morning and afternoon peak traffic periods.

Water from the test pumping will be discharged into the channelized Halawa Stream. It is expected that the water that will be discharged will be clean and therefore will not introduce any pollutants into the environment. Care will be taken in disposing of the test water to preclude the possibility of flushing debris or re-suspending sediments and other pollutants in Halawa Stream.

If the test pumping results indicate that the quality or quantity of the water from the well is unsatisfactory for irrigation use, the caprock nonpotable well will be capped and/or sealed to prevent malicious or accidental contamination of the underlying groundwater aquifers.

If the test pumping is successful, the well will be converted to permanent production well and connected to the existing nonpotable water system. To reduce permanent pump noise levels, a surface pump may be installed with mutes, or a submersible pump may be installed to reduce noise levels to less than the regulatory limit.

Since there are no potable water wells down-gradient from the well site, and the nearest potable water well is located up-gradient about 1/2 mile away, it unlikely that any potable water wells within this aquifer could be affected.

Halawa Stream is located about 50 feet to the south of the site for the well. There will not be any adverse impacts to Halawa Stream's cultural and recreational resources in this vicinity because Halawa Stream lacks these resources in close proximity to the project area, due to the extensive channelization of the stream in this area.

Halawa Stream, which is channelized in this vicinity, has an invert of about 12 feet above mean sea level (msl) and is perched over horizontal layers of low-permeability alluvium. The horizontal layers of low-permeability alluvium serve to isolate the water flowing into Halawa Stream from the underground alluvial water found in the caprock at considerably lower depths. The Halawa Caprock Nonpotable Well is proposed to be cased to a depth of about 105 feet (about 75 feet below msl) within the alluvium, with the screened intake section of the well extending from about 75 feet below msl to 250 feet below msl to the bottom of the well. The water drawn from the alluvium from 75 feet below to 250 feet below msl due to the pumping of this well is not expected to affect the water flowing into Halawa Stream because of the approximately 87 feet separating the screened intake section of the well from the stream's invert, and because of the intervening layers of alluvium. Water is also inhibited from flowing into Halawa Stream in this vicinity since much of the stream in this area is channelized and lined with concrete.

There will be no adverse impacts to Halawa Stream's aquatic and riparian resources because stream flow will not be affected by the pumping of the well due to the intervening layers of low-permeability alluvium, and the nearly impervious concrete bottom and walls of the stream channel that extends 1/4-mile downstream and 1/2-mile upstream from the proposed well site.

The springs that flow into Pearl Harbor occur due to the lack of overlying caprock. Alluvium in these areas of spring flow around Pearl Harbor is young, thin, and ineffective in preventing discharge of basal water as spring flow. These springs occur in the middle and west portions of Pearl Harbor in the Waipahu-Waiawa Aquifer, at Kalauao, Waiau, Waiawa, and Waikele. Lesser springs may occur elsewhere, but flows from these lesser springs are immeasurably small, due to the thicker caprock that prevents spring flow into Pearl Harbor. The proposed Halawa Nonpotable Well, which is in the Waimalu Aquifer along the east side of Pearl Harbor, occurs in an area where the thicker caprock prevents any measurable spring flow from reaching the Halawa Stream and Pearl Harbor estuarine areas. Thus, impacts to the estuarine areas would not be measurable and are anticipated to be insignificant.

There is no potential for adverse impacts to the five wetland areas in the Pearl Harbor Sector. No significant impacts are anticipated because all of these wetlands in the Pearl Harbor Sector are in the Waipahu-Waiawa Aquifer, and are not in the Waimalu Aquifer

where the Halawa Caprock Nonpotable Well is being proposed. Further, the nearest wetland, the East Loch Wetlands at Waiau, is about 3 miles away.

1.7 Determination

In accordance with Chapter 343, Hawaii Revised Statutes (HRS), the BWS has determined that an EIS is not required for the Halawa Caprock Nonpotable Well construction, test pumping, and if successful, conversion to a permanent producing nonpotable water well and connection to the existing nonpotable water system.

This determination has been made primarily because the impacts of this project are not significant enough to require the preparation of an EIS. Whatever minor adverse impacts that may result from this project may be minimized to insignificant levels by the application of the recommended mitigation measures. The BWS has concluded that this project has potentially significant benefits in terms of the nonpotable water supplies that may be obtainable from the Halawa Nonpotable Caprock Well.

1.8 Agencies and Others Consulted in Making this Assessment

The following agencies were consulted during the preparation of the draft environmental assessment for this project:

State of Hawaii agencies

- Department of Land and Natural Resources
  - Commission on Water Resources Management
- Department of Transportation
- Department of Health
  - Environmental Management Division
  - Office of Environmental Quality Control

City and County of Honolulu agencies

- Planning Department
- Land Utilization Department

Others

- Hawaiian Electric Company, Inc.

Twenty-one government agencies and four groups or other individuals were provided a copy of the draft environmental assessment for this project and requested to provide comments. The following is a list of those agencies and others who were provided a copy of the draft environmental assessment.

Federal agencies

- U.S. Department of Agriculture, Soil Conservation Service
- U.S. Army Corps of Engineers, Pacific Ocean Division
- U.S. Department of Transportation
- U.S. Fish and Wildlife Service
- U.S. Department of the Interior, U.S. Geological Survey, Water Resources Division
- U.S. National Oceanic and Atmospheric Administration

State of Hawaii agencies

- Department of Agriculture
- Department of Business, Economic Development, and Tourism
- Department of Education
- Department of Land and Natural Resources
  - Aquatic Resources Division
  - Forestry and Wildlife Division
  - Historic Preservation Division
  - Commission on Water Resources Management
- Department of Health
  - Environmental Management Division
  - Office of Environmental Quality Control
- University of Hawaii
  - Environmental Center
  - Water Resources Research Center
- Aloha Stadium Authority

City and County of Honolulu agencies

- Planning Department
- Land Utilization Department
- Public Works

Others

- City Council District 8 Member Mufi Hannemann
- Aiea Neighborhood Board No. 20 Chair Mike Miura
- Sierra Club, Hawaii Chapter
- Hawaiian Electric Company, Inc.

Chapter 2
Purpose and Need for the Proposed Action

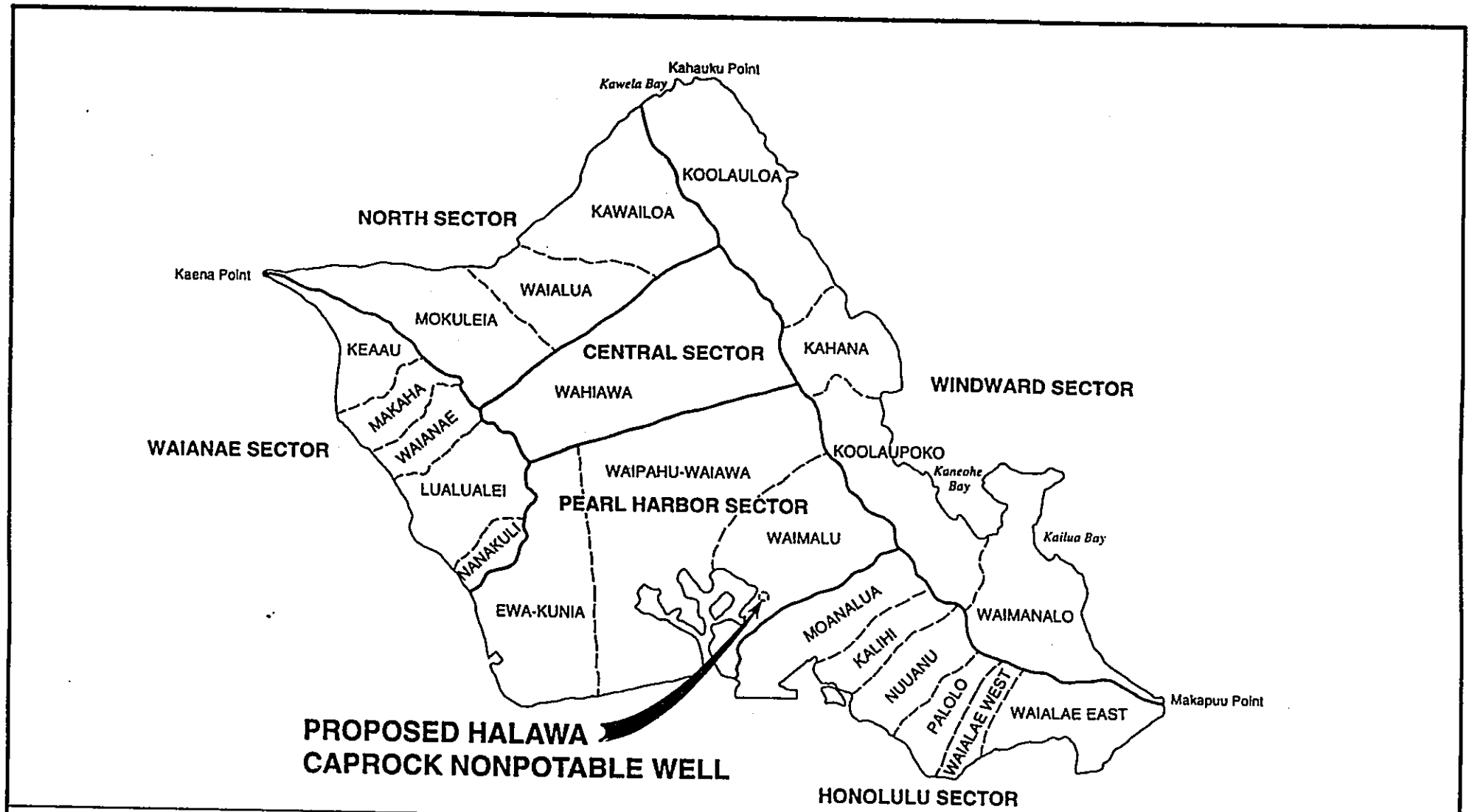
2.1 Project's Purpose and Need

In 1980, the average municipal water demand on the island of Oahu was 130 mgd. The BWS's 1982 *Oahu Water Plan* projected that the island-wide average municipal water demand would increase to 156 mgd in 1990 and to 181 mgd in the year 2000. Actual BWS water usage in 1990 averaged 158 mgd, of which 156 mgd was potable water. The CWRM, in its 1992 review draft of the *Hawaii Water Plan, Oahu Water Management Plan* (OWMP), projected that municipal water demand would be between 204 to 213 mgd by the year 2010, depending on whether the upper limit of the City and County of Honolulu's General Plan population projection for Oahu is attained. Thus, additional water requirements for the year 2010 are projected to be between 48 and 57 mgd.

To meet the growing island-wide demand for water, the BWS plans to develop new sources of nonpotable groundwater on Oahu within the Pearl Harbor Sector, within the Waimalu Aquifer (see Figure 2-1). The development of additional nonpotable water sources for irrigation purposes will allow an exchange or substitution of the existing potable irrigation groundwater that is now being used for irrigation with lower quality water. This saving of potable groundwater that would otherwise be used for irrigation for municipal use is necessary to accommodate the growing demand for potable water within the City and County of Honolulu.

The Halawa Caprock Nonpotable Well, which will consist of a single nonpotable well, is a proposed BWS well project within the Pearl Harbor Sector, Waimalu Aquifer. If the tests for the quantity and quality of the nonpotable groundwater from the well prove to be successful, the BWS intends to convert this well into a production well, and integrate it into the BWS nonpotable water system serving the area from the Halawa Interchange to the Middle Street Interchange.

This nonpotable water system consists of a nonpotable water source, storage, and transmission system extending from Kalauao Springs near Pearlridge Shopping Center, to the Halawa Reservoir at the 245 foot elevation at Halawa Heights. This nonpotable water system is currently being used to irrigate highway landscaping. This existing nonpotable water system extends from the vicinity of this proposed Halawa Caprock Nonpotable Well site southward within the H-1 Highway and then eastward into Nimitz Highway, the airport industrial areas, and Middle Street to Moanalua Road. The conversion of this well into a permanent well will provide an additional nonpotable groundwater source for this highway landscaping irrigation system. The proposed Halawa Caprock Nonpotable Well, if converted to a production well, is expected to be able to yield about 0.20 mgd of nonpotable water.



LEGEND

——— Groundwater Sector Boundary

– – – Aquifer System Boundary

Source: Commission on Water Resource Management, 1992.

Environmental Assessment
Halawa Caprock Nonpotable Well
City and County of Honolulu – Board of Water Supply

FIGURE 2-1

GROUNDWATER SECTORS AND AQUIFER SYSTEMS

NORTH

0 5 10 MILES

CH2M HILL

2.2 The State Water Code and the Commission on Water Resource Management

The State Water Code and a CWRM was established in 1987 by the Hawaii State Legislature in Section 174-C, HRS. The CWRM was established to handle the administration of the new State Water code.

The State Water Code established a Hawaii Water Plan consisting of four parts:

- a water resource protection plan prepared by the CWRM
- water use and development plans prepared by each county
- a state water project plan prepared by state agencies
- a water quality plan prepared by the Department of Health

As part of the Hawaii Water Plan, a study was commissioned to determine the sustainable yields of surface and groundwater sources statewide.

Under the State Water Code, the CWRM created management boundaries for "water management areas." Water management areas were designated by the CWRM for those areas where the CWRM decided, after conducting scientific investigation and research, that management of ground or surface waters, or both, was necessary because the water resources for that area were threatened by existing or proposed withdrawals or diversions of water.

In designating an area for groundwater use regulation, the CWRM must consider the following:

(1) *Whether an increase in water use of authorized planned use may cause the maximum rate of withdrawal from the groundwater source to reach 90 percent of the sustainable yield of the proposed water management area;*

(2) *There is an actual or threatened water quality degradation as determined by the Department of Health;*

(3) *Whether regulation is necessary to preserve the diminishing groundwater for future needs, as evidenced by excessively declining groundwater levels;*

(4) *Whether the rates, times, spacial patterns, or depths of existing withdrawals of groundwater are endangering the stability or optimum development of the groundwater body due to upconing or encroachment of salt water;*

(5) *Whether the chloride contents of existing wells are increasing to levels which materially reduce the value of their existing uses;*

(6) *Whether excessive preventable waste of water is occurring;*

(7) *Serious disputes respecting the use of the groundwater resources are occurring; or*

(8) *Whether water development projects that have received any federal, state, or county approval may result, in the opinion of the commission, in one of the above conditions.*

Notwithstanding an imminent designation of a water management area conditioned on a rise in the rate of groundwater withdrawal to a level of 90 percent of the area's sustainable yield, the CWRM, when such level reaches the 80 percent level of the sustainable yield, may invite the participation of water users in the affected area to an informational hearing for the purposes of assessing the groundwater situation and devising mitigative measures (Section 174C-44, HRS).

In designating an area for surface water use regulation, the CWRM must consider the following:

(1) *Whether regulation is necessary to preserve the diminishing surface water for future needs, as evidenced by excessively declining surface water levels, not related to rainfall variations, or increasing or proposed diversions of surface waters to levels which may detrimentally affect existing instream uses or prior existing off stream uses;*

(2) *Whether the diversions of stream waters are reducing the capacity of the stream to assimilate pollutants to an extent which adversely affects public health or existing instream uses; or*

(3) *Serious disputes respecting the use of surface water resources are occurring. (Section 174C-45, HRS)*

The CWRM has administrative control over the withdrawals of groundwater and diversions of surface waters within a water management area, and is responsible for ensuring reasonable beneficial uses of the resources in the public interest.

2.3 Groundwater Sectors and Aquifers

The CWRM has established, for planning and administration purposes, six groundwater sectors that encompass the entire island of Oahu (see Figure 2-1). These sectors are: Honolulu, Pearl Harbor, Waianae, Central, North, and Windward. Presently, all sectors except the Waianae Sector have been designated as groundwater management areas. The

Windward Sector, which became a groundwater management area in July 1992, is the last sector to be included as a groundwater management area on Oahu (CWRM, June 7, 1995).

Each groundwater sector is divided into aquifers. The Pearl Harbor Sector encompasses the area from Ewa, eastward through Kunia, Waipahu, Waiawa, Pearl City, Aiea, and Waimalu to Halawa, a distance of about 18 miles. The Pearl Harbor Sector is located down gradient from the central plains of Wahiawa to the shorelines of Pearl Harbor and the Mamala Bay. The Koolau Mountain range forms the northeast boundary and the Waianae Mountain range form the northwest boundary of the Pearl Harbor Sector. From west to east, the Pearl Harbor Sector is divided into the Ewa-Kunia, Waipahu-Waiawa, and Waimalu aquifers.

The Waimalu Aquifer is located at the eastern-most portion of the Pearl Harbor Sector. The Waimalu Aquifer is about 5 miles wide and about 6 to 10 miles long, extending from the Koolau Mountain ridge down to the shoreline of Pearl Harbor. The shoreline of the Waimalu Aquifer stretches from the Pearl Harbor's East Loch down to the mouth of Pearl Harbor near Hickam Air Force Base. The Halawa Caprock Nonpotable Well is proposed at a site about a half mile inland from the shoreline of East Loch's Aiea Bay in the flatland surrounding Pearl Harbor. The site is adjacent to Aloha Stadium and within the Halawa Interchange, at a ground elevation of about 30 feet above msl.

2.4 Sustainable Yield and the Pearl Harbor Water Management Area—Waimalu Aquifer

In order to evaluate the impacts of developing an additional permanent nonpotable groundwater source on this site, it may be necessary to estimate the sustainable yield of the underlying aquifer system. Sustainable yield is the amount of groundwater that can be removed from an aquifer over a period of many years without developing serious adverse impacts to the aquifer.

Within the Hawaiian Islands, the sustainable yield of basal aquifers for each island is always less than the average annual rate of recharge to the groundwater aquifer, because a certain amount of the groundwater is lost by mixing with the underlying salt water. Estimating sustainable yield for the island of Oahu and for its individual aquifers is complex because the amount of groundwater that is mixed with fresh water is dependent upon groundwater velocity, lens thickness, degree of agricultural and urban development, and numerous other factors that are not constant.

The Pearl Harbor Water Management Area (WMA), with an estimated sustainable yield of 184 mgd, has the highest sustainable yield of all of the Oahu aquifer system sectors. The Pearl Harbor WMA is also the most heavily utilized WMA for municipal water use. In 1990, 92.01 mgd (nearly 60 percent of BWS's total usage of 156 mgd) was taken from the Pearl Harbor WMA.

The OWMP notes that the Pearl Harbor WMA's total estimated sustainable yield of 184 mgd is distributed among the three aquifers as follows: Ewa-Kunia Aquifer, 20 mgd; Waipahu-Waiawa Aquifer, 119 mgd; and Waimalu Aquifer, 45 mgd.

In 1990, the groundwater withdrawals from the Pearl Harbor WMA were reported by the CWRM to be 159.80 mgd, or about 87 percent of the sustainable yield of 184 mgd for this WMA. The 159.80 mgd of groundwater withdrawn in 1990 from the three aquifers in the Pearl Harbor WMA was distributed as follows: Ewa-Kunia Aquifer, 10.22 mgd; Waipahu-Waiawa Aquifer, 99.57 mgd; and Waimalu Aquifer, 54.01 mgd.

In 1990, the average water withdrawn from the Waimalu Aquifer was 54.01 mgd, which is more than 9 mgd higher than this aquifer's estimated sustainable yield of 45 mgd.

