

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU

630 SOUTH BERETANIA STREET

HONOLULU, HAWAII 96843



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June 13, 1995 ⁹⁵ JUN 13 P3:15

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Manager and Chief Engineer

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

Dear Mr. Gill:

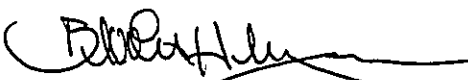
Subject: Negative Declaration for the Proposed Kapalama Exploratory Wells,
TMK: 1-6-22: 07, Kapalama, Honolulu, Oahu, Hawaii

The Board of Water Supply has reviewed the comments received during the public comment period which began on February 23, 1995. We have determined that the environmental impacts of this 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 June 23, 1995 OEQC Bulletin as a Negative Declaration.

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

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

Very truly yours,


FOR RAYMOND H. SATO
Manager and Chief Engineer

Attachment

1995-05-23-0A-*FEA-Kapalama Exploratory Wells* JUN 23 1995

FINAL ENVIRONMENTAL ASSESSMENT

**KAPALAMA
EXPLORATORY WELLS**

KAPALAMA, HONOLULU, OAHU, HAWAII
TAX MAP KEY: 1-6-22:07

PROPOSING AGENCY:
CITY AND COUNTY OF HONOLULU
BOARD OF WATER SUPPLY



Submitted pursuant to Chapter 343, Hawaii Revised Statutes

JUNE 1995

CH2M HILL

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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 two exploratory water wells at an undeveloped site near the lower edge of Kamehameha Schools' grounds near its Makuakane Street entrance in Kapalama. These two exploratory wells will be drilled within an existing 1.023-acre BWS site located at the *makai* edge of the Kamehameha Schools campus. The site is located about 3/8-mile *mauka* of the intersection of Likelike Highway and School Street. Each of the two wells is expected to be capable of yielding about 1.0 million gallons per day (mgd) of potable water, for a total of about 2.0 mgd.

The drilling and casing of these two exploratory wells is one step in a process that the BWS utilizes to obtain hydrogeological data on the potential of new groundwater resources. After the two exploratory wells have been drilled and cased, test pumping of the wells will be performed to determine if the quantity and quality of the water from these two exploratory wells are suitable for development. If the quantity and quality of the water are suitable, it may be possible to convert both of these two exploratory wells to production wells. Water from each of the two wells will be evaluated individually; if either well proves to be unsuitable, that exploratory well will be sealed and/or capped.

This environmental assessment focuses primarily on the drilling, casing, and testing of these two exploratory wells. The proposed action will also include the temporary installation of pumps, piping, and appurtenances. All construction work will be within the BWS's existing 1.023-acre Kapalama site.

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 county lands or funds must comply with Chapter 343, HRS. Environmental compliance pursuant to Chapter 343, HRS, is required because the exploratory well will be located within property under the jurisdiction and ownership of the BWS, and will be constructed with BWS funds.

A final environmental assessment and an accompanying Negative Declaration by the 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 Permits Required

An amendment to the City and County of Honolulu Development Plan Public Facilities Map will not be required for the drilling and testing of the exploratory wells. If the well tests are successful, the wells will be converted into production wells. Production wells will require an application for a Development Plan Public Facilities Map amendment to the City and County of Honolulu Department of General Planning and will require approval by the City and County of Honolulu City Council. Exploratory wells are considered minor and are not required to be shown on the Development Plan Public Facilities Map.

Well construction, pump installation, and water use permits will be required from the Commission on Water Resource Management (CWRM).

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

1.4 Benefits of this Project

The proposed exploratory well will furnish valuable data that will be added to Oahu's island-wide hydrogeological information base. This data will be valuable in estimating the quantity and quality of the groundwater resources available at this site, and—in combination with data from other wells—ultimately for the entire island. If the hydrogeological data shows that additional groundwater sources can be developed successfully at this site, these two exploratory wells may be converted to permanent potable water wells.

If the exploratory wells are converted into permanent production wells, they would be part of a major water development project that will integrate new groundwater sources into the Honolulu water system. The development of additional water sources is necessary in order to accommodate the growing demand for 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. This project is part of an overall groundwater development program intended to increase the municipal water supply to meet growing demand. If the BWS's new water source program is curtailed, the BWS would not be able to provide adequately for the water needs of the future population of the island, which 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, and would have substantially similar environmental outcomes and higher development costs because of inflation. Delay in the proposed well testing program would increase the risk that the growth in population will lead to water demands in excess of available supplies.

This environmental assessment analyzes one of many possible potable groundwater source sites in the Honolulu Sector, where virtually all of the prime groundwater sources are under restricted allocations of the CWRM. These alternative sites offer opportunities as new groundwater supply sources, but are considered by the BWS to be additions, rather than alternatives, to the proposed well testing program. For the Honolulu Sector, the BWS analyzed 21 potential sites for additional potable wells within the Honolulu Sector in its *Regional Environmental Impact Assessment for Development of Wells, Reservoirs, Transmission Lines and Appurtenances at Honolulu, Hawaii* (1984).

This 1984 BWS study evaluated the potential for an additional potable groundwater well at the Jonathan Springs well site in the Kalihi Aquifer. Two potential well sites in the Kalihi Aquifer were evaluated for possible use as non-potable groundwater sources; one potential non-potable groundwater well site was evaluated at the Palama Settlement Caprock Well site and three potential non-potable groundwater sites were evaluated in the Kalakaua School Caprock Well site. The three locations for non-potable groundwater wells within the Kalakaua School Caprock Well site were situated at Kalakaua Intermediate School, Farrington High School, and the BWS's Kalihi Pump Station.

Alternative source development was analyzed by the BWS in its 1984 study, where potential potable water source alternatives other than groundwater were evaluated, including desalinization, the development of surface and brackish water sources, and the recycling of treated wastewater. Typically these alternative sources have considerably higher costs and technical challenges. For instance, the use of surface water such as from Kapalama Stream has a high potential for health and safety problems, and would require a costly water treatment works. The development of these alternatives was not considered as feasible as the development of groundwater resources.

1.6 Potential Impacts of this Project and Mitigation Measures

Construction work, primarily the drilling of the exploratory well, will cause minor short-term noise and air pollution impacts to the adjacent residences and nearby school buildings. 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 operating condition and will be repaired or replaced as needed. For

the drilling, operations will be restricted to the hours of 7:30 am to 3:30 pm, on weekdays, and will exclude State holidays. Temporary surface pumps may be installed with mutes, or submersible pumps, which will reduce the pump noise considerably, may be used for the test pumping.

To mitigate the effects of site clearing, grading, and construction activities on the nearby school buildings and adjacent residences, dust control measures, such as water sprinkling and dust screens, will 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, Chapters 59 and 60, regarding Air Pollution Control.

Water from the test pumping will be discharged into the existing storm drainage system in Makuakane Street. It is expected that the water that will be discharged will be clean and therefore will not introduce any pollutants into the environment. The existing storm drainage system leads into Kapalama Stream. Care will be taken in disposing of the test water to preclude the possibility of flushing debris or resuspending sediments and other pollutants in Kapalama Stream.

If the test pumping results indicate that the quality or quantity of the water from either or both of the two exploratory wells is unsatisfactory, the unsatisfactory exploratory well (or wells) will be capped and/or sealed to prevent malicious or accidental contamination of the underlying groundwater aquifers.

A National Pollution Discharge Elimination Permit (NPDES) Permit is not required for the discharge of water from well test pumpings and is currently not regulated by the State DOH. However, a Best Management Practices (BMP) plan will be implemented. This will include carefully disposing the test water to preclude the possibility of flushing debris or resuspending sediments and other pollutants in Kapalama Stream.

There is no potential for either exploratory or production wells at this site to adversely impact the three wetland areas in the Honolulu Sector: Paiko Lagoon, Diamond Head Crater, and Kaaui Crater. No significant impacts are anticipated because of the great distances separating the well site from the wetlands and because the wetlands are not located in the same aquifer system as the site for the two wells.

The identified minor adverse impacts can be appropriately mitigated. There are substantial potential benefits that can be provided in terms of potable water supplies from the Kapalama Exploratory Wells, if they are converted to production wells.

1.7 Determination

In accordance with Chapter 343, HRS, the BWS has determined that an EIS is not required for the construction and test pumping of the Kapalama Exploratory Wells.

This determination that the construction and test pumping of the Kapalama Exploratory Wells will not require an EIS has been made based primarily on the short duration of the project and because whatever minor adverse impacts that may result from this project may be minimized to insignificant levels with the application of the recommended mitigation measures.

If the results of the test pumping of the Kapalama Exploratory Wells show adequate quality and quantity of water available for development, the BWS anticipates filing a subsequent EA and determination that an EIS is not required for the construction of the production wells.

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

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

City and County of Honolulu Agencies

- Planning Department
- Land Utilization Department

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

Federal Agencies

- U.S. Army Corps of Engineers, Pacific Ocean Division
- U.S. Department of the Interior
 - Fish and Wildlife Service
 - Geological Survey, Water Resources Division

State of Hawaii Agencies

- Department of Agriculture
- Department of Business, Economic Development, and Tourism
- 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

City and County of Honolulu Agencies

- Planning Department
- Land Utilization Department
- Public Works

Others

- City Council District 6 Member Jon Yoshimura
- Kamehameha Schools/Bishop Estate
- Liliha/Kapalama Neighborhood Board Chair Curtis Won
- Sierra Club, Hawaii Chapter
- Castle and Cooke, 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. In 1992, the CWRM, Department of Land and Natural Resources (DLNR), 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 potable groundwater on Oahu in Honolulu, within the Kalihi Aquifer (see Figure 2-1).

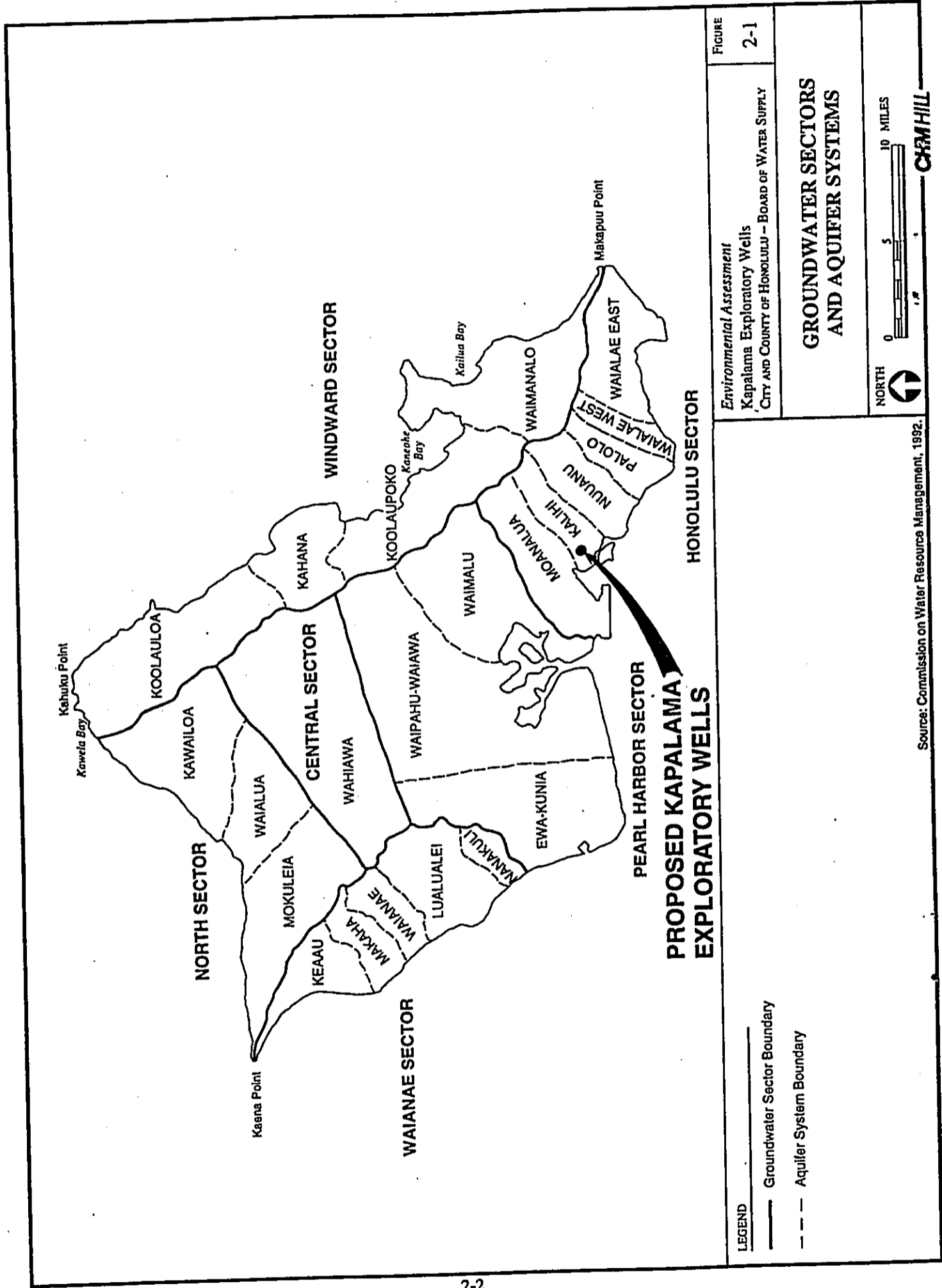
The Kapalama Exploratory Wells, which will consist of two exploratory wells, is a proposed BWS well project within the Honolulu Sector, Kalihi Aquifer. If the tests for the quantity and quality of the groundwater from the two exploratory wells prove to be successful, the BWS intends to convert these wells to production wells and integrate them into the BWS's Honolulu potable water source, storage, and transmission system. If converted to a production well, each of the two wells within the Kapalama Exploratory Well site is expected to be able to yield about 1.0 mgd of potable water, for a total of 2.0 mgd.