2.5 Low Potential for Potable Water Source Development within the Pearl Harbor Sector

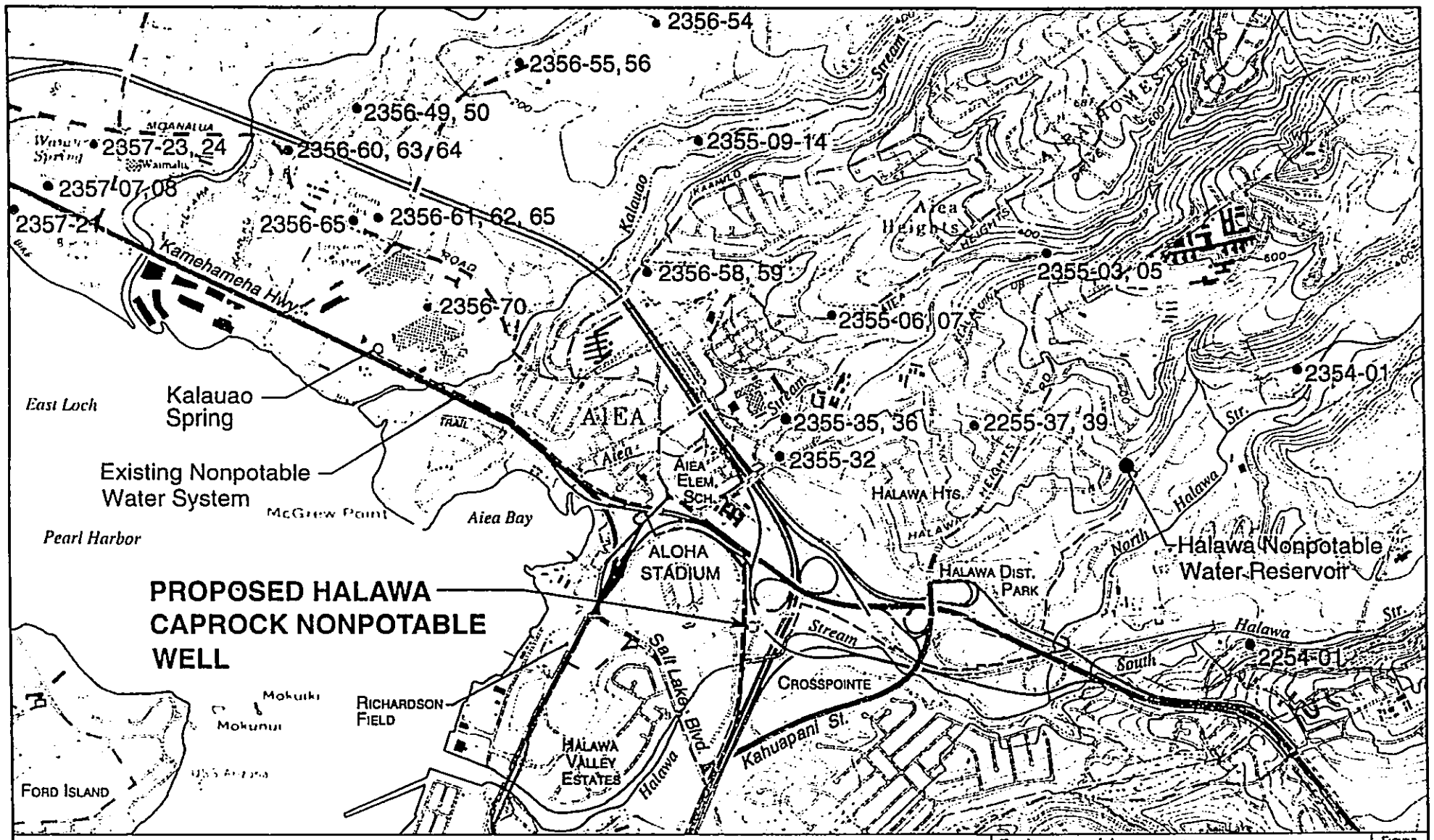
According to the OWMP report, the potential areas for source development, based on estimates of surplus sustainable yields, include the Wahiawa, North Shore, Windward, and Waianae areas and some undeveloped high level areas in Honolulu. Within the Pearl Harbor aquifers, virtually all of the prime potable groundwater sources have been developed and are under restricted allocations of the CWRM.

Thus, an effort is being made in the Pearl Harbor aquifers to increase the availability of existing potable water resources by exchanging or substituting potable irrigation water with lower quality water. The purpose of the Halawa Caprock Nonpotable Well is to determine if the development of a nonpotable water sources in the flatland adjacent to Pearl Harbor's East Loch in the Waimalu Aquifer is feasible.

The impact of development of additional sources of nonpotable groundwater in this area was analyzed in a separate 1984 study prepared for the BWS entitled *Regional Environmental Impact Assessment for Development of Wells, Reservoirs, Transmission Lines and Appurtenances at Honolulu, Hawaii.*

2.6 Existing Water Sources

According to OWMP, the Waimalu Aquifer facilities consist of 49 wells or shafts, and two springs. The wells, shafts, and springs in the vicinity of the proposed Halawa Caprock Nonpotable Well are shown on Figure 2-2. In the Waimalu Aquifer, the BWS operates 39 wells, Halawa Shaft, and Kalauao Springs. The U.S. Navy operates the Halawa and Red Hill Shafts. Seven wells and one spring are operated by private entities.



Well No.	Well Name				
2254-01	Red Hill Shaft (USN)	2255-37, 39	Halawa Wells	2356-61, 62, 65	Kaonohi Wells II
2255-32	Halawa Shaft (military)	2355-09-14	Kalauao	2356-70	Lau Taro Farm (private)
2255-37-39	Halawa Wells	2356-49, 50	Waimalu Wells I	2357-07	M.C. Lee (private)
2354-01	Halawa Shaft	2356-54	Pearl Country Club (private)	2357-08	M.C. Lee (private)
2355-03, 05	Aiea Gulch	2356-55, 56	Kaonohi Wells I	2357-23, 24	Kaahumanu Wells I
2355-06, 07	Aiea	2356-58, 59	Kaamilo	2357-21	W. Suyetani (private)
2355-09-14	Kalauao	2356-60, 63, 64	Waimalu Wells II		
2355-35, 36	C & H Refinery (private)				

Source: *Oahu Water Management Plan*, Commission on Water Resource Management, May 1992

Environmental Assessment
Halawa Caprock Nonpotable Well
CITY AND COUNTY OF HONOLULU – BOARD OF WATER SUPPLY

FIGURE 2-2

PROPOSED HALAWA CAPROCK NONPOTABLE WELL

NORTH 0 2000 4000 FEET

CH2M HILL

Records for the Waimalu Aquifer for 1990 indicate that the BWS withdrew a total of about 45.03 mgd from its wells and did not withdraw any water from Kalauao Springs and Waimalu Wells I and II. The U.S. Navy withdrew 7.03 mgd.

2.7 Recommended Water System Improvements

The *Regional Environmental Impact Assessment for Development of Wells, Reservoirs, Transmission Lines and Appurtenances at Honolulu, Hawaii* study addressed the impacts of developing proposed new basal groundwater, alluvial groundwater, and spring water sources in the Honolulu Sector. In the 1984 study, the BWS evaluated 21 proposed water development projects (including conventional groundwater wells, springs, or spring diversions), two proposed reservoirs, and two proposals for additional transmission pipelines totaling 11,500 linear feet (about 2.3 miles).

The existing nonpotable water system consists of a nonpotable water source, storage, and transmission system extending from Kalauao Spring near Pearlridge Shopping Center, to the Halawa Reservoir at the 245 foot elevation at Halawa Heights. This existing nonpotable water system extends from the vicinity of this proposed Halawa Caprock Nonpotable Well site southward within the H-1 Highway and then eastward into Nimitz Highway, the airport industrial areas, and Middle Street to Moanalua Road.

The 1984 BWS study evaluated 18 different nonpotable water source sites in Honolulu. One of the proposed potential nonpotable water source sites evaluated in this study was a proposed Halawa Alluvial Nonpotable Well, also located in the Waimalu Aquifer. The proposed Halawa Alluvial Exploratory Well site could be located about 3,000 feet east of the proposed Halawa Caprock Nonpotable Well, within another portion of the Halawa Interchange east of Kahuapaani Road. As with the proposed Halawa Caprock Nonpotable Well, a future Halawa Alluvial Nonpotable Exploratory Well located within the Halawa Interchange, if successful, could be integrated as an additional nonpotable water source in BWS's nonpotable water systems serving the area from the Halawa Interchange to the Middle Street Interchange.

Chapter 3
Project Description

3.1 Location and Site Characteristics

The proposed project site is located in Halawa on the leeward coast of Oahu. The site is about a half mile inland from the shoreline of East Loch's Aiea Bay in the flatland surrounding Pearl Harbor. The site is adjacent to Aloha Stadium within the Halawa Interchange at a ground elevation of about 30 feet above msl. The site is an existing grassed area within the highway interchange and is under the jurisdiction of the State of Hawaii DOT.

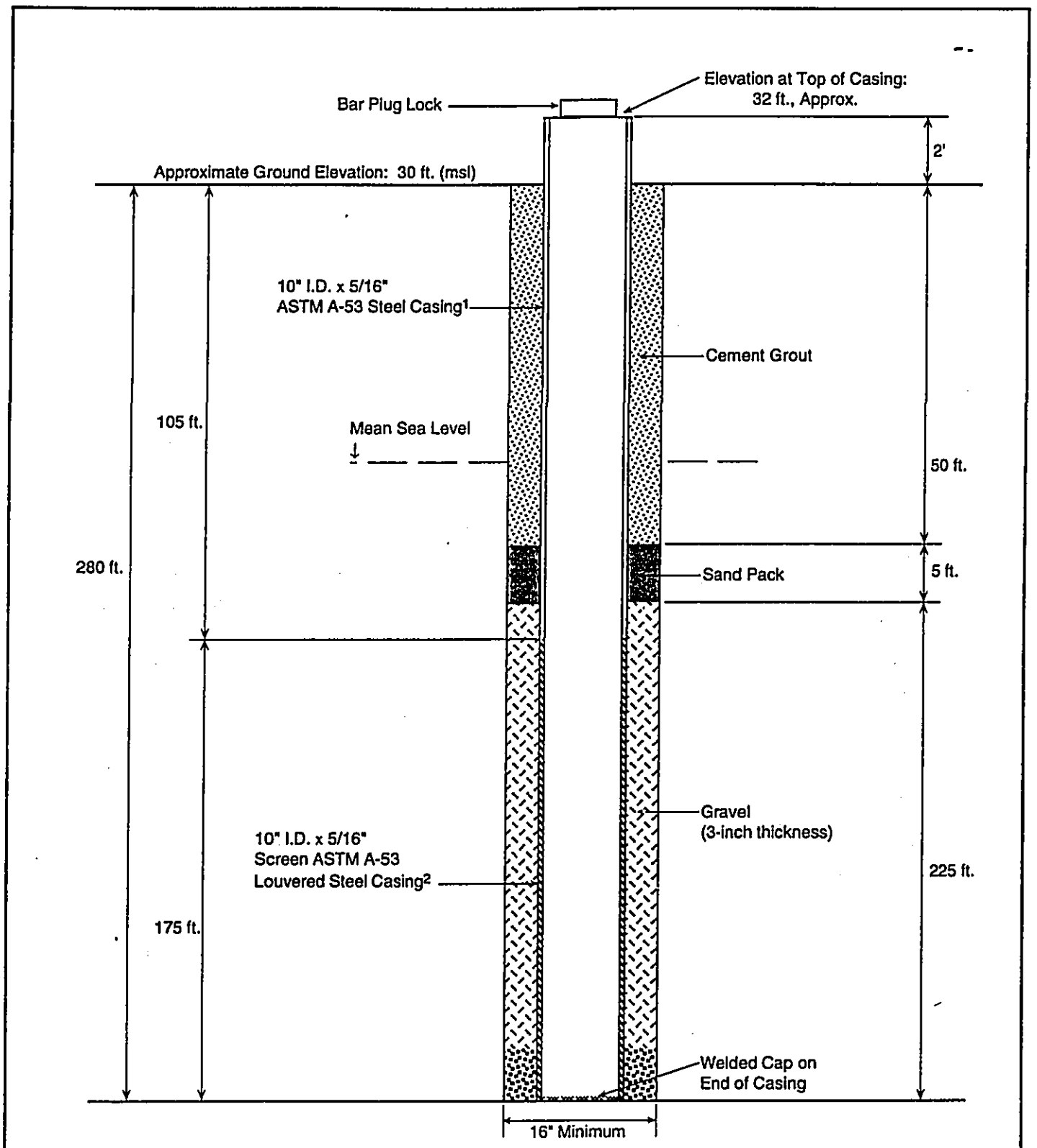
The proposed nonpotable well site is nearly triangular and surrounded on all sides by existing or proposed highway ramps. The west edge of the triangularly-shaped site is bounded by the exit ramp for east bound traffic from Kamehameha Highway; the exit ramp skirts around the north and then east edge of Aloha Stadium before continuing southward into the H-1 Highway towards Honolulu International Airport. The northeast edge of the triangularly shaped site is bounded by an elevated ramp that takes the eastbound H-1 traffic into the Moanalua Road. The southeast edge of the triangularly shaped site is bounded by a graded area that will be a future off-ramp for southbound traffic from the H-3 Highway. Halawa Stream, which is channelized in this vicinity, is located at the south corner of the proposed site.

The proposed well site is located within a portion of DOT's Halawa Interchange, identified as a portion of Tax Map Key plat 9-9-03:35. The site is part of the Interstate Federal Aid Primary (F.A.P.) No. I-H1-1(41) Highway, and is owned by the State of Hawaii.

Access to the site is via the Kamehameha Highway ramp into the southbound H-1 Highway (see Figure 2-2). The closest residences are located in the Crosspointe residential apartment area northeast of Kahuapaani Road about 500 feet across the highway interchange to the southeast. The nearest school, Aiea Elementary School, is located across the highway interchange about 1,200 feet to the northwest. The site is located about 200 to 300 feet east of Aloha Stadium's parking area and about 50 feet north of the channelized Halawa Stream.

3.2 Technical Characteristics

The Halawa Caprock Nonpotable Well site is proposed for a single exploratory well. The well is proposed to be located approximately at the center of the nearly triangular site. The well is proposed to be approximately 280 feet deep to about 250 feet below mean sea level and will attempt to extract nonpotable water from the underlying caprock (see Figure 3-1). The proposed Halawa Caprock Nonpotable Well, if converted to a nonpotable production well is expected to be able to yield about 0.2 mgd.



NOTES:

[1]Solid Casing:

Material:	ASTM *A-53 Steel
Length:	105 ft.
Inside Diameter:	10 in.
Wall thickness:	5/16 in.

[2]Louvered Casing:

Material:	ASTM A-53 Steel
Length:	175 ft.
Inside Diameter:	10 in.
Wall thickness:	5/16 in.

* ASTM=American Society for Testing and Materials

Environmental Assessment
Halawa Caprock Nonpotable Well
City and County of Honolulu – Board of Water Supply

Figure 3-1

WELL CROSS-SECTION

Not to scale

CH2M HILL

Within about 1-1/2 miles of the proposed Halawa Caprock Nonpotable Well site, there are five existing BWS potable water well sites (consisting of 11 wells) and one spring, located to the northwest, north, and northeast. All of the potable water wells are upgradient from the proposed caprock nonpotable well site. These nearby BWS well sites are: the Kaamilo Wells (Well Nos. 2356-58 and 59), Aiea Wells (Well Nos. 2355-06 and 07), Aiea Gulch Wells (Well Nos. 2355-03 and 05), Halawa Wells (Well Nos. 2255-37 to 39), Halawa Shaft (Well No. 2354-01), and Kalauao Spring. The U.S. Navy operates its Halawa Shaft (Well No. 2255-32) to the north of the site, and Red Hill Shaft (Well Nos. 2254-01 and 02) east of the site. C & H Refinery operates two wells (Well Nos. 2355-35 and 36) to the north of the site.

In 1990, the five existing BWS well sites in the vicinity of the proposed caprock nonpotable well site yielded 17.91 mgd. The Halawa Shaft accounts for 12.96 mgd, or nearly three-fourths of BWS's 17.91 mgd. The yields for the other BWS wells in 1990 were: Kaamilo Wells, 1.71 mgd; Aiea Wells, 1.29 mgd; and Aiea Gulch Wells, 1.02 mgd. Kalauao Spring was not in use in 1990. The U.S. Navy's Halawa Shaft yielded 1.03 mgd and its Red Hill Shaft yielded 6.00 mgd, for a total of 7.03 mgd. Of the two wells operated by the C & H Refinery north of the proposed caprock nonpotable well site, only Well No. 2255-36 was in use in 1990 and yielded 1.60 mgd. The total potable water drawn from the surrounding potable water wells and shafts amounted to 26.54 mgd in 1990.

The oldest of the BWS wells is the Halawa Shaft completed in 1944 at a ground elevation of 165 feet above msl, with the shaft extending to 18 feet below msl. The 14-inch diameter Aiea Gulch Wells were built in 1947 at a ground elevation of 304 feet above msl and extend to a depth of 38 to 40 feet below msl. The 14-inch diameter Aiea Wells were built in 1955 at a ground elevation of 258 feet above msl, and extend to depths of 100 to 102 feet below msl. The 16-inch diameter Halawa Wells were built in 1961 at ground elevations ranging from 256 to 270 feet above msl, and extend to depths ranging from 89 to 141 feet below msl.

The U.S. Navy's Halawa Shaft is the oldest water source in the area. It was built in 1937 at a ground elevation of 95 feet above msl and was constructed to a depth of 4 feet below msl. The U.S. Navy's Red Hill Shafts were built in 1943 and 1945 at a ground elevations of 200 and 158 feet above msl, and extend to a depths of 10 and 6 feet below msl. The wells at the C & H Refinery were drilled in 1956 at a ground elevation of 119 feet above msl and extend to depths from 121 to 125 feet below msl.

The source of the proposed Halawa Caprock Nonpotable Well water is the layers of alluvium and marine deposits that form the caprock. BWS hydrologists believe that there may be adequate yields of nonpotable groundwater available.

3.3 Construction and Well Testing

The proposed Halawa Caprock Nonpotable Well will be approximately 280 feet deep with the upper 105 feet consisting of a 5/16-inch-x-10-inch diameter steel casing. The lower 175 feet of the well will consist of a 5/16-inch-x-10-inch diameter louvered casing surrounded by a 3-inch layer of gravel pack. The ground elevation of the proposed Halawa Caprock Nonpotable Well will be about 30 feet above mean sea level (see Figure 3-1).

Drainage from the Halawa Caprock Nonpotable Well from testing or flushing will be conveyed through temporary 6-inch diameter pipes that will lead into the channelized Halawa Stream to the south of the site. Halawa Stream empties into Pearl Harbor's West Loch. Halawa Stream will be used to dispose of the water extracted during the yield draw down test and the long term constant rate pump test.

The yield draw down test will be conducted after the Halawa Nonpotable Well is drilled, and temporary diesel pumps and pipelines are connected. The yield draw down test will be performed for the exploratory well at a rate of 75 to 300 gallons per minute. Following the yield draw down test, a constant rate pump test will be conducted for the well for a period of several days at the rate determined from the yield-draw down tests. Water table draw down rates will be measured and the quality of water will be tested.

Should the quantity and quality of the nonpotable water prove to be satisfactory for irrigation use, the exploratory well will be temporarily capped. If the pump tests prove to be unsatisfactory, the well will be sealed and/or capped. In either case, when the yield draw down and the long term constant rate pump tests are completed, the temporary diesel pumps, and pipelines will be removed from the site, and all surplus excavation material and construction debris will be removed and disposed of off-site in compliance with applicable State, and City and County regulations.

If the well tests are satisfactory, the well will be integrated into the existing nonpotable water system. The existing nonpotable water system presently connects a nonpotable water source at Kalauao Spring near Pearlridge Shopping Center, to the Halawa Reservoir at the 245 foot elevation at Halawa Heights, and provides nonpotable irrigation water for highway landscaping from the area from Halawa Interchange to the Middle School Interchange. Permanent pumps will be installed at the well along with the necessary pipelines to connect the well to the existing 20-inch nonpotable water line located underground within the adjacent highway ramp, together with the necessary electrical and mechanical control devices. Electric pumps will be used for the permanent pump motor. The BWS will coordinate with Hawaiian Electric Company, Inc. (HECO) to arrange the connection of electric power to the pump motor and control devices for the nonpotable water well.

3.4 Project Schedule, Cost, and Work Force

The construction and testing of the proposed Halawa Caprock Nonpotable Well is expected to occur in the 1995/96 fiscal year and take 3 months to complete. The capital cost for the exploratory portion of this project is estimated at $120,000, and would involve a work crew consisting of no more than four people at any one time.