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

The State Water Code and a Commission on Water Resource Management was established in 1987 by the Hawaii State Legislature in Section 174-C of the 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): Honolulu, Pearl Harbor, Waianae, Central, North, and Windward. Currently, all sectors except the Waianae Sector have been designated as "groundwater management areas." The Windward Sector, which became a groundwater management area in March 1993, is the last sector to be included as a "groundwater management area" (*personal communications with Lenore Nakama, CWRM, May 12, 1994*).

Each groundwater sector is divided into aquifers. The Honolulu Sector covers an approximately 84-square-mile region that extends from Makapuu Point northwestward about 18 miles to Moanalua. The Honolulu Sector is generally bounded at its northeast edge by the ridge of the Koolau Mountains and extends in the southwestward direction for 2 to 7 miles down to the shoreline. From east to west, the Honolulu Sector is divided into the Waialae East, Waialae West, Palolo, Nuuanu, Kalihi, and Moanalua aquifers.

The Kalihi Aquifer is located near the western edge of the Honolulu Sector between the Moanalua and Nuuanu aquifers. The Kalihi Aquifer is about 2 miles wide and extends from the Koolau Mountain ridge down to the coastline near Honolulu Harbor and Sand Island, a distance of about 7 miles. The Kapalama Exploratory Wells are proposed to be located in lower portion of the Kalihi Aquifer near the base of Kapalama Heights, about 3/8-mile *mauka* of the intersection of Likelike Highway and School Street.

2.4 Sustainable Yield and Honolulu Water Management Area

In order to evaluate the impacts of developing permanent potable groundwater source(s) on this site, the sustainable yield of the underlying aquifer system, as estimated by DLNR, must be taken into account. Sustainable yield is the amount of groundwater that can be removed from an aquifer over a period of many years without the development of 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 of the amount of fresh groundwater that 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 the degree of aquifer confinement, lens thickness, the degree of agricultural and urban development, and numerous other factors.

At 53 mgd, the Honolulu Water Management Area (WMA) has the third highest estimated sustainable yield of all of the Oahu aquifer system sectors. The highest estimated sustainable yield of 184 mgd occurs in the Pearl Harbor WMA and the second highest sustainable yield of 99 mgd occurs in the Windward Sector. The Honolulu WMA is also heavily utilized for municipal water use. In 1990, 40.66 mgd—or more than one-fourth of BWS's total usage of 156 mgd—was taken from the Honolulu WMA.

The OWMP notes that the Honolulu WMA's total estimated sustainable yield of 53 mgd is distributed among the six aquifers that constitute the Honolulu sector as follows: Waialae East Aquifer, 2 mgd; Waialae West Aquifer, 4 mgd; Palolo Aquifer, 5 mgd; Nuuanu Aquifer, 15 mgd; Kalihi Aquifer, 9 mgd; and Moanalua Aquifer, 18 mgd.

In 1990, groundwater withdrawals from the Honolulu WMA were reported by the CWRM to be 46.29 mgd, or about 87 percent of the sustainable yield of 53 mgd for this WMA. The 46.29 mgd of groundwater withdrawn in 1990 from the six aquifers in the Honolulu WMA was distributed as follows: Waialae East and Waialae West aquifers, 0.78 mgd; Palolo Aquifer, 6.76 mgd; Nuuanu Aquifer, 16.77 mgd; Kalihi Aquifer, 9.91 mgd; and Moanalua Aquifer, 12.07 mgd.

In 1990, the average water withdrawn from the Kalihi Aquifer was 9.91 mgd, which is nearly 1 mgd higher than this aquifer's estimated sustainable yield of 9 mgd.

2.5 Potential Areas for Water Source Development within Honolulu

According to the OWMP report, there is potential for developing additional potable water sources in the high level areas in Honolulu. The purpose of the Kapalama Exploratory

Wells is to determine if the development of additional potable water sources in the Kapalama-Kamehameha Heights area of the Kalihi Aquifer is feasible.

The OWMP report also states that virtually all of the prime groundwater sources in the Honolulu aquifers have been developed and are under restricted allocations of the CWRM and that the development of new sources in the Honolulu aquifers will require efforts to reallocate existing potable water supplies.

The impact of development of additional sources of potable groundwater in Honolulu was done in a separate study entitled *Regional Environmental Impact Assessment for Development of Wells, Reservoirs, Transmission Lines and Appurtenances at Honolulu, Hawaii* (BWS, 1984).

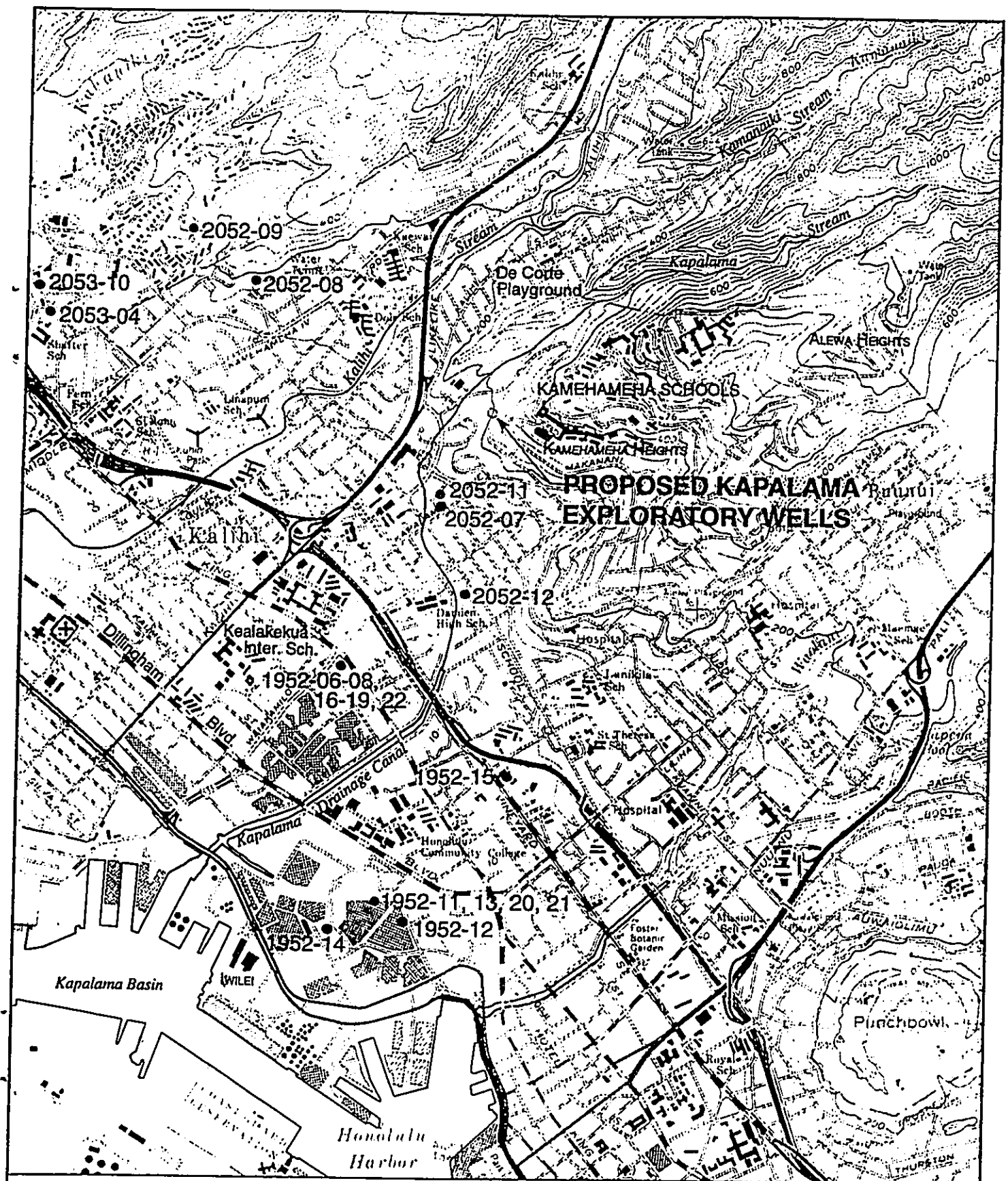
2.6 Existing Water Sources

According to OWMP, the Kalihi Aquifer facilities consists of 18 wells (see Figure 2-2). Nine wells are operated by six different private entities and nine are operated by the BWS. Of the nine wells operated by the BWS, eight wells are located at the Kalihi Pump Station and one well is located at Jonathan Springs. The nine wells owned by private entities include: four wells operated by Castle and Cooke at the Dole Cannery; a presently under-utilized well held by Del Monte Cannery; an unused well held by the Honolulu Gas Company in Iwilei; a presently unused well in the basement of a building in Palama Settlement; and two wells operated by Kamehameha Schools in Kapalama. Further information on the BWS's water system in the Honolulu Sector and Kalihi Aquifer may be found in the *Regional Environmental Impact Assessment for Development of Wells, Reservoirs, Transmission Lines and Appurtenances at Honolulu, Hawaii*, 1984.

Records for the Kalihi Aquifer for 1990 indicate that the BWS withdrew a total of about 8.43 mgd from its nine wells, while private users withdrew a total of about 1.56 mgd from the remaining nine wells, for a total of about 10 mgd. The CWRM has set the authorized water use for the Kalihi Aquifer System at 12.2 mgd, more than 3 mgd above the estimated sustainable yield for this aquifer.