Drilling will be completed in about 1 month. Installation of the casing screen and gravel pack will take up to a week and another 2 to 3 weeks will be required to install the pump and run the test pumping. Demobilization may take up to 1 week. Total project duration is therefore for the construction and testing of the exploratory well is estimated to be about 3 months.

If the well tests are successful, the well will be integrated into the existing nonpotable water system.

Chapter 4
Environmental Setting, Potential Impacts, and Mitigation

4.1 Land Use and Ownership

4.1.1 Existing Environment

Land use in this vicinity of Halawa, in the flatland surrounding Pearl Harbor's East Loch and Aiea Bay, is urban. Adjacent land uses consist of multi-lane grade separated concrete highways, a highway interchange, and elevated highway on-ramps and off-ramps. Surrounding land uses include Aloha Stadium to the west, Aiea Elementary School to the northwest, the Halawa Heights residential area to the northeast across the highway interchange, and the *Crosspointe* residential apartments across the highway interchange to the east. Single-family residential homes at the Halawa Valley Estates are located to the southwest beyond Salt Lake Boulevard, and commercial activities are located in the Stadium Mall Shopping Center at Salt Lake Boulevard and Kahuapaani Street.

The highways and the highway interchange are owned by the State of Hawaii DOT. Aloha Stadium and Aiea Elementary School are owned by the State of Hawaii. The residential apartments, single-family residential lots, and commercial areas in the vicinity are privately owned or leased. A 5.154-acre parcel within the highway interchange north of the proposed Halawa Caprock Nonpotable Well site is a remnant parcel that was formerly a portion of the U.S. Navy Reservation; it is still owned by the U.S. government.

The site proposed for the Halawa Caprock Nonpotable Well is located within a grassed area owned by the Hawaii DOT within its H-1 Highway/Moanalua Road Interchange. The proposed nonpotable well site is located on a portion of Tax Map Key 9-9-03:35 plat, identified as the Interstate Federal Aid Primary (F.A.P.) No. I-H1-1(41) Highway. The highway interchange, including the site proposed for the Halawa Caprock Nonpotable Well, is owned by and under the jurisdiction of the State of Hawaii DOT.

4.1.2 Project Impacts

Installation of the Halawa Caprock Nonpotable Well will not change any of the surrounding land uses and ownership patterns.

4.1.3 Mitigation Measures

During the course of locating the well site, a survey will be conducted to assure that the construction site will not affect the remnant Federal property that was formerly a part of the U.S. Navy Reservation. No other mitigation measures are proposed or required.

4.2 Topography, Climate and Rainfall

4.2.1 Existing Environment

The proposed BWS site is in Halawa, on the leeward coast of Oahu in the low flatland surrounding the northeast shoreline of Pearl Harbor's East Loch. The site is about a half mile inland and eastward of the shoreline of Aiea Bay, a small embayment within East Loch. The site's ground elevation is about 30 feet above msl.

The proposed BWS site is at the foot of Halawa Valley. Halawa Valley stretches from the upper ridges of the Koolau Mountains southwestward down to the shoreline of East Loch, and is straddled by Aiea Valley to the northwest and Moanalua Valley to the southeast. There are two streams within Halawa Valley, the North Halawa Stream and the South Halawa Stream, which converge and flow into East Loch. North Halawa Stream, the closest stream to the BWS site, is channelized and located about 50 feet to the south. Aiea Stream is the next closest stream to the BWS site and is located about a half mile to the northwest. Aiea Stream also drains into East Loch (see Figure 3-1).

Temperature ranges from 74 to 75 degrees Fahrenheit in March and ranges from 79 to 80 degrees Fahrenheit in September. A northeasterly or windward trade wind is prevalent throughout most of the year. In Hawaii, the term "windward" generally refers to the normal direction of this prevailing trade wind, and not the direction of the wind at a specific time. The northeast trade wind occurs with higher frequency in the summer, about 90 percent of the time, as compared to winter, when the northeast trade wind occurs only about 50 percent of the time.

Rainfall averages about 150 inches per year at near the top of the Halawa Valley near the ridge line of the Koolau Mountain range (at an elevation of about 2,800 feet above msl). The rainfall at this elevation near the ridge line is the result of mountain caused or "orographic" rains that form as the moist trade wind air moves in from the sea, predominantly from the northeast direction on the other side of the island, first along the lower flat lands of Kaneohe and Kahaluu, and then up the steep slopes of the Koolau Mountains. Rainfall distribution closely follows the topographic contours, with higher rainfall at the upper slopes and lower rainfall at lower elevations.

The BWS site is located at an elevation of about 30 feet above msl, at the foot of Halawa Valley in the flatland surrounding Pearl Harbor's East Loch near North Halawa Stream, and has an average rainfall of about 30 inches per year.

4.2.2 Project Impacts

Installation of the well would not have any significant effect on the topography, climate, or rainfall in the area.

4.2.3 Mitigation Measures

No mitigation measures are proposed or required.

4.3 Geology and Hydrology

4.3.1 Geology

The island of Oahu is result of the growth, connection, and erosion of two elongated shield volcanoes that are the foundation of the present Waianae and Koolau mountain ranges. The Waianae volcano, which is the older of the two volcanoes, formed the caldera that is now the Waianae mountain range. The Koolau volcano became active after the Waianae volcano had reached its maturity and continued its activity long after the Waianae volcano ceased its activity. The Koolau volcano continued to build and fill in the region between the two volcanoes, creating one island as lava flows continued westward creating the Schofield plateau and the leeward areas of what is now Honolulu.

Within the geological time known as the "great erosional period," the Koolau volcano was for a long period of time inactive, during which time erosion and the deposition of sediment continued to shape the deep valleys on island of Oahu. Changes in sea level also shaped the island, as evidenced by the marine and terrestrial sediments deposited on the coastal plains, especially around Pearl Harbor. Reef limestone coral fossils are found miles inland from the present shoreline and conspicuous submarine benches are found offshore. Pearl Harbor itself is essentially made up of a number of drowned river valleys.

After the long period of volcanic quiet, eruptions broke out on the slopes of the Koolau range and at the heads of the deeply eroded valleys, with lava from these eruptions running down the valleys and spreading out. During this period of secondary activity, eruptions along southeastern end of the Koolau mountain range built a series of cones. Southeast of the proposed nonpotable well site in Halawa, three cones, Makalapa, Aliamanu, and Salt Lake, erupted through the old coral plain. The eruptions at Makalapa, Aliamanu, and Salt Lake blocked the well-established Halawa Stream, which originally flowed southwest directly to the sea, and forced it to flow sharply to the west where it now flows into Pearl Harbor's East Loch.

The area surrounding the proposed site for the well is composed chiefly of older alluvium made of noncalcerous deposits, made up of nearly impermeable friable conglomerates which grade into partly consolidated sands and silts that are emerged delta deposits. In this region of lower rainfall, these materials have a tendency to be much more cemented than in the wetter mauka areas (Stearns, 1935).

The soils at the surface of the proposed Halawa Caprock Nonpotable Well site is classified by the U.S. Soil Conservation Service as Kawaihapai clay loam (KlA), Honouliuli clay (HxA), and Waipahu silty clay (WzA). The Kawaihapai clay loam is found on the most southern portion of the BWS site nearest Halawa Stream. The Honouliuli clay is located further north away from Halawa Stream, and the Waipahu silty clay is located along the furthest north portion of the site.

Kawaihapai clay loam is characterized as having moderate permeability, slow runoff, no more than slight erosion hazard, and low shrink-swell potential. Honouliuli clay is characterized as having moderately slow permeability, slow runoff, no more than a moderate erosion hazard, and high shrink-swell potential. Waipahu silty clay is characterized as having moderately slow permeability, slow or very slow runoff, no or slight erosion hazard, and high shrink-well potential. All three of the soil types on the site are typically found in areas with 0 to 2 percent slopes. The generalized characterization of Kawaihapai clay loam substratum is stony and gravelly. Honouliuli clay is characterized as being underlain by reef limestone, while Waipahu silty clay substratum is characterized as clayey alluvium.

4.3.2 Groundwater Hydrology

The proposed BWS well site is located in Halawa in the flatland surrounding Pearl Harbor at East Loch, within the Waimalu Aquifer System. The Waimalu Aquifer consists of a thick basal lenses that is hydrologically confined along the coast by the caprock. Because rainfall is greater in the interior higher elevation mountain areas, recharge of the basal groundwater is also greatest in these higher elevation areas. Thus, basal groundwater generally flows from the higher interior areas to the lower coastal areas, through the caprock formation, and then out to sea. The highest yields of basal groundwater are expected in the *makai* areas of the Waimalu Aquifer where there are unconfined or confined basaltic aquifers.

The Pearl Harbor springs discharge more than 60 mgd directly from Koolau basalt at low points along the upper edge confining caprock. Springs around the perimeter of Pearl Harbor flow because of a lack of overlying caprock which was never deposited or has eroded away, as evidenced by a bedrock ridge near all the large discharges at Kalauao, Waiau, Waiawa, and Waikele. Alluvium at these locations is young, thin, and ineffective in preventing discharge of base water as spring flow. In the areas close to the shoreline where there are confined basalts, the caprock, which is formed of marine and alluvial deposits, is the barrier that retards the seaward flow of basal groundwater (MacDonald, 1990).

Basal groundwater may also occur in significant quantities in the coastal plain and valley sedimentary deposits, although in much less abundance than found in the basaltic lava aquifers. Since the storage capacity and the permeability of these sedimentary deposits is small as compared to that of the basaltic lava aquifers, and many of the coastal plain sedimentary aquifers tend to be brackish, it has always been easier to develop potable groundwater from the basaltic lava aquifers. Sedimentary aquifers along the stream valley may hold some promise for the development of potable groundwater (MacDonald, 1990). The chiefly older alluvium of consolidated noncalcerous deposits in this area around Pearl Harbor grades into partly consolidated sands and silts that are emerged delta deposits, and may yield small supplies of potable water (Stearns, 1935). The development of brackish nonpotable water from the coastal plain sedimentary deposits surrounding Pearl Harbor's East Loch suitable for landscape irrigation use appears to be promising.

The Waimalu Aquifer facilities consists of 49 wells or shafts, and two springs. The wells, shafts, and springs in the vicinity of the proposed Halawa Caprock Nonpotable are shown on Figure 2-2. In the Waimalu Aquifer, the BWS operates 39 wells, Halawa Shaft, and Kalauao Spring. The U.S. Navy operates the Halawa and Red Hill Shafts. Seven wells and one spring are operated by private entities.

Records for the Waimalu Aquifer for 1990 indicate that the BWS withdrew a total of about 45.03 mgd from its wells and did not withdraw any water from Kalauao Spring and Waimalu Wells I and II. The U.S. Navy withdrew 7.03 mgd.

In 1990, the average water withdrawn by all users including the BWS from the Waimalu Aquifer was 54.01 mgd, which is more than 9 mgd higher than this aquifer's estimated sustainable yield of 45 mgd.

The proposed Halawa Caprock Nonpotable Well is proposed to be 280 feet deep and reach a depth of 250 feet below msl and will attempt to draw brackish nonpotable water suitable for irrigation use from the caprock. If the test pumping results indicate that the quality or quantity of the water from the well is unsatisfactory for landscape irrigation use, the well will be capped and/or sealed to prevent malicious or accidental contamination of the underlying groundwater aquifers.

Since there are no potable water wells downgradient from the well site and the nearest potable water well is located upgradient about 1/2 mile away, it unlikely that any potable wells within this aquifer could be affected.

4.3.3 Surface Water Hydrology

The Halawa Valley drainage basin flows into North Halawa Stream and South Halawa Stream. The streams converge to form Halawa Stream, a perennial stream. Halawa Stream is the closest stream to the BWS site and is located about 50 feet to the south. Halawa Stream is channelized and lined with concrete in the vicinity of the site. Halawa Stream is channelized and lined with concrete for about 1/4 mile downstream from the site to the vicinity of Salt Lake Boulevard, and for a little more than 1/2 mile upstream from the site to the vicinity of Kahuapani Street. Halawa Stream continues downstream for about one mile, then empties into Pearl Harbor's East Loch. The U.S. Geological Survey stream flow gage in the lower reach of Halawa Stream (No. 227000) is located at 16.52 feet above msl. The median flow for the Halawa Stream was 3.8 cfs (2.4 mgd) for the period since 1953 to 1980. Average flow data were not available (CWRM, 1990).

Water from the test pumping will be discharged into Halawa Stream. It is expected that the water that will be discharged will be clean and therefore will not introduce any pollutants into the environment. Care will be taken in disposing of the test water to preclude the possibility of flushing debris or re-suspending sediments and other pollutants in Halawa Stream.

The U.S. Fish and Wildlife Service (USFWS) in 1977 classified perennial streams into four categories based upon the environmental quality and the appropriate use of the stream, using Hawaii State Department of Health (DOH) water quality standards (Timbol and Maciolek, 1978). The four stream categories are:

- Pristine-Preservation Streams. These streams have high environmental and biological quality.

- Limited Consumptive Streams. These streams have moderate to high quality water or natural values. Use of these streams is controlled to prevent excessive modification.

- Exploitive-Consumptive Streams. These streams have moderate to low natural (environmental-biological) quality and/or moderate to low water quality (because of exploitation, modification or degradation). These streams are intended for water related recreational activities.

- Construct-Alter Streams. These streams have low environmental and biological quality and may be restricted to the public for health or safety reasons.

The Halawa Stream was classified as a Exploitive-Consumptive Stream. Halawa Stream is a continuously flowing perennial stream with a length of about 24.9 miles, of which about

2.5 miles has been modified with lined channels, elevated culverts and revetments from 1937 to 1974.

In 1991, the CWRM published *Hawaii Stream Assessment, A Preliminary Appraisal of Hawaii's Stream Resources* (HSA) in cooperation with the U.S. Department of Interior, National Park Service. The report represented the State of Hawaii's first attempt to identify streams that might be appropriate for protection. Four stream resource categories were used in the *Hawaii Stream Assessment.*

- Aquatic Resources. These resources are the unique aquatic fauna that have a life cycle involving both the stream and the sea, including freshwater fish, mollusks, crustaceans, and insects. Good aquatic resources were more likely for larger streams lacking stream modifications.

- Riparian Resources. These resources are the biological/ecological stream-associated resources such as: rare, threatened and endangered species and communities; protected areas; wetlands; and native forests. These resources give an indication of the status of the watershed that the stream is located within.

- Cultural Resources. These stream-related resources included archaeological resources, historic sites, and current taro cultivation areas. The criteria to be considered as stream-related were that changes in stream management would affect the resource, the resource was functionally dependent on the stream, or the resource was in close proximity to the stream.

- Recreational Resources. These resources include boating, camping, fishing, hunting, nature study areas, parks, scenic views, and swimming.

Resource categories were ranked in HSA as outstanding, substantial, moderate and limited. Halawa Stream was identified as having limited aquatic resources, unknown (unranked) riparian resources, outstanding cultural resources, and substantial recreational resources.

Halawa Stream's limited aquatic resource ranking was due to HSA's Aquatic Resources Committee ranking that classified Halawa Stream as being "without" aquatic resources which by HSA definition means that no native species were found. HSA reported two surveys of aquatic resources conducted for Halawa Stream, the latest survey occurring in 1989. The surveys identified one introduced (non-native) species (from a group of nine species) that may be a noxious, non-native stream animal that may prey upon and/or out-compete native species.

Halawa Stream was not ranked for riparian resources. This lack of ranking was due to HSA's inventory that indicated that, within Halawa Stream there were detrimental plants,

such as mangrove, california grass, and hau; detrimental animals, such as pigs; and only 10 percent native forest along the stream's entire length.

Halawa Stream's outstanding cultural resources ranking was due to a partial survey of the stream valley and the substantial existing information that was available to predict what historic sites might be in unsurveyed areas. HSA listed a rough estimate of 75 historic sites in Halawa Valley that were arranged in continuous sites, noting that the overall sensitivity of Halawa Valley based on the density of archaeological sites and land disturbance was high and that the valley was significant for the information contained at the sites. However, it is highly unlikely that there exists any cultural resources related to Halawa Stream in the vicinity of the proposed Halawa Caprock Nonpotable Well because of the extensive channelization and modifications to the stream that resulted with the construction of the highway and highway interchange.

Halawa Stream's substantial recreational resources ranking was due to hiking, fishing, swimming, and hunting resources. However, although these recreational resources may be apparent considerably further upstream in the upper reaches of Halawa Stream's two tributaries, they are not apparent in the vicinity of the proposed Halawa Caprock Nonpotable Well. Recreational resources are not apparent because of the extensive channelization and modifications to the stream in this area, and because the extensive highway infrastructure makes access to this area for recreational use unlikely.

Halawa Stream, which is channelized in this vicinity, has an invert of about 12 feet above msl and is perched over horizontal layers of low-permeability alluvium. The horizontal layers of low-permeability alluvium serve to isolate the water flowing into Halawa Stream from the underground alluvial water found in the caprock at considerably lower depths. The Halawa Caprock Nonpotable Well is proposed to be cased to a depth of about 105 feet (about 75 feet below msl) within the alluvium, with the screened intake section of the well extending from about 75 feet below msl to 250 feet below msl to the bottom of the well. The water drawn from the alluvium from 75 feet below to 250 feet below msl due to the pumping of this well is not expected to affect the water flowing into Halawa Stream because of the approximately 87 feet separating the screened intake section of the well from the stream's invert, and because of the intervening layers of alluvium. Further, water is also inhibited from flowing into (or out of) Halawa Stream in this vicinity, since the stream in this area is channelized and lined with concrete. As was indicated earlier, Halawa Stream is channelized and lined with concrete for about 1/4 mile downstream from the site and for about 1/2 mile upstream from the site.

There will not be any adverse impacts to Halawa Stream's cultural and recreational resources in this vicinity because of Halawa Stream's lack of cultural and recreational resources in close proximity to the project area due to the extensive channelization of the stream that took place with the building of the highway and highway interchange. There will be no adverse impacts to Halawa Stream's aquatic and riparian resources because stream flow will not be affected by the pumping of the well due to the intervening layers of

low-permeability alluvium, and the nearly impervious concrete bottom and walls of the stream channel that extends 1/4-mile downstream and 1/2-mile upstream from the proposed well site.

Within the Pearl Harbor Sector, wetlands occur around the edge of Pearl Harbor at five sites: 1) East Loch Wetlands, at Waiau on the east side of Pearl City Peninsula; 2) Pearl Harbor National Wildlife Refuge, Waiawa Unit, on the west side of Pearl City Peninsula; 3) Waipio Peninsula Ponds, on the west side of Waipio Peninsula; 4) Honouliuli Ponds, along the west shore of West Loch; and 5) Pearl Harbor National Wildlife Refuge, Honouliuli Unit, also on the west shore of West Loch (U.S. Army, 1977).

As was indicated earlier, the springs that flow into Pearl Harbor occur due to the lack of overlying caprock. Alluvium in these areas of spring flow around Pearl Harbor is young, thin, and ineffective in preventing discharge of basal water as spring flow. These springs occur in the middle and west portions of Pearl Harbor in the Waipahu-Waiawa Aquifer, at Kalauao, Waiau, Waiawa, and Waikele. Lesser springs may occur elsewhere, but flows from these lesser springs are immeasurably small, due to the thicker caprock that prevents spring flow into Pearl Harbor. The proposed Halawa Nonpotable Well, which is in the Waimalu Aquifer along the east side of Pearl Harbor, occurs in an area where the thicker caprock prevents any measurable spring flow from reaching the Halawa Stream and Pearl Harbor estuarine areas. Thus, impacts to the estuarine areas would not be measurable and are anticipated to be insignificant.

There is no potential for adverse impacts to the five wetland areas in the Pearl Harbor Sector. No significant impacts are anticipated because all of these wetlands in the Pearl Harbor Sector are in the Waipahu-Waiawa Aquifer and are not in the Waimalu Aquifer where the Halawa Caprock Nonpotable Well is being proposed. Further, the nearest wetland, the East Loch Wetlands at Waiau, is about 3 miles away.