2.7 Potential for Reallocation of CWRM Permitted Uses within the Kalihi Aquifer

In order for the Kapalama Exploratory Wells to be converted to production wells, a reallocation of CWRM-permitted use from existing wells within the Kalihi Aquifer to the Kapalama Exploratory Wells may be necessary. The reallocation of existing CWRM-permitted use to the Kapalama Exploratory Wells may be possible as large-scale agricultural activities on Oahu continue to decline. This decline will result in a reduction of water required for processing the agricultural products at the commercial canneries at Iwilei in the Kalihi Aquifer. The reduction of commercial cannery water use at Iwilei would make




Well Number	Well Name
1952-06-08, 16-19, 22	Kalihi Pump Station
1952-11, 13, 20, 21	Castle and Cooke, Dolc Cannery
1952-12	Del Monte Cannery
1952-14	Honolulu Gas Co.
1952-15	Palama Settlement
2052-07	Kamehameha Schools
2052-11	Kamehameha Schools
2052-12	Jonathan Springs

Environmental Assessment
 Kapalama Exploratory Wells
 CITY AND COUNTY OF HONOLULU - BOARD OF WATER SUPPLY

FIGURE
 2-2

**PROPOSED KAPALAMA
 EXPLORATORY WELLS**

NORTH
 0 2000 4000 FEET

CH2M HILL

available for reallocation the CWRM-permitted water use now held by the privately operated cannery wells at Iwilei to the BWS for use elsewhere in the Kalihi Aquifer. Reallocating this "freed" CWRM-permitted water use to the BWS could allow the Kapalama Exploratory Wells to be converted to production wells.

Castle and Cooke, Inc. has four Dole Cannery wells in Iwilei that have a CWRM-permitted water usage of 2.0 mgd, but were utilizing 1.27 mgd in 1990. One additional private well in Iwilei operated by the Del Monte Corporation has a CWRM-permitted water usage of 0.24 mgd that was utilizing 0.09 mgd in 1990. The combined total of CWRM-permitted use from both the four Dole Cannery wells and the one Del Monte well is 2.24 mgd.

If the Kapalama Exploratory Wells are to be converted to production wells, it may require that nearly all of the CWRM-permitted use of 2.24 mgd from the Dole Cannery wells and the one Del Monte well in Iwilei be reallocated to the Kapalama Exploratory Wells. The expected yield of the Kapalama Exploratory Wells is 2.0 mgd.

2.8 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 of Oahu. 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).

Within the Kalihi Aquifer, the BWS's *Regional Environmental Impact Assessment for Development of Wells, Reservoirs, Transmission Lines and Appurtenances at Honolulu, Hawaii*, proposed the following: an additional potable groundwater well at the Jonathan Springs Well site; two sites for nonpotable groundwater wells, one at the Kalakaua School Caprock Well site and one at Palama Settlement; and an additional transmission pipeline along Dillingham Boulevard.

Chapter 3 Project Description

3.1 Location and Site Characteristics

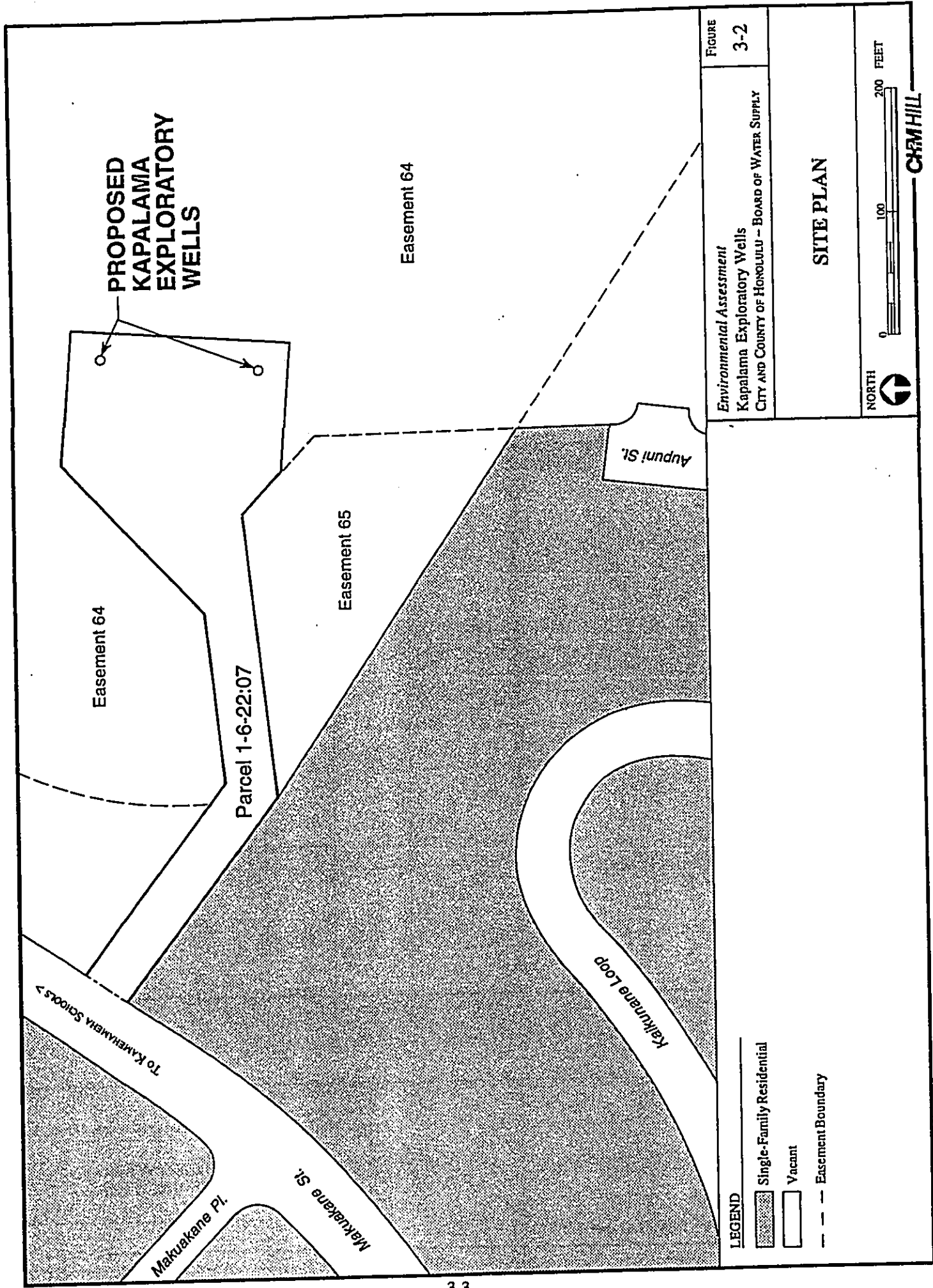
The proposed project is located in Kapalama on the leeward coast of Oahu, near the lower edge of the grounds of Kamehameha Schools' Makuakane Street entrance. The BWS site is located along the lower slopes of Kamehameha Heights, about 400 to 500 feet southeast of Kapalama Stream, and at an elevation of about 200 feet above mean sea level (msl). The site is about 3/8 mile *mauka* of the intersection of Likelike Highway and School Street. The two proposed exploratory wells are to be located within the BWS's existing 1.023-acre site, identified by Tax Map Key 1-6-22:07 (see Figure 3-1). The 1.023-acre site is located within a larger perpetual easement at the foot of Kamehameha Heights that was granted by Bishop Estate to the City and County of Honolulu BWS for underground water development.

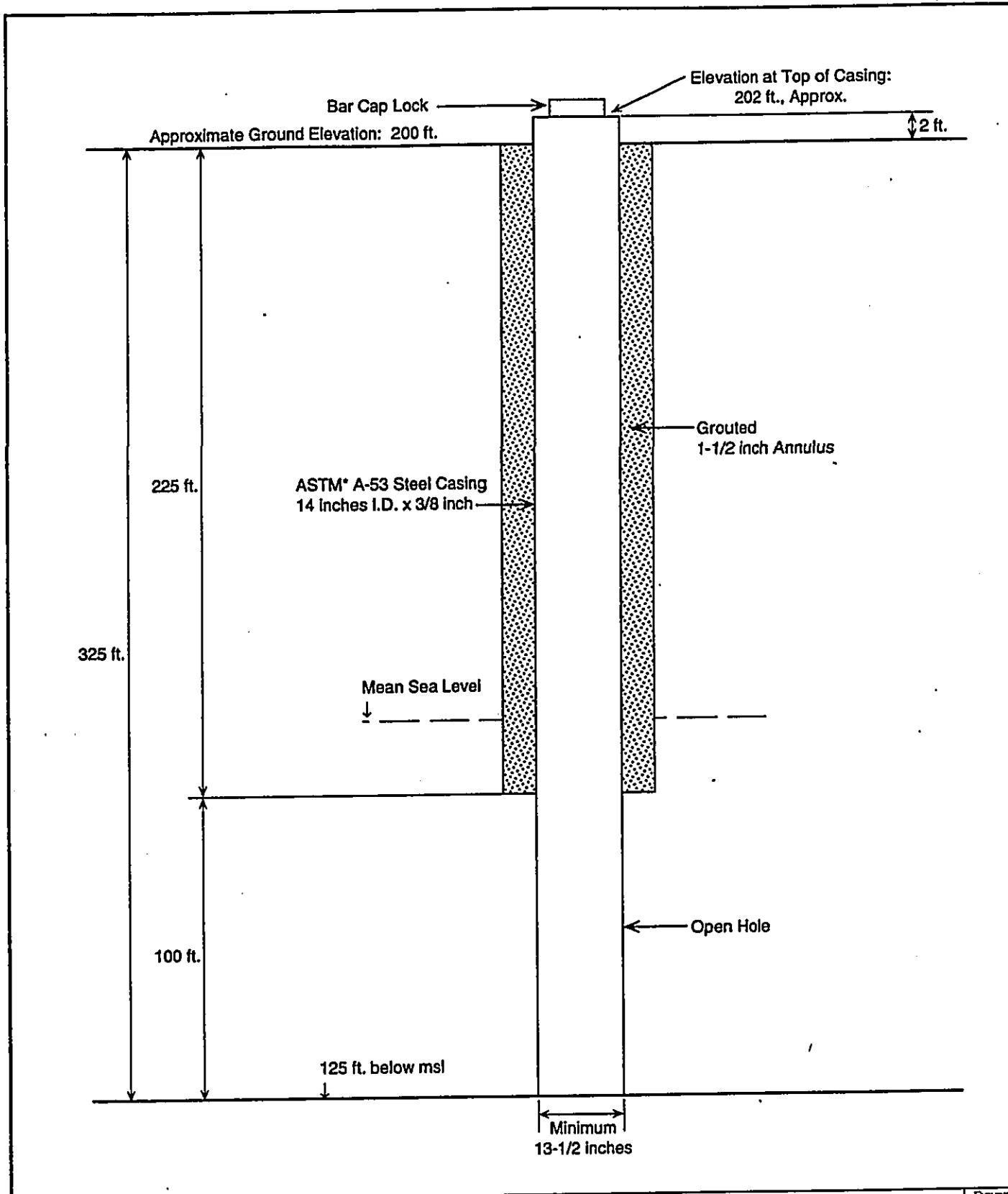
Access to the 1.023-acre site is via a unpaved driveway off the end of Makuakane Street. Makuakane Street is a paved and curbed roadway. At the end of Makuakane Street, the street becomes the entry road leading up to a guard post at Kamehameha Schools' south entrance (see Figure 3-2). Single-family residences are located adjacent to the BWS site on the *makai* side of the unpaved driveway and are also located near the end of Aupuni Street. The residences at the end of Aupuni Street are about 400 feet to the south of the proposed locations for the two exploratory wells. The 1.023-acre site is presently undeveloped and covered with *Koa-haole* and Guinea grass. The storm drainage systems on Makuakane Street and Aupuni Street consist of underground pipes that convey storm water into Kapalama Stream.