4.3.4 Project Impacts

No adverse impacts to the geological formations underlying the drilling site for the well or to the soils at the surface of the site are expected. Impacts to the groundwater and surface water flows are expected to be insignificant.

4.3.5 Mitigation Measures

During the test pumping, care will be taken in disposing of the test water to preclude the possibility of flushing debris or re-suspending sediments and other pollutants in Halawa Stream. Best Management Practices (BMP) will be implemented and therefore a National Pollution Discharge Elimination System (NPDES) Permit is not required.

If the pump tests results indicate that the quality or quantity of the water from the well is unsatisfactory, the well will be capped and/or sealed to prevent malicious or accidental contamination of the underlying groundwater aquifer.

Pumpage of this well will not affect stream flow within Halawa Stream because of the elevation difference between the stream's invert and the section of the well drawing water, and the intervening layers of low permeability alluvium.

No other mitigation measures are proposed or required.

4.4 Natural Hazards

4.4.1 Flood Zones

The proposed Halawa Caprock Nonpotable Well site is located at an elevation of about 30 feet above msl, about a half-mile east of the East Loch of Pearl Harbor. The site is adjacent to a channelized section of Halawa Stream, in the Flood Insurance Rate Map (FIRM) Zone D. Zone D is an area in which flood hazards are undetermined. However, the nearest flood hazard area inundated by the 100-year floods is located at Aiea Stream, located more than 1/2 mile to the northwest. The well site is located outside of all identified 100-year flood areas.

4.4.2 Seismic Activity

Under the Uniform Building Code (UBC), the island of Oahu is designated as Seismic Zone 1, which in a scale from 1 to 4, is the zone with the lowest potential for ground motion created by seismic events. The UBC establishes minimum design criteria for structures to resist the effects of seismic ground motion, in accordance with the standards for the seismic zone in which the structure is to be built. In the interest of public health and safety, the BWS has adopted the standards for Seismic Zone 3 for all of its structures. All structures that will be built as part of this project will be designed and built in accordance with the UBC standards for Seismic Zone 3.

4.4.3 Project Impacts

The proposed project will not affect nor will be affected by flooding. Seismic risk at the project site is minimal. The proposed project will not affect seismic activity, and will not likely be affected by seismic activity.

4.4.4 Mitigation Measures

As a public health and safety measure, the BWS has adopted the standards for Seismic Zone 3 for the design and construction of all the structures that will be a part of this project.

No other mitigation measures are proposed or required.

4.5 Demographics

4.5.1 Population, Housing, and Employment

The Halawa project area where the nonpotable water well is proposed is located in the Halawa area, as designated in the U.S. Census. According to U.S. Census reports, in 1990 the Halawa area had a population of 13,408 and had 4,094 housing units. Employment in this area includes the commercial and retail services at Stadium Mall, teaching and administration jobs at Aiea Elementary School, the Aloha Stadium Authority, and the U.S. Navy.

4.5.2 Project Impacts

The proposed Halawa Caprock Nonpotable Well project will involve a small amount of new construction work. However, this work will be temporary and will most likely be conducted by workers from outside of this census tract. Existing and future population, housing, and employment in this portion of Halawa will not be affected by this project.

4.5.3 Mitigation Measures

No mitigation measures are proposed or required.

4.6 Roadways and Traffic

4.6.1 Roadways and Traffic

The eastbound Moanalua Road off ramp that connects to the southbound H-1 Highway at the Halawa interchange will be the primary vehicular access to the site. This ramp can also be accessed through an exit from Aloha Stadium connecting to southbound H-1 Highway.

According to the State of Hawaii DOT, average daily traffic on H-1 Highway at this interchange in 1991 amounted to 114,047. Traffic on this section of H-1 Highway is 85 percent southbound during the morning peak hour and 75 northbound during the afternoon

peak hour. Average daily traffic on Moanalua Freeway at this interchange in 1991 amounted to 44,205. Traffic on this section of Moanalua Freeway is 85 percent eastbound during the morning peak hour and 60 percent westbound during the afternoon peak hour. Traffic on both the H-1 Highway and the Moanalua Freeway consists of a mix of automobiles, trucks, and buses.

The highest average daily traffic from the eastbound Moanalua Road off ramp connecting to the southbound H-1 Highway in this interchange amounted to about 2,643 in 1991 and would occur during the morning peak hour.

One exit for Aloha Stadium exits into this ramp connecting to southbound H-1 Highway. Traffic from Aloha Stadium into this ramp can be heavy after sporting or other events held at the stadium. However, since most of these events end late during the evenings and on weekends, traffic impacts due to the moving of construction vehicles onto or off the site will not occur.

The may be some minimal impact to the relatively light traffic on this ramp if construction vehicles are moved onto or off the site during the morning and afternoon traffic peaks, when traffic on this ramp is highest.

The southeast edge of the project site is bounded by a graded area that will be a graded off-ramp for the southbound traffic from the H-3 Highway. The BWS will coordinate its plans for the siting and the timing of the construction of the proposed exploratory nonpotable well with the construction of the future off ramp for southbound traffic from the H-3 Highway with the State of Hawaii DOT, Construction Branch. The BWS anticipates that if the proposed exploratory nonpotable well is successful, that it will be converted to a permanent production nonpotable well. The BWS's site plans will locate its well facilities so that vehicular access to the site, connection to the existing nonpotable water main, drainage, and connection to electric lines will be in accordance with the requirements of the DOT so that the proposed nonpotable well will not affect adversely or be affected adversely by the future off-ramp for southbound traffic from the H-3 Highway.

4.6.2 Project Impacts

The project will create a slight and temporary rise in heavy truck traffic. No significant or long-term impacts to either the H-1 Highway, Moanalua Freeway, or the Halawa interchange are expected with this project. The project will not have any adverse traffic effects upon the Aloha Stadium.

4.6.3 Mitigation Measures

To minimize traffic impacts, the contractor will schedule heavy truck activity between the hours of 8:00 am to 3:00 pm Monday through Friday and will exclude State holidays.

The BWS will coordinate its plans for construction of the nonpotable water well with the State of Hawaii DOT, Construction Branch, in order to insure that the nonpotable well facility will not affect adversely or be adversely affected by the future off-ramp for southbound traffic from the H-3 Highway.

4.7 Visual and Recreational Resources

4.7.1 Visual Resources and Recreational Resources

The City and County of Honolulu's *Coastal View Study (1987)* notes that the proposed project is located in Section A, Pearl Harbor, of the South Shore View Shed. In this view shed, Kamehameha Highway, located about 1/2 mile makai of the project site, is identified as the closest coastal roadway. The *Coastal View Study* notes that the flat terrain and the built up facilities surrounding Pearl Harbor provide little public viewing opportunities into the harbor. However, in the vicinity of the project area, the *makai* view of Pearl Harbor from the portion of Kamehameha Highway adjacent to Richardson Park is identified as a significant roadway view into Pearl Harbor. Pedestrian views into to Pearl Harbor at Richardson Park near the Aloha Stadium were also identified as significant stationary views.

Richardson Park, located a little more than 1/2 mile makai of the proposed project area, is the closest recreational area to the site. Another recreational area, the Halawa District Park, is located across the highway interchange a little more than 1/2 mile to the northeast of the project site.

4.7.2 Project Impacts

The proposed project site is not visible from Kamehameha Highway in the vicinity of Richardson Park. The significant coastal views identified in the *Coastal View Study (1987)* from Kamehameha Highway in the vicinity of Richardson Park will not be affected.

Since the project site and both Richardson Park and Halawa District Park are separated by a distance of at least 1/2 mile, both the Richardson Park and Halawa District Park recreational areas will not be affected by this proposed project in any way.

4.7.3 Mitigation Measures

No mitigation measures are proposed or required.

4.8 Cultural Resources

4.8.1 Cultural Resources

An archaeological reconnaissance survey was conducted by Cultural Surveys of Hawaii on October 3, 1994. The results of the archaeological reconnaissance survey and related research are found in Appendix A of this report.

The project site has been heavily modified for construction of the freeways and entrance/exit ramps that completely surround it. *Sites of Oahu* shows no archaeological sites within the area. The earliest historic map of the area from 1817 shows agricultural fields (probably taro patches) adjacent to Aiea Bay. Maps dated 1913 and after show roads and railroads running along the shoreline of Pearl Harbor, encompassing the project site. The freeway and stadium were built throughout the 1960s and early 1970s.

4.8.2 Project Impacts

The results of the field work show that this project area is devoid of archaeological potential. The proposal for additional development of this site will not impact any archaeological resources.

4.8.3 Mitigation Measures

No further archaeological investigation should be required for this project. However, in the unlikely event that archaeological remains are encountered during the development of the well, work should cease in the immediate area and the State Historic Preservation Division of the Department of Land and Natural Resources should be notified to determine significance and treatment of the findings.

4.9 Biological Resources

4.9.1 Botanical Resources

A botanical reconnaissance survey was conducted by Char and Associates on September 28, 1994. The results of the botanical reconnaissance survey and related research are found in Appendix B of this report.

The proposed project site is undeveloped, but has been extensively disturbed and is covered almost exclusively by alien species. The vegetation is composed of an open grassy lawn and several plantings of shrubs and trees which are periodically maintained. The predominant groundcover is a mixture of Bermuda grass with scattered weedy patches. The

drier slopes support pitted beardgrass and swollen finger grass, while the damper swale areas support plants such as wedelia, California grass, and rice grass (*mauu laiki).*

Trees on the site include a few older 15- to 40-foot tall coconut trees and one Chinese fan palm which may have been on site before the interchange was built. Other smaller trees include royal poinciana and be-still trees.

None of the plants found on the site are candidates for threatened or endangered species status, and none are listed or proposed as threatened and endangered species (U.S. Fish and Wildlife Service, 1989, 1990, 1994.)

None of the plants are considered rare or vulnerable (Wagner et al., 1990). Two native species were observed on the site: the coconut or *nui*, and rice grass. Both are indigenous—that is, they are species native to the Hawaiian islands and elsewhere.

4.9.2 Faunal Resources

Faunal (bird and mammal) reconnaissance surveys were conducted by Philip L. Bruner, Environmental Consultant, on July 28, 1994. The results of this bird and mammal reconnaissance surveys and related research are found in Appendix C of this report.

Given the location and surrounding environment it is unlikely that any native resident landbirds, waterbirds, or migratory birds would frequent this property. No birds of these types were observed during the survey. It is possible that the migratory seabird Pacific Golden Plover (*Pluvialis fulva*) may have territories at this site during the months of August through April.

A total of nine species of exotic bird were recorded, although other species of exotic birds probably also occur in this area. None of these exotic species are "endangered" or "threatened."

No feral mammals were found on the survey. The introduced Small Indian Mongoose (*Herpestes auropunctatus*), along with rats, mice, and feral cats, are common in nearby areas.

It is unlikely that the endemic and endangered Hawaiian Hoary Bat (*Lasiurus cinereus semotus)* occurs at this location.

4.9.3 Project Impacts

There are no sensitive native plants communities on the project site. The proposed project will not have any affect on any significant biological resources.

There were no sensitive bird or mammal resources observed on or nearby the project site. The proposed project should have no impact on any significant bird or mammal resources.

4.9.4 Mitigation Measures

For both botanical and faunal resources, no mitigation measures are proposed or required.

4.10 Air Quality and Noise

4.10.1 Air Quality and Noise

Air quality on Oahu in Honolulu is affected mostly by motor vehicles with comparatively minor effects caused by industrial pollutants. In general, air quality in Honolulu is relatively clean and low in pollution, except where there are large numbers of motor vehicles. In the vicinity of the BWS project site near Aloha Stadium and the Halawa Interchange, vehicles travelling on the H-1 Highway, Moanalua Road, and the on and off ramps on the interchange are the predominant source of air pollution. In *Atlas of Hawaii*, air quality was studied during the period between July through September 1991. During heavy traffic conditions, suspended particulates were measured about 40 ug/m^3 and carbon monoxide from vehicular sources were measured at about 10 mg/m^3 near the project site. In *State of Hawaii, Data Book, 1992, A Statistical Abstract*, the nearest Hawaii State Department of Health sampling site at Pearl City measured suspended particulates in a range from 8 to 29 ug/m^3, with an arithmetic average of 15 mg/m^3. Fortunately, air pollution due to vehicular emissions is usually dispersed rapidly out to sea by the predominantly northeast or trade winds.

Ambient noise at and around the project site results mainly from vehicular movements on Moanalua Road and H-1 Highway, and the on and off ramps to the interchange. Noise also results from the events held at the Aloha Stadium but generally occurs mostly on the weekends, during the evenings, and at intermittent frequencies. Ambient noise levels due to vehicles are highest during the weekday morning peak traffic period and somewhat less during afternoon peak traffic period.

4.10.2 Project Impacts

Clearing, grading, and construction will involve heavy vehicle and equipment operations that will create a small amount of fugitive dust and pollutant emissions. The fugitive dust and pollutant emissions will have no adverse impact upon Aloha Stadium, the adjacent highway ramp separating the proposed BWS site from the Aloha Stadium, or the nearby residents. There will be no long-term air quality impacts once construction is completed.

On the island of Oahu, community noise controls have been set for analyzing noise impacts pursuant to Hawaii Department of Health Rules, Title 11, Chapter 43. Allowable daytime and nighttime noise level standards for sensitive receptors in residential, preservation, hotel,

apartment, and business districts have been set under these rules. The project site is located in a R-5, Residential zone. For residential zones, the maximum allowable daytime noise level from 7:00 am to 10:00 pm is 55 dBA, and the maximum allowable nighttime noise level from 10:00 pm to 7:00 am is 45 dBA.

The project may have some noise impacts to the adjacent residents or to the users of Aloha Stadium. Clearing, grading, heaving equipment moving, construction, and the drilling of the well will have noise, but because of the distance separating the site from Aloha Stadium and from the residents at Halawa Valley Estates and Crosspointe, the noise will not be intrusive. For the well drilling, if the cable drilling method is used, noise will result from the drill bit hitting rock, in a manner similar to a pile driver. Noise will also result from the operation of the diesel engine driving the drill. To reduce pump noise levels during the test pumping, a surface pump may be installed with mutes, or a submersible pump, which will considerably reduce pump noise levels, may be installed. If the test pumping is successful, the well will be converted to a permanent production well and connected to the existing nonpotable water system. To reduce permanent pump noise levels, a surface pump may be installed with mutes, or a submersible pump may be installed to reduce noise levels to less than the regulatory limit.

A noise permit will be required from the Noise and Radiation Branch of the State of Hawaii Department of Health.

There will be no noise impacts after the construction is completed.

4.10.3 Mitigation Measures

To mitigate the effects of site clearing, grading, and construction activities to the nearby school buildings and adjacent residences, dust control measures such as water sprinkling may be implemented by the contractor to reduce dust levels, as necessary. Further, the contractor will properly maintain its internal combustion equipment to minimize exhaust emissions, and will comply with the Hawaii Department of Health Rules Title 11, Chapter 59 and 60 regarding Air Pollution Control.

Contractors will comply with all of the conditions of the required noise permit. Mufflers will be required for all construction equipment. All noise attenuating equipment will be maintained in proper operation condition and will be repaired or replaced as needed. For the drilling operation, the rotary drill method will be used, and drilling operations will be restricted to the hours of 7:30 am to 3:30 pm, on weekdays, and will exclude state holidays. To reduce pump noise levels during test pumping, a surface pump may be installed with mutes, or a submersible pump, which will reduce pump noise levels considerably, may be installed.

If the test pumping is successful, and a permanent pump is installed, a surface pump with mutes may be installed, or a submersible pump may be installed to reduce noise levels to less than the regulatory limit.

Chapter 5
Relationship to Land Use Designations and Controls

5.1 State Land Use Designations and Controls

The subject property is located with the State Land Use Urban District. According to State law, Chapter 205, HRS, the land use controls in the Urban Districts on the island of Oahu are under the jurisdiction of the City and County of Honolulu.

A well construction pump installation and water use permit will be required from the Commission on Water Resource Management.

A permit to perform work on a State Highway will be required from the State of Hawaii, Department of Transportation, Highways Division.

A noise permit will be required from the State of Hawaii, Department of Health, Noise and Radiation Branch.

5.2 City and County of Honolulu Land Use Designations and Controls

The subject parcel is shown as a roadway on the City and County of Honolulu's Development Plan Land Use Map and is shown as R-5, Residential, on the City and County of Honolulu's Zoning Map. According to the City and County of Honolulu's Land Use Ordinance (LUO), the proposed project is considered a Utility Installation, Type A, and is a principal permitted use in the R-5, Residential zoning district.

According to the City and County of Honolulu Planning Department, the construction of an exploratory well is considered minor and is not required to be shown on the Development Plan Public Facilities Map.

If the Halawa Caprock Nonpotable Well is converted to a production well, the well site will need to be consistent with the City and County of Honolulu's Development Plan Public Facilities Map. Before City and County of Honolulu funds can be committed for construction of a permanent production well, the well site must be shown as a "site determined nonpotable water well programmed for construction within 6 years." A Development Plan Public Facilities Map amendment would require an application to the City and County of Honolulu Planning Department and approval by the City Council of the City and County of Honolulu.

A building permit will be required from the City and County of Honolulu, Building Department.

Chapter 6
Possible Alternatives

The no action alternative, the delayed action alternative, alternative sites, and alternative sources were considered either in this environmental assessment or in previous environmental analyses done by the BWS.

6.1 No Action Alternative

The no action alternative was not pursued because it would be contrary to the BWS's legal mandate to provide for the water needs of a growing population. The BWS is mandated to use nonpotable irrigation water for all existing and proposed large landscaped areas such as golf courses, parks, schools, cemeteries, and highways. This project is part of an overall nonpotable groundwater development program intended to exchange or substitute existing potable irrigation water with lower quality water for irrigation, which in turn will free nonpotable water to meet growing municipal water demands. If the BWS's nonpotable water source development program is curtailed, the BWS would be hampered in providing adequately for the potable water needs of the future population of the island, which may result in restrictions in new development as well as regional water shortages.

6.2 Delayed Action

The delayed action alternative was considered but not pursued because this alternative would delay the BWS's implementation schedule and would have substantially similar environmental outcomes and higher development costs because of inflation.

Delay in the proposed nonpotable well testing program would increase the risk that population growth will lead to water demands in excess of the available supplies.

6.3 Alternative Sites

This environmental assessment analyzes one of many possible nonpotable groundwater source sites in the Honolulu, Pearl Harbor, and Windward Sectors. A 1984 BWS study, *Regional Environmental Impact Assessment for Development of Wells, Reservoirs, Transmission Lines and Appurtenances at Honolulu, Hawaii*, evaluated the potential for 18 additional nonpotable ground water well sites in the Honolulu area in 1984, including the Halawa site.

The BWS's *Nonpotable Water Study* in 1992 evaluated the use of nonpotable water from Kalauao Spring for Blaisdell Park, from Kunawai Springs for Foster Gardens, from the existing Kapiolani Park brackish wells for Kapiolani Park and Honolulu Zoo, and from Waikele Stream for the Ted Makalena Golf Course.

In addition to this, another BWS study, *Windward Oahu Nonpotable Water Study* in 1994 evaluated nonpotable well sources for the irrigation of the following:

- the Olomana Golf links
- the Mid Pacific Country Club
- the Koolau Youth Correctional Facility and the Kawailoa Training School for Girls
- the Pali Golf Course, the Hawaii Pacific College-Hawaii Loa Campus, and the Hawaiian Memorial Park
- the Hawaii State Hospital
- the Kahuku Golf Course and the Kahuku District Park

The most recent BWS nonpotable water study was completed in July 1994 and is entitled *Nonpotable Water Sources and Possible Usage Sites, Volume II, Pearl Harbor District, Halawa Stream to Waiawa Stream.* This study evaluated four nonpotable water sources in the Pearl Harbor area including the proposed Halawa Nonpotable Well site. The four sites evaluated were:

- Waiawa Stream-Spring at H-1 Freeway
- HECO Tunnel-Waiau
- Waiawa Springs outlet
- Halawa Valley

The alternative sites offer opportunities as new nonpotable groundwater supply sources, but are considered by the BWS to be additions to, rather than alternatives to, the proposed caprock nonpotable groundwater well testing at this Halawa site.

If the exploratory nonpotable water well site as proposed proves to be unfeasible, a future alternative location for an exploratory nonpotable water well site, located a few hundred feet to the west of the proposed exploratory nonpotable water well site may be possible. This future alternative location for an exploratory nonpotable water well site could be located in the grassy strip separating the highway off-ramp and the Aloha Stadium parking lot. The grassy strip between the highway off-ramp and the Aloha Stadium parking lots does not contain any particular cultural/archaeological, botanical, or faunal (bird and mammal) characteristics that would be an impediment to the development of an exploratory nonpotable water well or permanent production nonpotable well in this area.

The grassy strip separating the highway off-ramp and the Aloha Stadium parking lot has been extensively modified with the construction of the highway and Aloha Stadium; this

extensive modification has obliterated any sites of cultural or archaeological significance. The present vegetation in this grassy strip is typical of vegetation planted within landscaped highway areas, and does not include any listed, proposed, or candidate threatened and endangered plant species. Like the other areas near this highway interchange and Aloha Stadium, no native birds, and no endangered or threatened birds would be expected at this location between the highway off-ramp and the Aloha Stadium parking lot.

6.4 Alternative Sources

The development of nonpotable groundwater sources is considered to an alternative to development of potable groundwater sources, and was analyzed by the BWS in *Regional Environmental Impact Assessment for Development of Wells, Reservoirs, Transmission Lines and Appurtenances at Honolulu, Hawaii.* In the 1984 study, nonpotable water from three different sources (caprock springs, the caprock, and the alluvium) were evaluated.

The development of potential nonpotable water from surface water sources was also evaluated in 1992 in *Nonpotable Water Study*, including the possible use of surface water from Kunawai Springs for Foster Gardens, and Waikele Stream for the Ted Makalena Golf Course. Typically the lower water quality of these alternative surface and groundwater sources is not suitable for use as potable water sources, but may be suitable for use as irrigation water for the landscaped areas of golf courses, parks, schools and highways.

The 1984 study also touched on the use of recycled of treated wastewater. However, the recycling of treated wastewater has considerably higher costs and technical challenges even if it is to be used as irrigation water; recycling of treated wastewater for irrigation use has a higher potential for health and safety problems, and would require installation of a costly water treatment plant. Further, the nearest sources of wastewater that could be treated and used for irrigation are located at Honouliuli and Sand Island, which are both too far away to be practical for use at this site. The recycling of treated wastewater as an alternative nonpotable water source for irrigation use in this area was not considered as feasible for their project as the development of groundwater sources.

Chapter 7
List of Preparers

CH2M HILL

Robert Chuck, P.E.	Project Administrator and Senior Reviewer
Clyde Kanehiro	Cartographer
Bennett Mark, P.E., A.I.C.P	Project Manager
Mara Soloway	Project Assistant

SUBCONSULTANTS

Phillip L. Bruner	Faunal (Bird and Mammal) Resources
Char and Associates	Botanical Resources
Cultural Surveys Hawaii	Archaeological and Cultural Resources

Chapter 8
Agencies Consulted in Making this Assessment

The following agencies were consulted during the preparation of the draft environmental assessment for this project:

State of Hawaii agencies

- Department of Land and Natural Resources
  - Commission on Water Resources Management
- Department of Transportation
- Department of Health
  - Environmental Management Division
  - Office of Environmental Quality Control

City and County of Honolulu agencies

- Planning Department
- Land Utilization Department

Others

- Hawaiian Electric Company, Inc.

Chapter 9
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Appendix A

Archaeological Reconnaissance Survey of Proposed Halawa Well Halawa, 'Ewa, O'ahu (TMK 9-9-03:35)

by

Hallett H. Hammatt, Ph.D.

for

CH2M Hill

Cultural Surveys Hawaii
October 1994

TABLE OF CONTENTS

LIST OF FIGURES

I. INTRODUCTION

Introduction

The purpose of this report is to describe the results of an archaeological reconnaissance survey conducted at the proposed Halawa Caprock, Non Potable Well (.20 MGD), Halawa, 'Ewa, O'ahu (TMK 9-9-03:35) (Fig. 1-3). The Board of Water supply is proposing to develop a non potable water supply for irrigation purposes. The capacity of this will is expected to be .20 million gallons per day to the production of the well.

Description of the Property

The property is located adjacent to the H-1 freeway on-ramp which serves as the *makai* exit for Aloha Stadium. It is bounded on the west by the Aloha Stadium on-ramp, on the north east by an overpass designated exit 13A of the eastbound H-1, and on the south east by a freeway entry ramp which joins the Aloha Stadium exit ramp at the point where it joins the east bound H-1 freeway. The site, roughly an oblique triangle in shape, is approximately 2 acres in area at an elevation of 30 ft. The site is undeveloped, but has been fully graded and planted with a grass ground cover, several palm, coconut, other trees. A PVC and rainbird irrigation system and associated control box are present. The site slopes down from the freeway entry ramps towards the north east. Runoff from the irrigation system has created a small ditch which flows towards the north east boundary of the site (ie. under the overpass) (See photo appendix).

History of the Property

This property, as well as the surrounding area, has been heavily modified for construction of freeways, and entrance/exit ramps which totally surround it. A check of the 'Ewa map in Sterling and Summers (1978) shows no archaeological sites within the area. The earliest historic map of the area is by Otto von Kotzbue is from 1817 (in

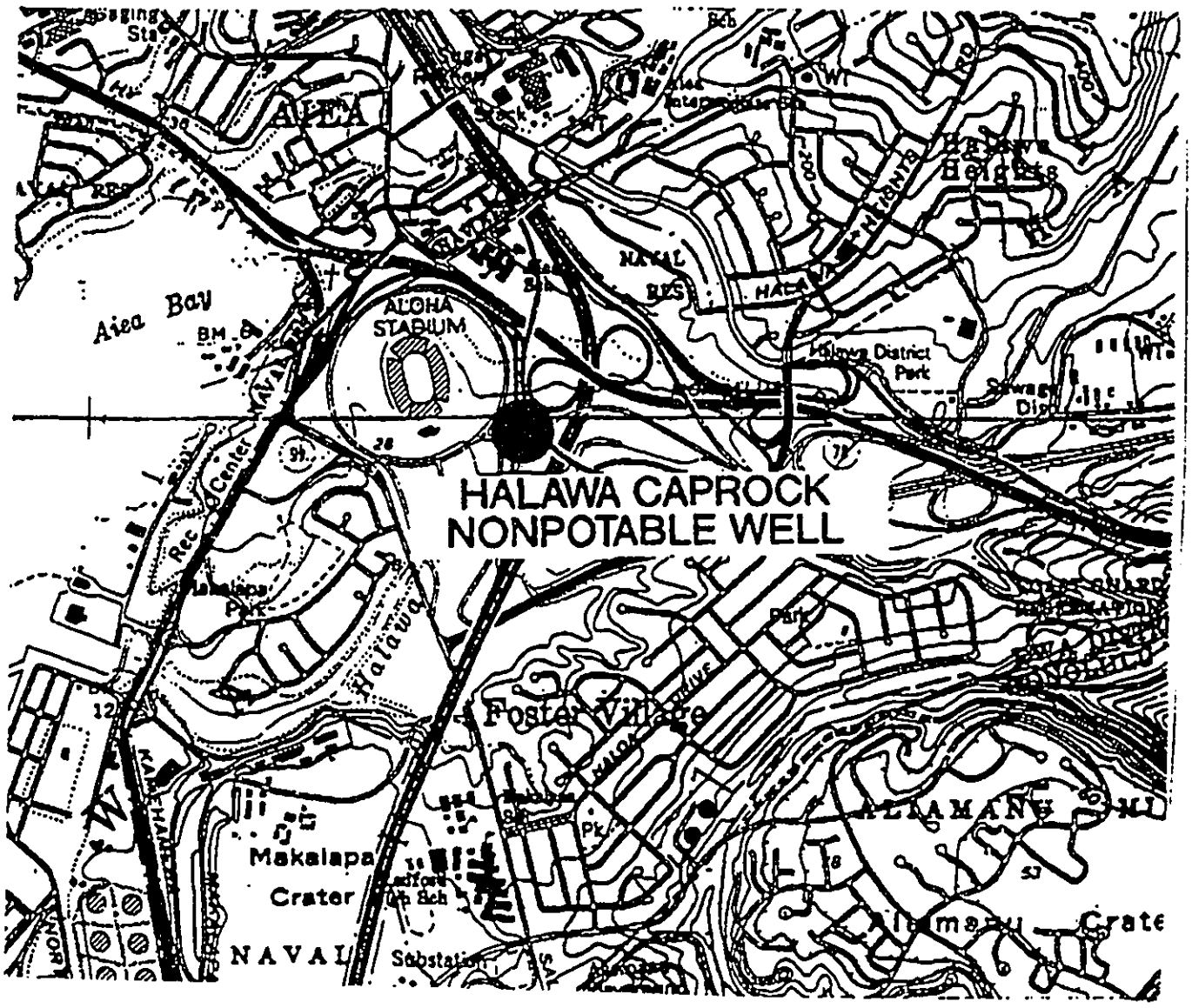


Figure 1 USGS 7.5 Minute Series Topographic Map of Waipahu Quad, Showing Project Location

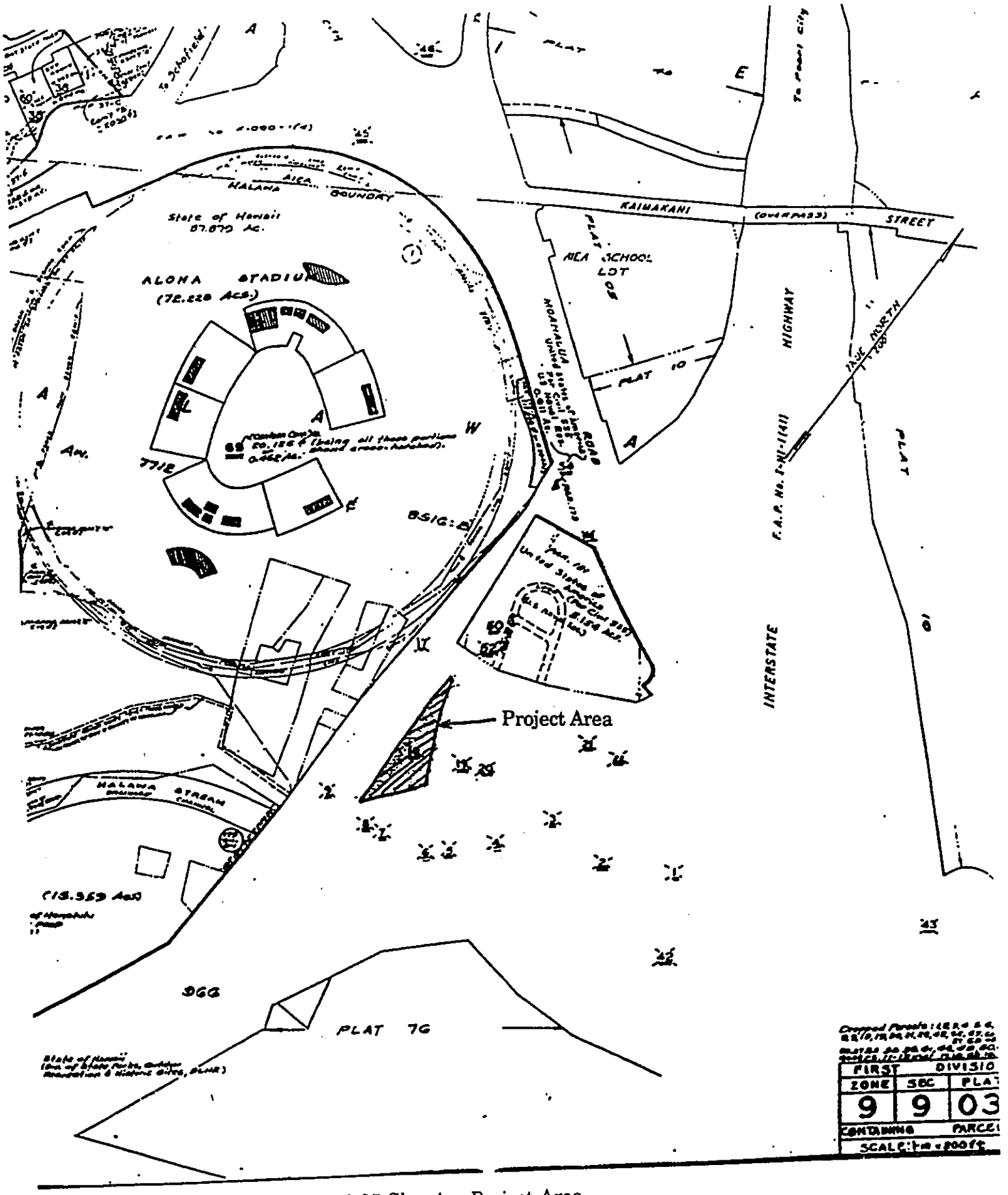


Figure 2 TMK 99-03:35 Showing Project Area

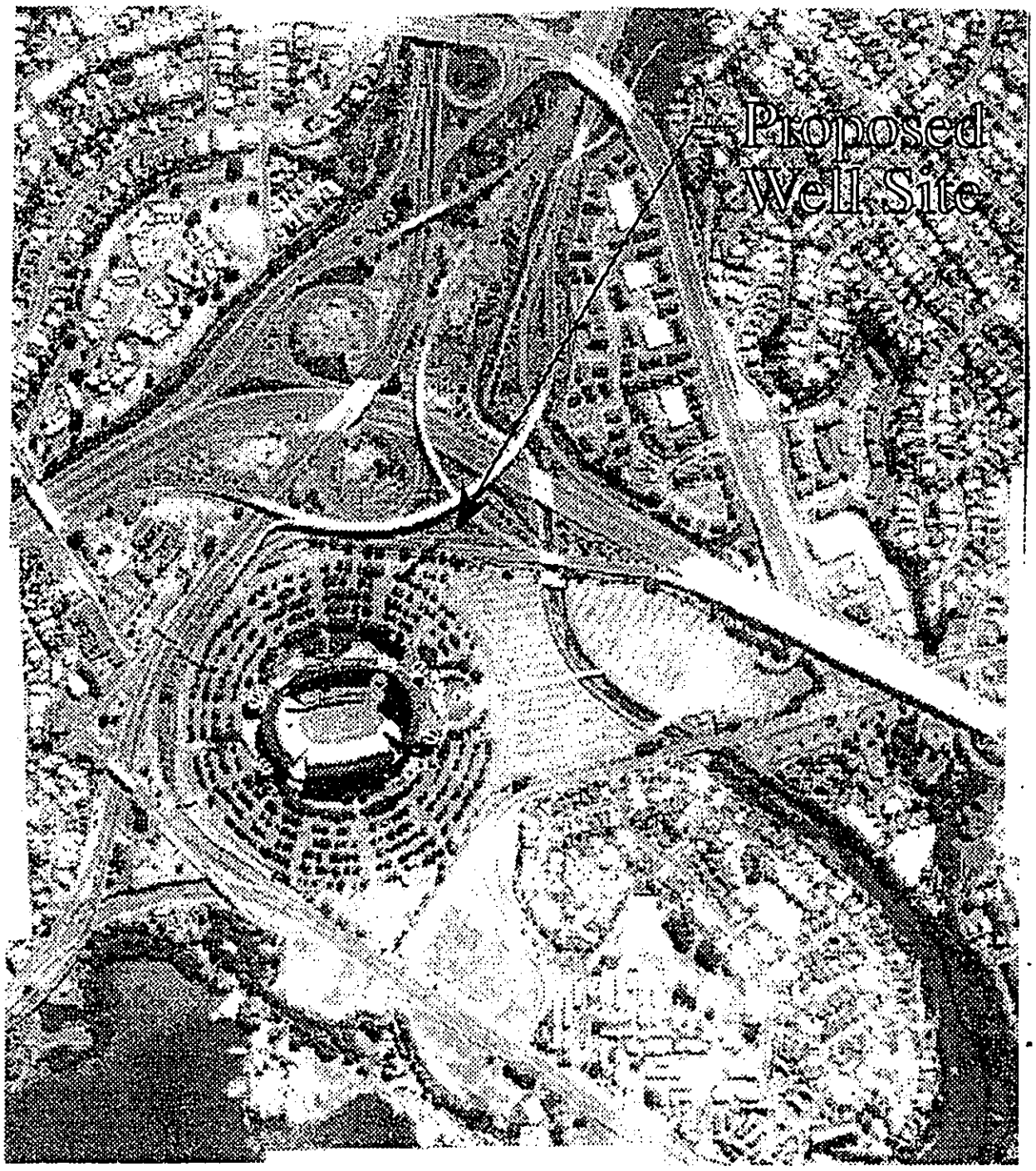


Figure 3 Aerial Photograph Showing Proposed Well Site

Fitzpatrick 1986:48-49; Fig. 4). This map shows agricultural fields, probably taro patches within this general area, adjacent to Aiea Bay.

All evidence of early historic or pre-historic Hawaiian activity, including habitation and agriculture within this area would have been eradicated by development of the area in the late 19th century for commercial sugar cultivation. The 1913 Fire Control Map shows this area on the east side of Aiea Bay to be in sugar cane with roads and railroads running along the shoreline of Pearl Harbor (Fig. 5). Another of the Honolulu Plantation Co., shows this same railroad and road network with numbered cane fields, whose location corresponds well with the present project area (Fig. 6). The H-2 Freeway and the network of roads around Aloha Stadium were built throughout the 1960s and early 1970s. This construction involved massive earth massive, including both cutting and filling. The original landscape both in and around the project area has been radically modified as a result of this activity.