3.2 Technical Characteristics

The Kapalama Exploratory Wells site is proposed for two exploratory wells. The two wells are proposed to be located on the northeast and southeast portions of the 1.023-acre BWS site, about 120 feet apart from each other. Both wells are proposed to be approximately 325 feet deep to about 125 feet below mean sea level and will attempt to extract potable water from the underlying basalt (see Figure 3-3). If both of the proposed Kapalama Exploratory Wells are converted to production wells, they are expected to be able to yield about 1.0 mgd each for a total of about 2.0 mgd.

In the vicinity of the proposed Kapalama Exploratory Wells, there are eight existing BWS potable water wells located to the southwest at the Kalihi Pump Station (Well Nos. 1952-06 to 08, 16 to 19, and 22), one BWS well to the south at Jonathan Springs (Well No. 2052-12), and two Kamehameha Schools wells located to the south (Well Nos. 2052-07 and 11) (see Figure 2-2).





NOTES:

Casing:

Material: Steel
 Length: 225 ft.
 Diameter: 14 in.
 Wall thickness: 3/8 in.

*ASTM = American Society for Testing and Materials

Environmental Assessment
 Kapalama Exploratory Wells
 CITY AND COUNTY OF HONOLULU - BOARD OF WATER SUPPLY

FIGURE
 3-3

**TYPICAL WELL
 CROSS-SECTION**

Not to scale

CH2M HILL

In 1990, the eight existing BWS wells at the Kalihi Pump Station were yielding 7.51 mgd and the one existing BWS well at Jonathan Springs was yielding 0.92 mgd. Also in 1990, the two Kamehameha Schools wells yielded 0.20 mgd.

Of the eight existing 12-inch diameter BWS wells at the Kalihi Pump Station, three were constructed in the year 1900 to depths varying from 439 to 469 feet below msl, and five were constructed in the years from 1926-27 to depths varying from 336 feet to 409 feet below msl. The wells at the Kalihi Pump Station site are situated at ground elevation varying from 19 to 24 above msl.

The 14-inch diameter Jonathan Springs Well, at a ground elevation of 90 feet above msl, was constructed in 1981, and reaches a depth of 120 feet below msl.

The two 12-inch diameter Kamehameha Schools Wells were built in 1927 and 1977. The 1927 well is located at a ground elevation of 80 feet above msl, and reaches a depth of 241 feet below msl. The 1977 well is located at a ground elevation of 90 feet above msl and reaches a depth of 244 feet below msl.

It is expected that the two proposed Kapalama Exploratory Wells will be successful in yielding the necessary quantity and quality of groundwater because it will be extracting water at a depth of 125 feet below msl, from a basaltic layer, where BWS hydrologists have predicted that there may be adequate yields of groundwater available.

3.3 Construction and Exploratory Well Testing

The two proposed exploratory wells will be approximately 325 feet deep with the upper 225 feet consisting of a 14-inch diameter steel casing. The lower 100 feet of the well will be uncased. The ground elevation of the proposed exploratory wells will be approximately 200 feet above mean sea level (see Figure 3-3).

Drainage from the two exploratory wells from testing or flushing will be conveyed through temporary 8-inch diameter pipes that will lead into the storm drainage system at the curbs of either or both Makuakane Street and Aupuni Street. The underground storm drainage system of both Makuakane Street and Aupuni Street empties into Kapalama Stream. This existing roadway curb drainage system will be used to dispose of the water extracted during the yield draw down test and the constant rate pumping test.

A yield draw down test will be conducted after each exploratory well is drilled, and a temporary electric pump and pipelines are connected. Power for the pump will be through temporary electrical feed lines from the utility poles located near the end of Makuakane Street or Aupuni Street. The yield draw down test will be performed for each exploratory well at a rate of 500 to 900 gallons per minute. Following each yield draw down test, a long-term constant rate pumping test will be conducted for a period of three days at the rate

determined from the yield-draw down test. Water table draw down will be measured and the quality of water will be tested.

Should the quantity and quality of the water prove to be satisfactory, the two exploratory wells will be temporarily capped. The wells will then be converted to production wells following reallocation of CWRM permitted use to these wells and following a Development Plan Public Facilities Map amendment to show the facility as a "site determined, water well programmed for construction within 6 years." If the test pumpings prove to be unsatisfactory, the unsatisfactory exploratory well or wells will be sealed and/or capped. In either case, when the yield draw down and long-term constant rate pumping tests are completed, the temporary pumps, pipelines, and electrical lines 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.

3.4 Project Schedule, Cost, and Work Force

The construction and testing phase of the proposed Kapalama Exploratory Wells is expected to begin in August 1995, and take 8 months to complete. The capital cost for the construction and testing phase of the two exploratory wells project is estimated at \$310,000.

Drilling will be completed in about 6 months. Installation of the casings will take about a week and another 2 to 3 weeks will be required to install the pumps and run the test pumpings. Demobilization may take up to 2 weeks. Total duration for the construction and testing phase of this project is therefore estimated to be about 8 months.

If the test pumpings are successful, the wells will be converted to production wells. Conversion to production wells will first require reallocation of CWRM-permitted use to the wells and a Development Plan Public Facilities Map amendment to show the facility as a "site determined water well, programmed for construction within 6 years." Installation of permanent pumps, pipelines, a control house, and the required electrical and mechanical control devices is estimated to take about a year to complete at an estimated cost of \$1,890,000.

If the exploratory wells are converted to production wells, water from these wells is planned to be piped to the BWS municipal system via the existing 12-inch water main in Makuakane Street; a permanent pipe drainage system which would lead to the storm drainage system in Makuakane Street would also be constructed.