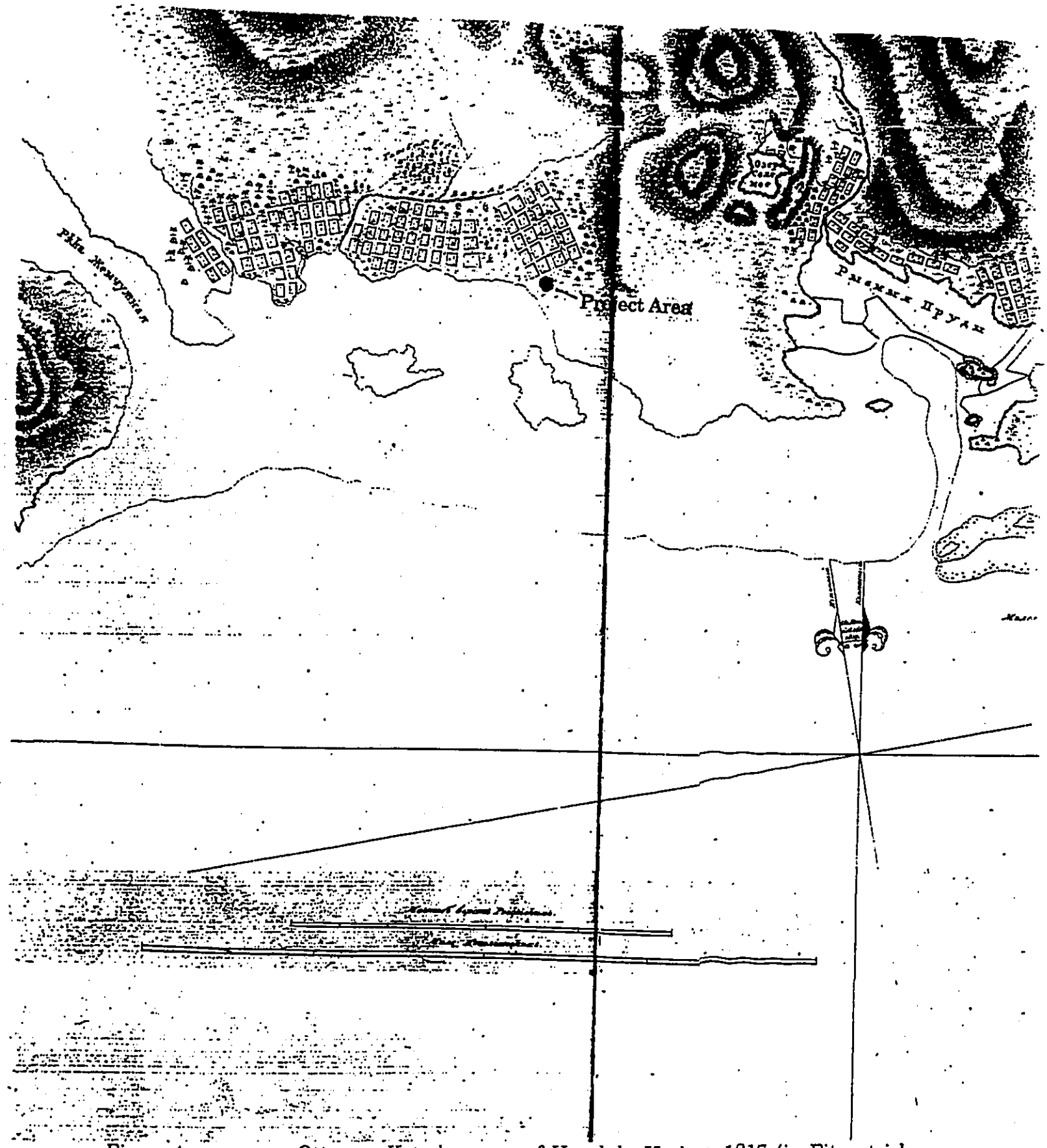


Figure 4 Otto von Kotzebue map of Honolulu Harbor, 1817 (in Fitzpatrick 1986:48-49)

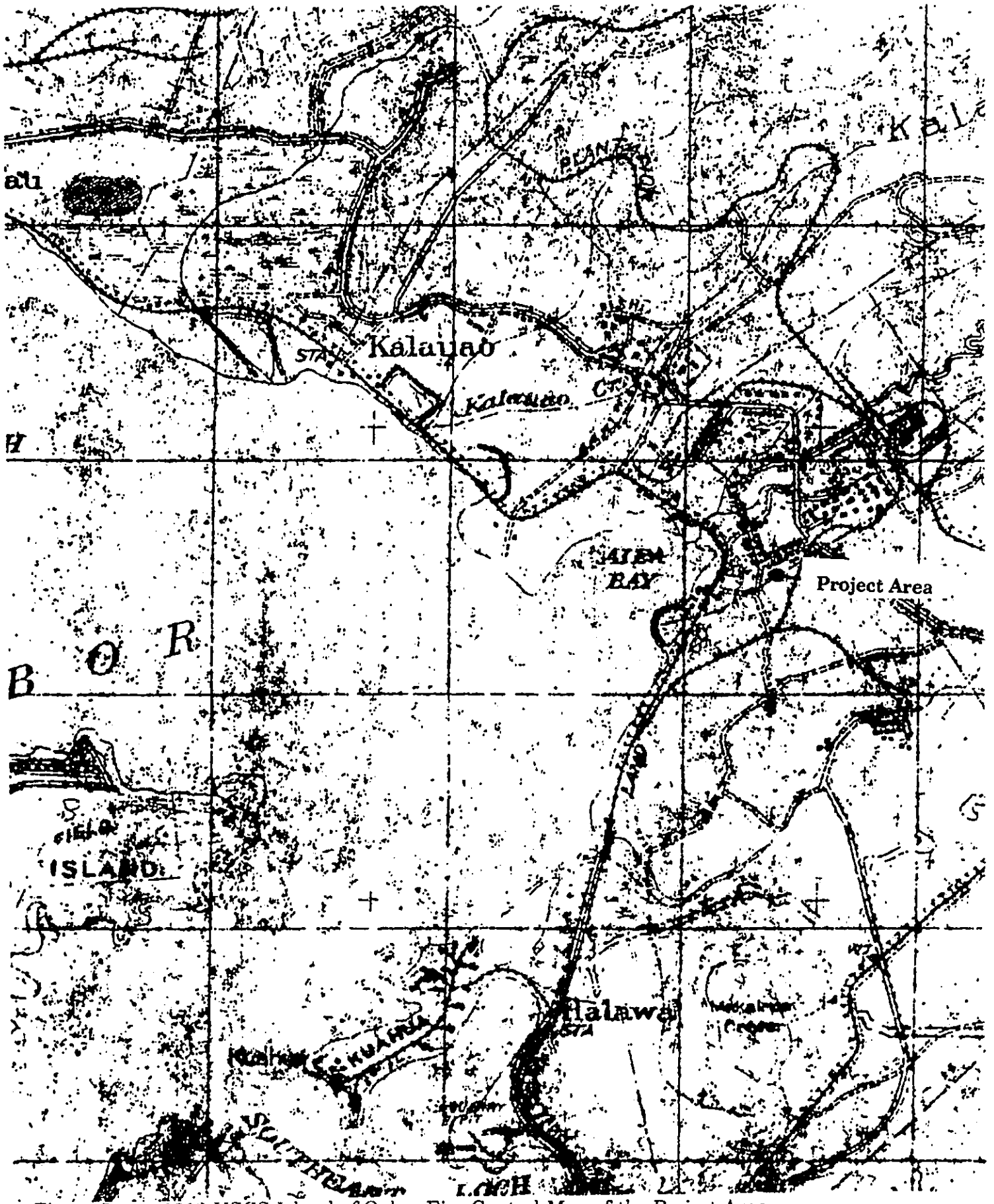
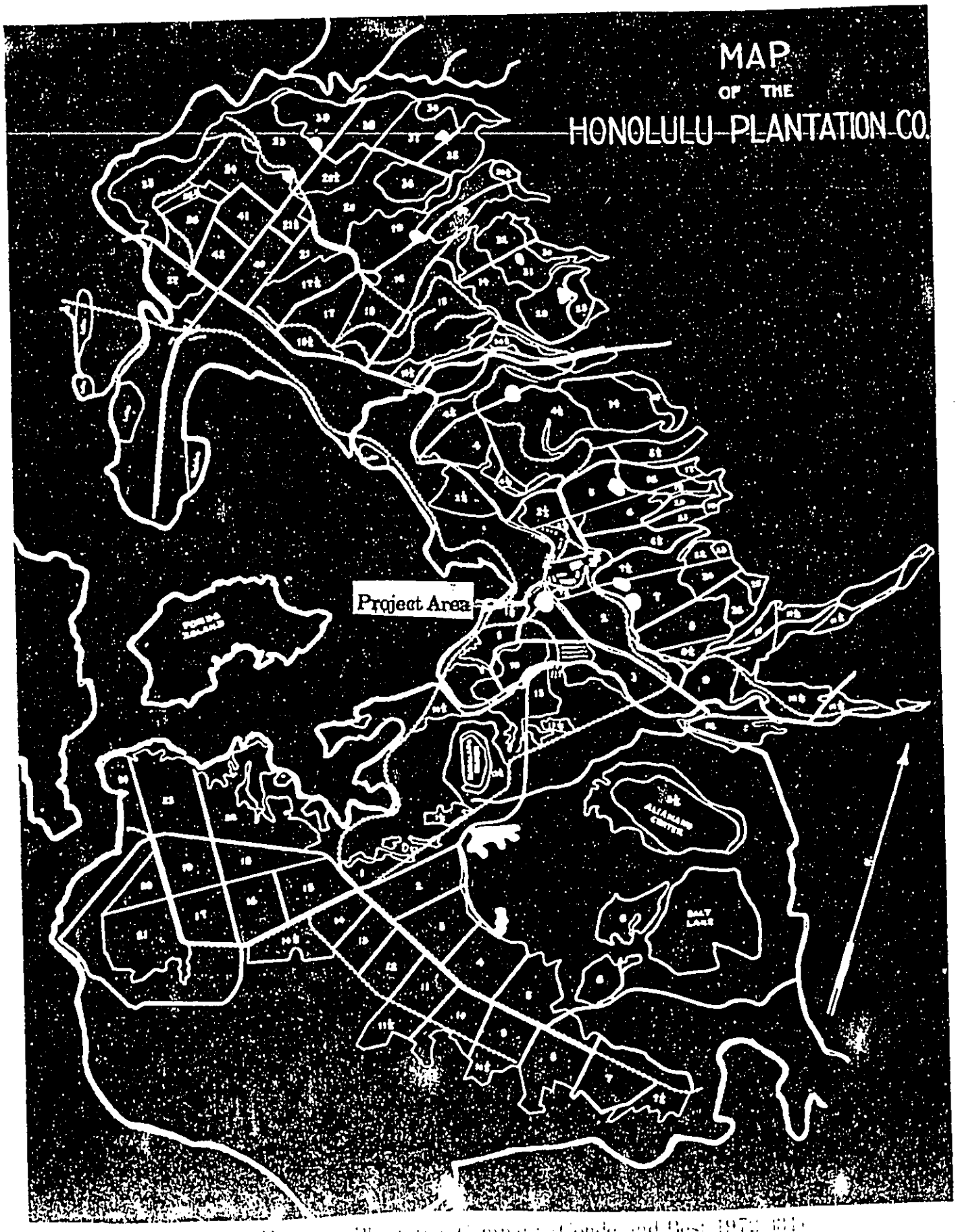


Figure 5 1913 USGS Island of Oahu, Fire Control Map of the Project Area


MAP
OF THE
HONOLULU PLANTATION CO.
Project Area

II. ARCHAEOLOGICAL FINDINGS

Archaeological Fieldwork

Archaeological fieldwork was conducted on October 3, 1994, and consisted of an inspection of the site by John Winieski of Cultural Surveys Hawaii, Inc. Through inspection of the site, it was very clear that the entire area had been previously graded for the building of the freeway entry and exit ramps. The graded area consists of brown fill dirt and gravel associated with road work. The area is completely planted with grass ground cover, intended to control soil erosion, as well as several palm, coconut, and other trees. An irrigation system is on site for maintenance of the ground cover.

Conclusions

It is clear from the results of the fieldwork that this project area is devoid of archaeological potential. The proposal for installation of a well at the site will not impact archaeological resources. For these reasons, no further archaeological investigation should be required for this project.

III. REFERENCES

Condé, Jesse C. and Gerald M. Best
1973 *Sugar Trains, Narrow Gauge Rails of Hawaii*, Glenwood Publishers, Felton Calif.

Fitzpatrick, Gary L.
1986 *Palapala'aina: The Early Mapping of Hawai'i.*

Sterling, Elspeth P. and Catherine C. Summers (comp.)
1978 *Sites of O'ahu*, Dept. of Anthropology, B.P. Bishop Museum, Honolulu.

PHOTO APPENDIX

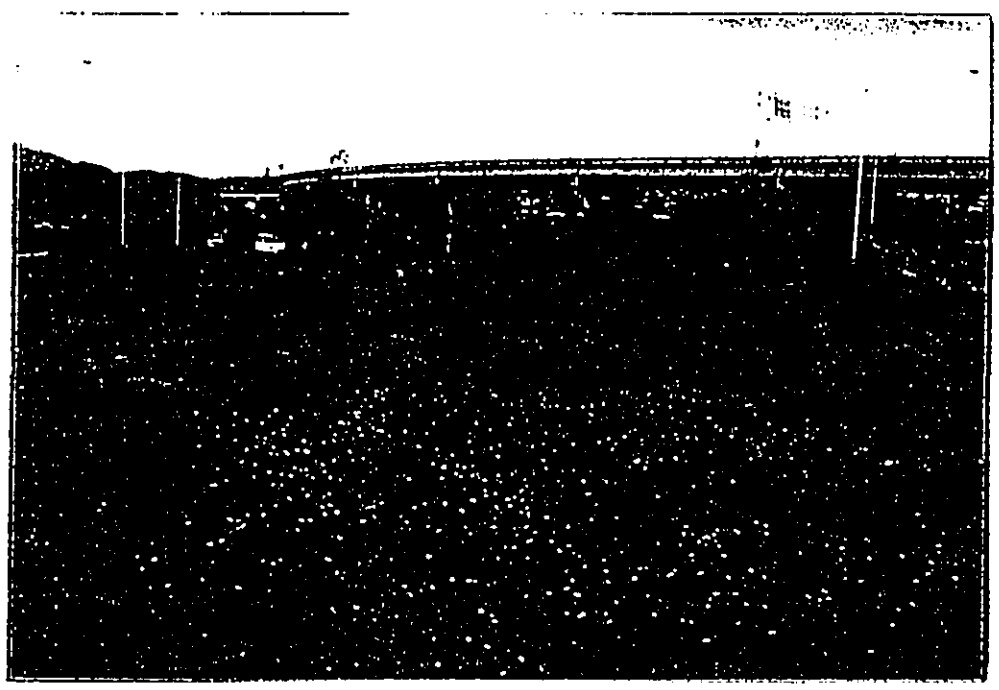


Figure 9 Project Area, View to Northeast, Showing Grass Cover and Adjacent Highway Ramp

Figure 10 Project Area, View to South

Appendix B

CHAR & ASSOCIATES
Botanical / Environmental Consultants
4471 Puu Panini Ave.
Honolulu, Hawaii 96816
(808) 734-7828

October 1994

BOTANICAL RESOURCES ASSESSMENT HALAWA CAPROCK NONPOTABLE WELL 'EWA DISTRICT, ISLAND OF O'AHU

INTRODUCTION

The proposed well site is located within the Halawa Interchange east of the Aloha Stadium. The site is approximately 15,000 square feet in area and roughly triangular in shape. The proposed 0.20 MGD well will provide nonpotable water for irrigation purposes. The proposed project will include a pump station, transmission main, and appurtenances.

At the request of the Honolulu Board of Water Supply and CH2M Hill, a botanical resources assessment study was conducted for the well site on 28 September 1994. The primary objectives of the botanical assessment study were to describe the vegetation, search for threatened and endangered species as well as rare and vulnerable plants, and identify areas of potential environmental problems or concerns. A walk-through survey method was used. Notes were made on plant associations and distribution, substrate types, topography, drainage, etc. Plant identifications were made in the field; plants which could not be positively identified were collected for later determination in the herbarium, and for comparison with the most recent taxonomic literature. The plant

names used in the following discussion follow Wagner et al. (1990).

DESCRIPTION OF THE VEGETATION

The vegetation on the proposed Halawa well site is composed of an open, grassy lawn and several plantings of shrubs and trees which are periodically maintained. The ground cover is a mixed assemblage of species composed primarily of Bermuda grass or manienie (Cynodon dactylon) with scattered weedy patches. Pitted beardgrass (Bothriochloa pertusa) and swollen finger grass (Chloris barbata) are locally abundant on the drier sloping areas or on areas with thin, stony soils. Low-lying swale areas which are somewhat damper support wedelia (Wedelia trilobata) -- a commonly used ground cover with yellow, daisy-like flowers, California grass (Brachiaria mutica), sensitive plant or puahilahila (Mimosa pudica), and a few clumps of rice grass or mau'u laiki (Paspalum scrobiculatum). Other ground cover species occasionally observed on the site are: hairy honohono (Commelina benghalensis), Boerhavia coccinea, false mallow (Malvastrum coromandelianum, and hierba del cabello (Calyptocarpus vialis).

There are a few 15- to 40-foot tall coconut trees (Cocos nucifera) and one Chinese fan palm (Livistonia chinensis) on the project site. Some of these are old specimens and may have been on the site before the interchange was built. Other trees on the site include several small royal poinciana (Delonix regia), about 3 to 10 feet tall, and milo (Thespesia populnea), about 10 feet tall. There are large clumps of be-still tree (Cascabela thevetia), 12 to 15 feet tall, on the makai side of the property.

Among the shrubs found on the property are kolomona (Senna surattensis) and Bougainvillea hybrids. There are a few koa-haole

(Leucaena leucocephala) plants in the grassy areas, but these are mowed over and kept low. Occasionally, a few field bindweed vines (Ipomoea obscura) can be found climbing up the taller woody material.

DISCUSSION AND RECOMMENDATIONS

The vegetation found on the proposed 0.20 MGD caprock well site is composed almost entirely of introduced or alien species, these are plants which were brought to the islands by humans, intentionally or accidentally after Cook's dicovery of the Hawaiian Islands in 1778. Only two of the species on the site are not introduced; these are the coconut or niu, which is originally of early Polynesian introduction, and rice grass or mau'u laiki. The rice grass is presumably indigenous, that is, it is native to the Hawaiian Islands and also other tropical areas.

None of the plants found on the site is a listed, proposed or candidate threatened and endangered species (U.S. Fish and Wildlife Service 1990, 1994). None of the plants is considered rare or vulnerable (Wagner et al. 1990). There are no sensitive native plant-dominated communities (Hawai'i Heritage Program 1994) on the property. This is not surprising as the site has been extensively disturbed in the past and also during the construction of the interchange.

Given the findings above and the limited nature of the project, there should be no significant negative impact to the botanical resources. There are no botanical reasons to impose any restrictions, conditions, or impediments to the proposed use of the site. No recommendations are offered at this time.

References

Hawai'i Heritage Program, The Nature Conservancy of Hawai'i. 1994. Summary listing of Hawaiian natural communities. Memorandum. February 1994.

U.S. Fish and Wildlife Service. 1990. Endangered and threatened wildlife and plants; Review of plant taxa for listing as Endangered and Threatened Species; Notice of review. Federal Register 55(35): 6184-6229.

_____ . Plants, Hawaiian Islands, Listed, proposed or candidate species under the U.S. Endangered Species ACt, Updated: march 28, 1994. Unpublished list, Pacific Islands Office, Honolulu.

Wagner, W.L., D.R. Herbst, and S.H. Sohmer. 1990. Manual of the flowering plants of Hawai'i. 2 vols. University of Hawai'i Press and B.P. Bishop Museum Press, Honolulu. B.P. Bishop Museum Special Publication No. 83.

Appendix C

AVIFAUNAL AND FERAL MAMMAL SURVEY FOR A BOARD OF WATER SUPPLY EXPLORATORY WELL SITE AT HALAWA, OAHU

Prepared for

CH2M Hill

by

Phillip L. Bruner
Assistant Professor of Biology
Director, Museum of Natural History
BYU-Hawaii
Environmental Consultant - Faunal (Bird & Mammal) Surveys

3 August 1994

INTRODUCTION

The purpose of this report is to summarize the findings of a bird and mammal field survey of a proposed well site at Halawa, Oahu conducted on 28 July 1994 (Fig. 1). Also included are references to pertinent literature.

The objectives of the field survey were to:

1- Record what bird and mammal species occur on and near the property, or may likely be found there given the type of habitats available.

2- Determine the presence or likely occurrence of any native fauna, particularly any that are considered "Endangered" or "Threatened".

3- Evaluate the importance of the property for native wildlife and note any special or unique resources.

GENERAL SITE DESCRIPTION

Figure One indicates the location of the proposed well site. This property is surrounded by highways. The site has been

landscaped with grass and a variety of introduced trees. A low section of the site is wet with some standing water and wetland vegetation.

Weather during the field survey was clear and calm. Traffic around the site was constant and loud.

STUDY METHODS

Field observations were made with binoculars and by listening for vocalizations. The entire area was walked. Counts were made of all birds seen or heard during the visit (Table 1). Published data of birds known from this region of the island were consulted in order to acquire a more complete picture of the possible species that might be expected in this area (Pratt et al. 1987); Hawaii Audubon Society 1993; Tanino 1994).

Scientific names used in this report follow those given in Hawaii's Birds (Hawaii Audubon Society 1993); Field guide to the birds of Hawaii and the Tropical Pacific (Pratt et al. 1987) and Mammal species of the World (Honacki et al. 1982).

RESULTS

Resident Endemic (Native) Land Birds:

No native, resident land birds were observed on the survey. Given the location and surrounding environment it is unlikely that any native resident landbird would ever occur on this property.

Resident Waterbirds:

The drainage ditch with standing water and emergent vegetation is probably too small and inobvious to attract birds like Black-necked Stilt (Himantopus mexicanus). I would be more than a little surprised to learn that this site was ever used by native waterbirds.

Seabirds and Migratory Shorebirds:

No seabirds were observed on the survey. The White Tern (Gygis alba) is listed as "Threatened" on Oahu by the State of Hawaii Division of Forestry and Wildlife. This species nests in large trees like banyans, ironwoods and monkeypods. None were seen on this survey. The few large trees at this site are suitable nesting sites for this species.

No migratory shorebirds were recorded on this survey. The lawn habitat could support Pacific Golden-Plover (Pluvialis fulva). This species nests in the arctic and winters on lawns and in open fields in Hawaii (Johnson et al. 1981). It is possible that plover

may have territories at this site during the months of August through April. Plover are not an "endangered" species.

Exotic (Introduced) Birds:

A total of nine species of exotic birds were recorded during the field survey (Table 1). Pratt et al. (1987); Hawaii Audubon Society (1993) and Tanino (1994) note that other species which might occur in this area include: Northern Cardinal (Cardinalis cardinalis) and Japanese White-eye (Zosterops japonicus). No unusual species were recorded at this location.

Feral Mammals:

No feral mammals were found on the survey. The introduced Small Indian Mongoose (Herpestes auropunctatus) along with rats, mice and feral cats are common in nearby areas.

Oahu records of the endemic and endangered Hawaiian Hoary Bat (Lasiurus cinereus semotus) are limited (Tomich 1986; Kepler and Scott 1990). It is unlikely any occur at this location.

DISCUSSION AND CONCLUSIONS

This field survey was necessarily brief and thus can provide only a limited view of the wildlife which utilize the area. The number and relative abundance of each species may vary throughout

the year due to available food resources and reproductive success. Exotic species sometimes prosper only to later disappear or become a less significant part of the ecosystem (Williams 1987; Moulton et al. 1990). Long term studies could provide a more comprehensive view of the bird and mammal populations in a particular area. Nevertheless, some general conclusions related to birds and mammals at this site are provided. The following comments summarize the findings of this survey.

1- The entire site along with nearby areas were covered on foot. All birds seen and heard were tallied. These data are summarized in Table 1.

2- No native birds were recorded on the survey. No "endangered" or "threatened" species were found on the survey. The only species in this categoray which might nest in the large trees on and near this site is the "threatened" White Tern. The native migratory Pacific Golden-Plover may use this area during the months of August through April. They are not "threatened" or "endangered".

3- This site is surrounded by highways and developed lands. I would not characterize this property as important, unique or special for native or non-native birds and mammals. Any development at this site should have no significant consequences on the populations of birds and mammals on Oahu.

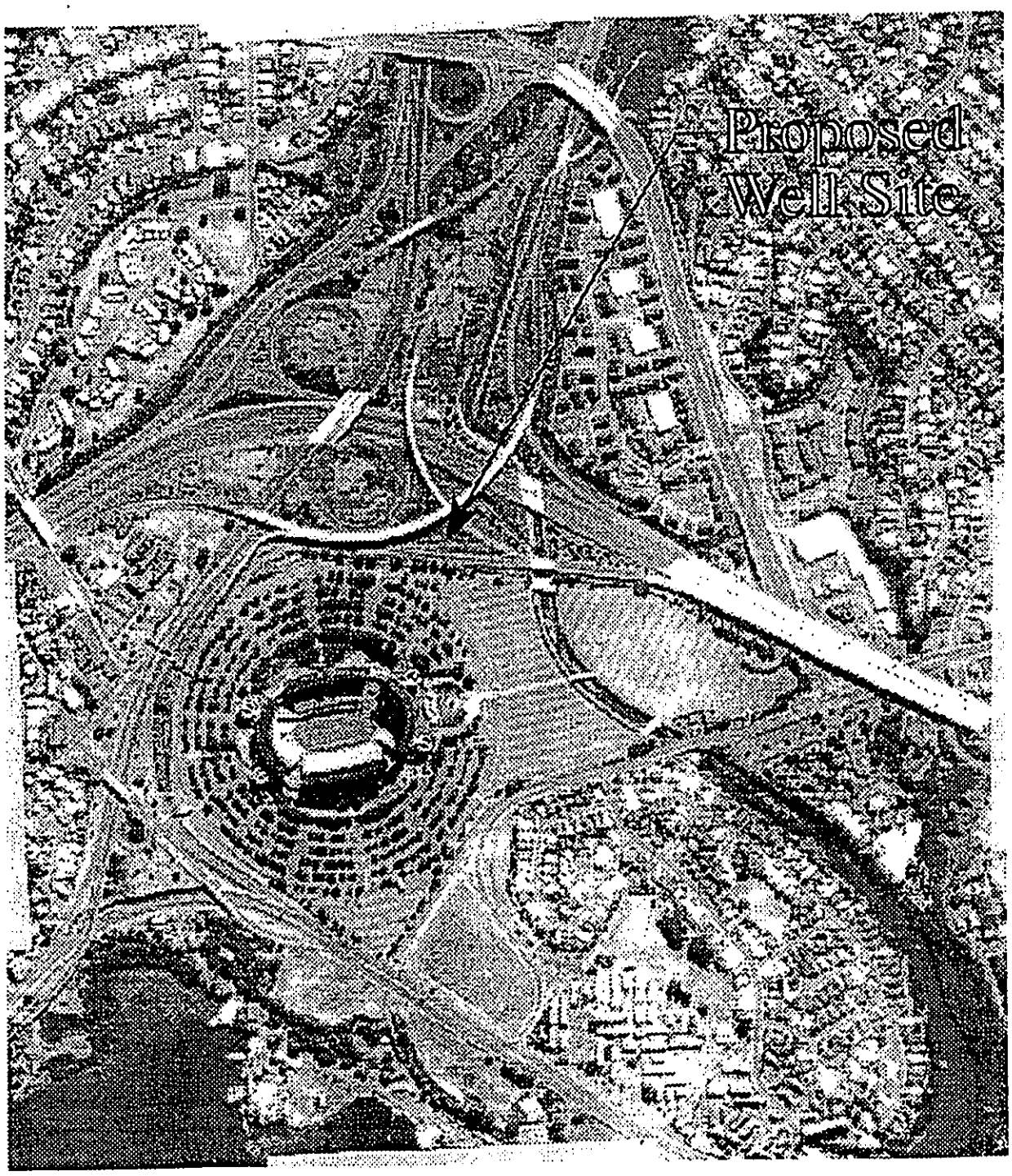


Fig. 1. Location of the faunal survey for the Halawa site.

TABLE 1

Introduced birds recorded at the proposed Halawa well site on Oahu. These data provide only an estimate of relative abundance.

COMMON NAME	SCIENTIFIC NAME	Total Number Recorded
Spotted Dove	Streptopelia chinensis	2
Zebra Dove	Geopelia striata	8
Common Myna	Acridotheres tristis	10
Red-vented Bulbul	Pycnonotus cafer	12
Red-crested Cardinal	Paroaria coronata	2
House Finch	Carpodacus mexicanus	3
House Sparrow	Passer domesticus	13
Nutmeg Mannikin	Lonchura malabarica	6
Java Sparrow	Padda oryzivora	4

SOURCES CITED

Hawaii Audubon Society. 1993. Hawaii's Birds. Fourth Edition. Hawaii Audubon Society, Honolulu.

Honacki, J. H., K. E. Kinman and J. W. Koeppl ed. 1982. Mammal Species of the World: A taxonomic and geographic reference. Allen Press, Inc. and the Association of Systematic Collections.

Johnson, O. W., P. M. Johnson, and P. L. Bruner. 1981. Wintering behavior and site-faithfulness of Golden Plovers on Oahu. 'Elepaio 41(12):123-130.

Kepler, C. B. and J. M. Scott. 1990. Notes on Distribution and Behavior of the endangered Hawaiian Hoary Bat (Lasiurus cinereus semotus) 1974-1983. 'Elepaio 50(7):59-64.

Moulton, M. P., S. L. Pimm and N. W. Krissinger. 1990. Nutmeg Mannikin (Lonchura punctulata): a comparison of abundance in Oahu vs. Maui sugarcane fields: evidence for competitive exclusion? 'Elepaio 50(10):83-85.

Pratt, H. D., P. L. Bruner and D. G. Berrett. 1987. A field guide to the birds of Hawaii and the Tropical Pacific. Princeton Univ. Press.

Tanino, L. 1994. Honolulu Count: 50th annual Honolulu Christmas Count - 1993. 'Elepaio 54(3):13-15.

Tomich, P. Q. 1986. Mammals in Hawaii. Bishop Museum Press.

Williams, R. N. 1987. Alien Birds on Oahu. 1944-1985. 'Elepaio 47(9):87-92.

Appendix D

Appendix D

Agencies and Others Provided a Copy of the Draft Environmental Assessment

Twenty-one governmental agencies and four other groups or individuals were provided a copy of the draft environmental assessment for this project and were requested to provide comments. The following is a list of those agencies and others that were requested to provide comments.

Federal Agencies

- U.S. Department of Agriculture, Soil Conservation Service
- U.S. Army Corps of Engineers, Pacific Ocean Division
- U.S. Department of Transportation
- U.S. Fish and Wildlife Service
- U.S. Department of the Interior, U.S. Geological Survey, Water Resources Division
- U.S. National Oceanic and Atmospheric Administration

State of Hawaii Agencies

- Department of Agriculture
- Department of Business, Economic Development, and Tourism
- Department of Education
- Department of Land and Natural Resources
  - Aquatic Resources Division
  - Forestry and Wildlife Division
  - Historic Preservation Division
  - Commission on Water Resources Management
- Department of Health
  - Environmental Management Division
  - Office of Environmental Quality Control
- University of Hawaii
  - Environmental Center
  - Water Resources Research Center
- Aloha Stadium Authority

City and County of Honolulu Agencies

- Planning Department
- Land Utilization Department
- Public Works

Others

- City Council District 8 Member Mufi Hannemann
- Aiea Neighborhood Board No. 20 Chair Mike Miura
- Sierra Club, Hawaii Chapter
- Hawaiian Electric Company, Inc.

Appendix E

Appendix E

Comments and Responses to the Draft Environmental Assessment

PLN-101/95

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

June 1, 1995

REPLY TO ATTENTION OF

Planning Division

JUN 2 2 55 PM '95

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

Dear Mr. Usagawa:

Thank you for the opportunity to review and comment on the Draft Environmental Assessment (DEA) for the Halawa Caprock Nonpotable Well, Halawa, Oahu, Hawaii (TMK 9-9-3: 35). The following comments are provided pursuant to Corps of Engineers authorities to disseminate flood hazard information under the Flood Control Act of 1960 and to issue Department of the Army (DA) permits under the Clean Water Act; the Rivers and Harbors Act of 1899; and the Marine Protection, Research and Sanctuaries Act.

a. A DA permit will be required if any portion of this project affects wetlands, streams, gulches, or other waters of the U.S. Please contact Ms. Kathy Dady for further information at 438-9258 (extension 15).

b. The flood hazard information provided on page 4-10 of the DEA is correct.

Sincerely,

Ray H. Jyo, P.E.
Director of Engineering

Copy Furnished:

Mr. Bennett Mark
CH2M Hill
1585 Kapiolani Boulevard, Suite 1420
Honolulu, Hawaii 96814-4530

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU

COPY

June 20, 1995

Mr. Ray H. Jyo, P.E.
Department of the Army
U. S. Army Engineer District, Honolulu
Fort Shafter, Hawaii 96858-5440

Dear Mr. Jyo:

Subject: Your Letter of June 1, 1995 on the Draft Environmental Assessment (EA) for the Proposed Halawa Caprock Nonpotable Well, Halawa, Oahu, Hawaii, TMK: 9-9-3: 35

Thank you for reviewing the Draft EA for the proposed Halawa Caprock Nonpotable Well project.

We understand that a Department of the Army permit will be required if any portion of this project affects wetlands, streams, gulches, or other waters of the U. S. We do not anticipate that a Department of the Army permit will be required for this project.

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

Very truly yours,

for RAYMOND H. SATO
Manager and Chief Engineer

cc: Bennett Mark, CH2M Hill

United States Department of the Interior
FISH AND WILDLIFE SERVICE
Pacific Islands Ecoregion
300 Ala Moana Blvd., Room 6307
Honolulu, Hawaii 96850

Tel: (808) 541-3441 Fax: (808) 541-3470

In Reply Refer To: JMB

MAY 02 1995

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

Re: Draft Environmental Assessment, Halawa Caprock Nonpotable Well

Dear Mr. Usagawa:

The U.S. Fish and Wildlife Service (Service) has reviewed the Draft Environmental Assessment (DEA) for the Halawa Caprock Nonpotable Well. The project sponsor is the Honolulu Board of Water Supply. The project involves drilling and testing a well for the production of roadside irrigation water. The Service offers the following comments for your consideration.

Test pumping and production of water from the well are not anticipated to affect stream flows, stream water quality or spring discharges into the wetlands of Pearl Harbor. The proposed well site lacks species of plants or animals of concern to the Service. No significant adverse effects to fish and wildlife resources are expected to result from the proposed action. Therefore, based on the information presented in the DEA, the Service does not object to the proposed project.

The Service appreciates the opportunity to provide comments on the DEA. If you have questions regarding these comments, please contact Fish and Wildlife Biologist Jeff Burgett at (808) 541-3441.

Sincerely,

Brooks Harper

Brooks Harper
Field Supervisor
Ecological Services

cc: CH2M HILL

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU

COPY

September 20, 1995

Mr. Brooks Harper
Fish and Wildlife Service
United States Department of the Interior
300 Ala Moana Boulevard, Room 6307
Honolulu, Hawaii 96850

Dear Mr. Harper:

Subject: Your Letter of May 2, 1995 on the Draft Environmental Assessment (EA) for the Proposed Halawa Caprock Nonpotable Well, Halawa, Oahu, Hawaii, TMK: 9-9-3: 35

Thank you for reviewing the Draft EA for the proposed Halawa Caprock Nonpotable Well project.

We understand that test pumping and production of water from the proposed well are not anticipated to affect stream flows, stream water quality or spring discharges into the wetlands of Pearl Harbor. We also note your comment that no significant adverse effects to fish and wildlife resources are expected to result from the proposed project. We acknowledge that the Service does not object to the proposed project.

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

Very truly yours,

RAYMOND H. SATO
Manager and Chief Engineer

cc: Bennett Mark, CH2M Hill

RECEIVED
SEP 22 1995

DEPARTMENT OF BUSINESS,
ECONOMIC DEVELOPMENT & TOURISM

Central Pacific Plaza, 220 South King Street, 11th Floor, Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804

Telephone: (808) 586-2355
Fax: (808) 586-2377

BENJAMIN J. CAYETANO
GOVERNOR
SEIJI F. NAYA
DIRECTOR
RICK EGGED
DEPUTY DIRECTOR

May 10, 1995

MEMORANDUM

TO: CH2M HILL
Attn: Bennett Mark

FROM: Shelley M. Mark

SUBJECT: Halawa Caprock Nonpotable Well

Thank you for the opportunity to offer comments on this project. Comments from the State Land Use Commission are enclosed.

Attachment

BENJAMIN J. CAYETANO
GOVERNOR

ESTHER UEDA
EXECUTIVE OFFICER

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

March 30, 1995

Subject: Director's Referral No. 95-039-N
Halawa Caprock Nonpotable Well Draft Environmental Assessment

We have reviewed the subject draft environmental assessment and confirm that the project area, identified as TMK: 9-9-03: por. 35, is within the State Land Use Urban District.

We have no further comments to offer at this time.

EU:LA:th

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU

COPY

RECEIVED
SEP 20 1995

September 19, 1995

Ms. Shelley M. Mark
State of Hawaii
Department of Business, Economic
Development and Tourism
P. O. Box 2359
Honolulu, Hawaii 96804

Dear Ms. Mark:

Subject: Your Letter of May 10, 1995 on the Draft Environmental Assessment (EA) for the Proposed Halawa Caprock Nonpotable Well, Halawa, Oahu, Hawaii, TMK: 9-9-3: 35

Thank you for reviewing the Draft EA for the proposed Halawa Caprock Nonpotable Well project.

We acknowledge that the project area is within the State Land Use Urban District.

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

Very truly yours,

RAYMOND H. SATO
Manager and Chief Engineer

cc: Mr. Bennett Mark, CH2M Hill

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

STATE HISTORIC PRESERVATION DIVISION
33 SOUTH KING STREET, 6TH FLOOR
HONOLULU, HAWAII 96813

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

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
CONSERVATION AND ENVIRONMENTAL AFFAIRS
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION DIVISION
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

LOG NO: 14207
DOC NO: 9504EJ07

April 6, 1995

Mr. Bennett Mark
CH2M Hill
1585 Kapiolani Boulevard, Suite 1420
Honolulu, Hawaii 96814-4530

Dear Mr. Mark:

SUBJECT: Draft Environmental Assessment (DEA) for Halawa Caprock Nonpotable Water, Halawa, Oahu
Halawa, 'Ewa, O'ahu
TMK: 9-9-03:035

Thank you for the opportunity to review the DEA for this project. A review of our records shows that there are no known historic sites at the project location. Because these lands were commercially cultivated with sugar cane for many years and extensive grading has occurred associated with the development of H-1 Freeway and the Aloha Stadium site, it is unlikely that significant historic sites will be found on them. Therefore, we believe that this project will have "no effect" on historic sites.

Thank you for the copy of the report, "Archaeological Reconnaissance Survey of Proposed Halawa Well" by Cultural Surveys Hawaii which has been added to our library.

If you have any questions please call Elaine Jourdane at 587-0015.

Sincerely yours,

DON HIBBARD, Administrator
State Historic Preservation Division

EJ:amk

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU

COPY

RECEIVED
SEP 20 1995

September 20, 1995

Mr. Don Hibbard
State Historic Preservation Division
Department of Land and Natural Resources
State of Hawaii
33 South King Street, 6th Floor
Honolulu, Hawaii 96813

Dear Mr. Hibbard:

Subject: Your Letter of April 6, 1995 on the Draft Environmental Assessment (EA) for the Proposed Halawa Caprock Nonpotable Well, Halawa, Oahu, Hawaii, TMK: 9-9-3: 35

Thank you for reviewing the Draft EA for the proposed Halawa Caprock Nonpotable Well project.

We acknowledge that the proposed project will have "no effect" on historic sites.

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

Very truly yours,

RAYMOND H. SATO
Manager and Chief Engineer

cc: Bennett Mark, CH2M Hill

PLN-68/95

Benjamin J. Cayetano
GOVERNOR

HERMAN M. AIZAWA, PH.D.
Superintendent
[redacted]

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

OFFICE OF THE SUPERINTENDENT

April 11, 1995

Apr 18 3 55 PM '95

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

Dear Mr. Usagawa:

SUBJECT: Draft Environmental Assessment
Halawa Caprock Nonpotable Well
TMK: 9-9-03: por. 35

We have reviewed the subject assessment and have no comment on the proposed construction of a nonpotable well.

Thank you for the opportunity to respond.

Sincerely,

Herman M. Aizawa, Ph.D.
Superintendent

HMA:jml

cc: A. Suga
A. Hokama
B. Mark, CH2M Hill

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU

COPY

April 28, 1995

Mr. Herman M. Aizawa, Superintendent
Department of Education
State of Hawaii
P. O. Box 2360
Honolulu, Hawaii 96804

Dear Mr. Aizawa:

Subject: Your Letter of April 11, 1995 on the Draft Environmental Assessment (EA) for the Halawa Caprock Nonpotable Well, Halawa, Oahu, Hawaii, TMK: 9-9-03: Portion 35

Thank you for reviewing the Draft EA for the proposed Halawa Caprock Nonpotable Well project.

We acknowledge that you have no comments on the proposed project.

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

Very truly yours,

RAYMOND H. SATO
Manager and Chief Engineer

cc: Mr. Bennett Mark, CH2M Hill

D. KALANI J. CAYETANO
GOVERNOR OF HAWAII

LAWRENCE MIKE
DIRECTOR OF HEALTH

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

In reply, please refer to:

December 14, 1994

TO: Those Persons Requesting Comments on Land Use Documents

FROM: June Harrigan-Lum, Manager June Harrigan-Lum
Environmental Planning Office

SUBJECT: Temporary Discontinuance of Land Use Reviews

Because of the lack of funds and resources this year, we are not able to hire someone to coordinate our 1995 legislative activities. As a result, we are using one of our existing staff members to do this work on a full time basis during the legislative session.

The legislative coordinator selected, Mr. Art Bauckham, is also the person who was coordinating the land use reviews and responses. Therefore, starting on January 1, and continuing until May 1, 1995, the Environmental Planning Office (EPO) will not be accepting any land use documents for coordinated replies.

If you would like staff in a specific branch or office (for instance, the Wastewater Branch) to comment on your proposal, you are welcome to contact the staff directly. A list of the Branch/Office names are attached for your reference. If you have already sent a copy of the document to the EPO, and you wish to have us send it to a specific branch, you may call 586-4337 and ask the clerical staff to send it to the appropriate branch. Please describe the document and the date of your cover letter.

Remember, on May 1, 1995 we will again start preparing coordinated responses throughout the Environmental Health Administration.

Thank you for your cooperation and patience in this matter.

Ref: Halawa Caprock Nonpotable Well
Location: Halawa, Oahu
TMK: 9-9-03: 35

4/6/95 - Asked EPO to route EA to Clean Water Branch

Branches and Offices in the Environmental Health Administration

Hazard Evaluation and Emergency Response----------586-4249

Environmental Planning Office--586-4337

Clean Air Branch----------586-4200

Clean Water Branch----------586-4309

Safe Drinking Water Branch-----586-4258

Office of Solid Waste Mgt.-----586-4240

Hazardous Waste Branch----------586-4226

Wastewater Branch----------586-4294

Noise and Radiation Branch-----586-4701

Sanitation Branch----------586-8000

Litter Control Office----------586-8400

Food and Drug Branch----------586-4725

Vector Control Branch----------831-6767

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

P-178/95

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

DEPUTY
GILBERT S. COLOMA-AGARAN

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

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
1151 PUNCHBOWL STREET, ROOM 325
HONOLULU, HAWAII 96813
TEL. (808) 587-0166

March 30, 1995

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

SUBJECT: Draft Environmental Assessment, Halawa Caprock Nonpotable Well, Halawa, Oahu, Hawaii, TMK: 9-9-03:35

Dear Mr. Usagawa:

We have had the opportunity to review the draft environmental assessment regarding the Halawa Caprock nonpotable well and have determined that the project is far removed from any of our concerns. Therefore, the proposed project will not affect our programs. Thank you for the opportunity to comment.

Very truly yours,

Michael G. Buck
Administrator

cc: Oahu DOFAW
OCEA

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU

COPY

May 9, 1995

Mr. Michael G. Buck, Administrator
Division of Forestry and Wildlife
Department of Land and Natural Resources
State of Hawaii
1151 Punchbowl Street, Room 325
Honolulu, Hawaii 96813

Dear Mr. Buck:

Subject: Your Letter of March 30, 1995 on the Draft Environmental Assessment (EA) for the Proposed Halawa Caprock Nonpotable Well, Halawa, Oahu, Hawaii, TMK: 9-9-03: Portion 35

Thank you for reviewing the Draft EA for the proposed Halawa Caprock Nonpotable Well project.

We acknowledge that you have no objections to the proposed project.

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

Very truly yours,

RAYMOND H. SATO
Manager and Chief Engineer

cc: Bennett Mark, CH2M Hill

PLN-105/95

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

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

JUN -7 1995

MICHAEL D. WILSON
CHAIRPERSON

ROBERT S. NAKATA
ROBERT G. GIRALD
DAVID A. NOBRIGA
LAWRENCE H. MIKE
RICHARD H. COX

RAE M. LOUI, P.E.
DEPUTY

JUN 14 9 05 AM '95

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

Dear Mr. Usagawa:

Halawa Caprock Nonpotable Well

We have received the Draft Environmental Assessment for the captioned proposed well, and offer the following comments.

Please note that, while the caprock is considered part of the Waimalu Aquifer System from an administrative standpoint, it is not hydrologically included in the estimated sustainable yield of 45 mgd. This aquifer system is consequently "overallocated" by over 8 mgd. The EA identifies (p.2-6 and 4-5) 1990 BWS withdrawals equal to the sustainable yield and adds that total withdrawals exceeded it by over 9 mgd. As a practical matter, caprock withdrawals should not be counted against the estimated sustainable yield. When this matter appears before the Commission on Water Resource Management for relevant permits, it would be beneficial for you to make a separate accounting of withdrawals from these "separate" sources.

The EA states incorrectly (p.2-4) that the last water management area was designated in March 1993. The March 1993 action merely separated the Ewa Caprock Aquifer from the basal aquifers of the Pearl Harbor Groundwater Management Area. The Windward Sector and the Island of Moloka'i, designated effective July 15, 1992, were the last two areas to be designated by the Commission. The EA also suffers a typo that links three Pearl Harbor aquifers with six Honolulu aquifers (p.2-6). We believe the quote (p.4-5) of about 12 mgd additional withdrawals by private operators is also erroneous.

If you have any questions, please call Charley Ice at 587-0251.

Sincerely,

RAE M. LOUI
Deputy Director

Cl:ss

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU

COPY

July 12, 1995

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

Dear Ms. Loui:

Subject: Your Letter of June 7, 1995 on the Draft Environmental Assessment (EA) for the Proposed Halawa Caprock Nonpotable Well, Halawa, Oahu, Hawaii, TMK: 9-9-3: 35

Thank you for reviewing the Draft EA for the proposed Halawa Caprock Nonpotable Well project.

We note your comment that the caprock is not included in the sustainable yield for the Waimalu Aquifer System and should not be counted against the estimated sustainable yield. We will ensure that this is made clear when the permit application for this project is submitted to the Commission on Water Resource Management.

We acknowledge your comment regarding the designation date of the Windward Sector and the Island of Molokai as a Groundwater Management Area. The statement regarding the Pearl Harbor and Honolulu aquifers and the reference to the estimated additional withdrawals by private operators will be revised in the final EA.

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

Very truly yours,

BARRY USAGAWA

cc: Bennett Mark, CH2M Hill

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

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MAY 02 1995

JEREMY HARRIS
MAYOR

CHERYL D. SOON
CHIEF PLANNING OFFICER

CAROLL TAKAHASHI
DEPUTY CHIEF PLANNING OFFICER

TH 3/95-0618

April 27, 1995

MEMORANDUM

TO: RAY SATO, MANAGER AND CHIEF ENGINEER
BOARD OF WATER SUPPLY

ATTN: BARRY USAGAWA

FROM: CHERYL D. SOON, CHIEF PLANNING OFFICER
PLANNING DEPARTMENT

SUBJECT: DRAFT ENVIRONMENTAL ASSESSMENT (DEA) FOR THE PROPOSED HALAWA CAPROCK NONPOTABLE WELL, HALAWA, OAHU, HAWAII, TAX MAP KEY: 9-9-03: 35

In response to CH2M Hill's letter of March 27, 1995 we have reviewed the subject DEA and offer the following comments:

We have no objections to the proposed project. Development and use of nonpotable water sources supports objectives and policies in the City's General Plan relating to maintaining an adequate supply of water for residents and visitors.

We concur that if the proposed well is developed into a nonpotable water production well, a Development Plan Public Facilities Map amendment will be required.

Thank you for the opportunity to comment on this matter. Should you have any questions, please contact Tim Hata of our staff at 527-6070.

CHERYL D. SOON
Chief Planning Officer

CDS:js

cc: Bennett Mark, CH2M Hill

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU

COPY

May 22, 1995

TO: CHERYL D. SOON, CHIEF PLANNING OFFICER
PLANNING DEPARTMENT

FROM: RAYMOND H. SATO, MANAGER AND CHIEF ENGINEER
BOARD OF WATER SUPPLY

SUBJECT: YOUR MEMORANDUM OF APRIL 27, 1995 REGARDING THE DRAFT ENVIRONMENTAL ASSESSMENT (EA) FOR THE PROPOSED HALAWA CAPROCK NONPOTABLE WELL, TMK: 9-9-03: 35

Thank you for reviewing the Draft EA for the proposed Halawa Caprock Nonpotable Well project.

We acknowledge that you have no objections to the proposed project.

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

cc: Bennett Mark, CH2M Hill

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

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JEREMY HARRIS
MAYOR

KENNETH E. SPRAGUE
DIRECTOR AND CHIEF ENGINEER

DARWIN J. HAMAMOTO
DEPUTY DIRECTOR

ENV 95-127

April 10, 1995

MEMORANDUM:

TO: RAYMOND SATO, MANAGER AND CHIEF ENGINEER
BOARD OF WATER SUPPLY

FROM: KENNETH E. SPRAGUE
DIRECTOR AND CHIEF ENGINEER

SUBJECT: DRAFT ENVIRONMENT ASSESSMENT (DEA)
HALAWA CAPROCK NONPOTABLE WELL
TAX MAP KEY: 9-9-03: 35

We have reviewed the subject DEA and wish to inform you that the Halawa Stream makai of H-1 is not part of the Municipal Separate Storm Sewer System and, therefore, no discharge permit is required by the Department of Public Works during pump testing.

Should you have any questions, please contact Mr. Alex Ho, Environmental Engineer, at 523-4150.

cc: CH2M Hill (Bennett Mark)

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU

COPY

May 9, 1995

TO: KENNETH E. SPRAGUE, DIRECTOR AND CHIEF ENGINEER
DEPARTMENT OF PUBLIC WORKS

FROM: RAYMOND H. SATO, MANAGER AND CHIEF ENGINEER
BOARD OF WATER SUPPLY

SUBJECT: DRAFT ENVIRONMENTAL ASSESSMENT (EA) FOR THE PROPOSED HALAWA CAPROCK NONPOTABLE WELL, HALAWA, OAHU, HAWAII
TMK: 9-9-03: POR. 35

Thank you for reviewing the Draft EA for the proposed Halawa Caprock Nonpotable Well project.

We acknowledge that a discharge permit is not required during pump testing because the Halawa Stream makai of H-1 is not part of the Municipal Separate Storm Sewer System.

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

cc: Bennett Mark, CH2M Hill

PLN-85/95

University of Hawai'i at Mānoa

Environmental Center
A Unit of Water Resources Research Center
Crawford 317 • 2550 Campus Road • Honolulu, Hawai'i 95822
Telephone: (808) 956-7361 • Facsimile: (808) 956-3980

May ~~April~~ 7, 1995
EA:0117

MAY 12 8 59 AM '95

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

Dear Mr. Usagawa:

Draft Environmental Assessment (EA)
Halawa Caprock Nonpotable Well
Halawa, Oahu

The City and County of Honolulu Board of Water Supply (BWS) proposes to drill and case a nonpotable water well in Halawa within the H-1/Moanalua Road interchange near Aloha Stadium. The well is expected to be capable of yielding .2 million gallons per day (mgd) of nonpotable water. If quantity and quality prove suitable, then the BWS will convert the well into a production well.

We reviewed the Draft Environmental Assessment (EA) with the assistance of Dave Penn, Geography; and Paul Berkowitz of the Environmental Center.

Conflict of Interest

Once again, it seems inappropriate for the approving agency to review their own application. It is hard to imagine that the inherent conflict of interest has no effect on the determination.

Foreshortened Public Review

In comparison to previous well projects, the BWS takes a different approach to the Halawa Nonpotable Well. Instead of preparing separate EAs for the exploratory and production phases, this document intends to encompass both phases. The problem with this approach is that if pump tests prove successful and permanent installation ensues, then the environmental review process is eliminated at a critical stage in the project. Before pump tests are conducted, much of the information required to make an effective environmental assessment is unknown. Therefore if no EA is prepared after the initial exploration, the public never receives the necessary information to evaluate the action properly.

This problem could be circumvented if the BWS specified precise criteria or standards for converting exploratory wells into production wells. For the Halawa Nonpotable Well, no such standards are provided: the BWS simply states that if the well is "suitable" in terms of quantity and quality, it will go into production. We believe the document ought to explicitly define what is meant by the term "suitable."

Sustainable Yield

On page 4-5, the aquifer's sustainable yield is listed as 45 million gallons per day (mgd). In the same paragraph, current use is stated as 54.01 mgd, or approximately 9 mgd higher than the sustainable yield estimate. Furthermore, records from 1990 list the following uses from Waimalu Aquifer: BWS, 45.03 mgd; U.S. Navy, 7.03 mgd; private users, 11.99 mgd; and Sumida Farms, 6.0 mgd. These 1990 figures add to approximately 70 mgd. How is it that these figures do not sum to the stated total use of 54.01 mgd? This inconsistency needs to be clarified.

In either case, since use figures exceed the sustainable yield, it seems that an evaluation of excessive pumping should be included. What will be the effects on future water availability if use continues to exceed sustainable yield? How might groundwater quality be impacted? Will salt water intrusion occur?

Section 2.5 states that "the impact of development of additional sources of nonpotable groundwater in this area was analyzed in a separate 1984 study." Rather than merely citing that the analysis has been performed, the results of the analysis need to be mentioned. A properly comprehensive, stand-alone EA should disseminate this type of information to the public as evidence and analysis relevant to the determination of potential project significance.

The document fails to list to amount of permitted use allocated by the State Water Commission. These data would serve as an important comparison to current use figures and sustainable yield estimates.

Finally, in terms of data, the BWS presents 1990 information. Given the rapid pace of change on Oahu, these figures ought to be updated to the present.

Cultural Considerations

A tremendous difference exists between an archaeological survey, as was performed for this EA, and a cultural resource assessment, which ought to be performed for every EA. The terse history of the property indicates that it may have contained taro patches, indicating potential ties with Hawaiian families, beliefs, and practices which may be impacted by the proposed action. Simply because there are no "sites" does not mean that it is culturally insignificant and immune from harm.

Effects on Local Hydrology

Aside from the stated geologic generalizations, is there any other evidence to further support the assertion that the Waimalu aquifer in the proposed project vicinity does not affect measurable flow in Halawa Stream and the Pearl Harbor estuarine areas?

Miscellaneous Water Resource Issues

How much existing potable irrigation water is being used within the subject nonpotable water system and other BWS systems? The savings of potable groundwater proposed on page 1-3 should be quantified and qualified: it is not clear where this potable water is coming from, what system it is distributed in, and where it is used.

The EA ought to explain why Kalauao springs and Waimalu Wells I and II were not used in 1990 and should indicate if and how the situation has changed. What is the additional capacity of these sources, and have permits been issued for them?

The identification of Kalauao springs as a non-potable source may require further explanation. The water is potable if properly collected at the source.

If Halawa Well does not go into production, could it be maintained as a monitoring well instead of being capped?

What is the land title status of the federally-owned Naval Reservation adjacent to the proposed well site? If another well were developed on that land close to the proposed Halawa Well, what would be the potential for interference between the two?

What are the contractual agreements between the BWS and DOT concerning use of the site and delivery of the water? What does DOT charge for the site? What does BWS charge for the water?

Conclusion

We have raised many issues, but our main concern focuses on the impacts of the proposed project on the Waimalu Aquifer. With present use already exceeding sustainable yield estimates, the BWS should discuss how the proposed action will affect future water availability and quality. Also, given that a single EA will cover both the exploratory and production phases, we are concerned that public input will be left out of the decision-making process. Before continuing with this project, we believe these issues, as well as the other issues related to local hydrology and culture, should be addressed.

Thank you for the opportunity to review this Draft EA.

Sincerely,

John T. Harrison
Environmental Coordinator

cc: OEQC
CH2M Hill
Roger Fujioka
Dave Penn
Paul Berkowitz

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU

COPY

RECEIVED
SEP 19 1995

September 15, 1995

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

Dear Mr. Harrison:

Subject: Your Letter of April 7, 1995 on the Draft Environmental Assessment (EA) for the Halawa Caprock Nonpotable Well, Halawa, Oahu, Hawaii, TMK: 9-9-03: Portion 35

Thank you for reviewing the Draft EA for the proposed Halawa Caprock Nonpotable Well project. We have the following responses to your comments:

1. Conflict of Interest: In the EA review process, the State's Environmental Impact Statement (EIS) law and the Department of Health's administrative rules are clear that for agency actions, the agency is required by law to determine the need (or lack thereof) for an EIS. Both the law and the administrative rules were established to assure that environmental concerns are given appropriate consideration in the decision making process.

2. Limited Public Review: The BWS is following the EA process as required both by the EIS law and the Department of Health's administrative rules for this project. The BWS is satisfied that by following the requirements of the law and the administrative rules in the preparation of this EA, appropriate consideration will be given to all agency and public comments prior to the determination on whether or not an EIS is required.

   The exploratory and possible production phases of this project were included in the draft EA so that all phases of this project, including its possible conclusion, are adequately disclosed. The administrative rules governing the preparation of an EA indicate that a proposed action should be considered in its entirety, and not on an incremental basis. This EA, because it addresses both the exploratory and production phases of this project, is consistent with

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU

COPY

the intent of these administrative rules. It should be noted that only if the pump tests are successful, will there be a consideration for a permanent installation. Because this well project would result in a new facility where none presently exists, other impacts such as access, traffic and visual impacts of a production station have to be addressed in a facility EA. If test pumping indicates project feasibility, another EA will be conducted.

3. Sustainable Yield: The Halawa Caprock well will not impact or factor in the Waimalu aquifer's sustainable yield limit because the well will capture caprock water perched above the basal aquifer hydraulically separated by impermeable layers. As a result, caprock sources should be accounted separately. Possible impacts to Halawa Stream and the Pearl Harbor estuary are not expected and are discussed in Section 4.3.3.

4. Cultural Resources: The BWS is satisfied that the cultural resource analysis done for this project by Cultural Surveys Hawaii was appropriate for this project, and that no cultural sites of significance will be adversely affected. The absence of adverse impacts to the cultural resources surrounding Halawa Stream are described in Section 4.3.3 of the EA. The State Historic Preservation Division of the State Department of Land and Natural Resources determined that this project would have "no effect" on historic sites, because the lands were commercially cultivated with sugar cane for many years and because of the extensive grading that has occurred with the development of the H-1 Freeway and the Aloha Stadium which completely surrounds this site.

Miscellaneous Water Resource Issues

5. If the Halawa nonpotable well is put into production, it would reduce by 0.2 million gallons per day (mgd) the amount of potable water now being used within the Halawa and Airport areas for landscape irrigation.

6. Kalauao Springs was not operating in 1990 because it was not activated as a nonpotable water source until 1991. Kalauao Springs is now being used as a nonpotable water source for the highway landscaping irrigation system between Halawa and Lagoon Drive including the Honolulu Airport and eventually the Navy-Marine and Hickam Golf Courses.

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU

COPY

7. The main factor for determining the suitability of a nonpotable groundwater source for irrigation of grasses and plants is its salinity. Experience in Hawaii indicates that grasses and plants tolerate low amounts of chlorides in brackish water. The BWS has selected a chloride level of 500 to 600 parts per million as the upper limit of tolerance for the plants and grass to be irrigated. If the quantity and quality of the nonpotable water is not suitable for highway landscape irrigation to supplement the Kalauao Spring, the well will be sealed and capped. If the well is not put into production, the BWS does not intend to maintain the facility as a monitoring well at this time because of the shallow depth necessary to capture caprock water.

8. Section 4.1 describes the land tenure of the surrounding area. As indicated in Section 3.1, a 5.154-acre parcel within the highway interchange north of the proposed well site is a remnant parcel that was formerly a portion of the U.S. Naval Reservation, and is still owned by the U.S. government. A tax map showing this parcel is shown in Appendix A.

9. There are no contractual agreements between the BWS and the Department of Transportation for this well site. If the exploratory well is deemed feasible for production, discussion on any agreements may occur at that time. The current BWS nonpotable water rate is $0.99 per thousand gallons. This rate does not supersede existing nonpotable quantity charge agreements.

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

Very truly yours,

RAYMOND H. SATO
Manager and Chief Engineer

cc: Bennett Mark, CH2M Hill