Chapter 4
Environmental Setting, Potential Impacts, and Mitigation

4.1 Land Use and Ownership

4.1.1 Existing Environment

Land use in the vicinity of Kapalama at the lower slopes of Kamehameha Heights is urban and consists of the landscaped lower campus of Kamehameha Schools, and the *mauka* edge of a single-family residential neighborhood. At the *mauka* end of Makuakane Street, an unpaved driveway along the east side of the street leads into the BWS site. A concrete masonry fence separates the unpaved driveway leading to the BWS site from the single family residential homes immediately *makai* of the driveway. Other single family residential homes are located near the end of Aupuni Street about 400 feet south of the proposed location for the two exploratory wells. A preschool is located about 1,000 feet away from the BWS site across Makuakane Street, just inside the entrance of Kamehameha Schools.

Makuakane Street is a paved and curbed City and County of Honolulu roadway. Beyond the end of Makuakane Street, the street continues in the *mauka* direction and becomes a private roadway leading to a guard shack at Kamehameha Schools' south entrance.

The 1.023-acre site, identified by Tax Map Key 1-6-22:07, is owned by the BWS. The site is located at the foot of Kamehameha Heights within a perpetual easement that was granted by the Bernice Pauahi Bishop Estate to the City and County of Honolulu BWS for underground water development. The 1.023-acre site is undeveloped and covered with *Koa-haole* brush and Guinea grass.

The Bernice Pauahi Bishop Estate owns more than 420 acres *mauka* of the BWS site including the perpetual easement area for water development that surrounds the 1.023-acre BWS site. A small portion of the Bernice Pauahi Bishop Estate's property wraps around the east and south portion of the BWS site and separates the site for the proposed wells from the single-family residential lots located near the end of Aupuni Street. The single-family residential lots in this vicinity are owned by individuals.

4.1.2 Project Impacts

Installation of the two Kapalama wells will not change any of the surrounding land uses and ownership patterns.

4.1.3 Mitigation Measures

No mitigation measures are proposed or required.

4.2 Topography, Climate, and Rainfall

4.2.1 Existing Environment

The site is located in Kapalama, at the lower elevation of the southwestern slope of Kamehameha Heights, at about 200 feet above msl. Kamehameha Heights is the most seaward portion of a Koolau Mountain flow slope and is straddled by the Kalihi Valley to the northwest and Nuuanu Valley to the southeast. Kapalama Stream is the most eastward of two streams within Kalihi Valley, the other stream being Kalihi Stream. Kapalama Stream is the closest stream to the BWS site and, at its closest, is about 400 to 500 feet to the northwest of the BWS site. Kapalama Stream continues *makai* for about another 3/4 mile where it becomes channelized into the Kapalama Drainage Canal. Kapalama Drainage Canal empties into Kapalama Basin (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 100 inches per year at near the top of the Kalihi and Nuuanu Valleys near the ridge line of the Koolau Mountain range at an elevation of about 2,700 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 Kailua, 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 has an average rainfall of between 40 to 50 inches per year.

4.2.2 Project Impacts

Installation of the two wells would not have any significant effect on the topography and will not have any effects on 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 activity had ceased. 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 the island of Oahu. Changes in sea level also shaped the island, as evidenced by the marine and terrestrial sediments deposited on the coastal plains. Reef limestone coral fossils are found miles inland from the present shoreline and conspicuous submarine benches are found offshore. After the long period of dormancy, eruptions broke out on the southern slopes of the Koolau range and at the heads of the deeply eroded valleys, with lava from these eruptions running down the valleys, spreading out, and flattening the floor of many valleys including Kalihi Valley.

The walls of Kalihi Valley, including the higher elevations of Kamehameha Heights, are made up of older Koolau basalt. The floor of Kalihi Valley near the middle of the valley is composed of a dense vesicular jointed layer of *aa* and *pahoehoe* from about 10 to 300 feet thick, overlying the older Koolau basalt. Recent alluvium is found downslope and southeast of this well site in lower Kamehameha Heights in the areas surrounding Kapalama Stream. The well site itself is located over deeply weathered Koolau basalt which is covered with deep-red lateritic soil (Stearns and Vaksvik, 1935).

The soils at the surface of the proposed Kapalama Exploratory Wells site is classified by the U.S. Soil Conservation Service as Kawaihapai stony clay loam (KlaB), Kawaihapai very stony clay loam (KlbC), and rock land (rRK). The Kawaihapai stony clay loam is found on the most western portion of the BWS site nearest Kapalama Stream where the unpaved driveway is located. The Kawaihapai very stony clay loam is found further upgradient away from Kapalama Stream on the northeast portion of the BWS site where one of the exploratory well sites is proposed to be located. The rock land is located the furthest upland from the stream at the southeast corner of the BWS site where the second exploratory well site is proposed to be located.

Kawaihapai stony clay loam is characterized as having slow runoff, slight erosion hazard. Kawaihapai very stony clay loam is characterized as having medium runoff, moderate erosion hazard. Both the KlaB and KlbC soil types have moderate permeability and

moderate shrink-swell potential. Rock land is characterized as having exposed rock covering 25 to 90 percent of the surface and very shallow soils that are very sticky, very plastic, and with high shrink-swell potential.

4.3.2 Groundwater Hydrology

The proposed BWS exploratory well site is located at the lower elevation of Kamehameha Heights within the Kalihi Aquifer System. The Kalihi aquifer consists of a thick basal lens 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 Kalihi Aquifer where the basaltic aquifer is confined. In the areas closer to the shoreline, the caprock, which is formed of marine and alluvial deposits, is the barrier that retards the seaward flow of basal groundwater.

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. However, 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 groundwater from the basaltic lava aquifers. Sedimentary aquifers along the stream valley may hold some promise for the development of groundwater (MacDonald, 1990).

There are 18 wells in the Kalihi Aquifer (see Figure 2-2). Nine wells are operated by six different private entities and nine are operated by the BWS. Of the nine wells operated by the BWS, eight wells are located at the Kalihi Pump Station and one well is located at Jonathan Springs. The nine wells owned by private entities include: four wells operated by Castle and Cooke at the Dole Cannery; a presently under-utilized well held by Del Monte Cannery; an unused well held by the Honolulu Gas Company in Iwilei; a presently unused well in the basement of a building in Palama Settlement; and two wells operated by Kamehameha Schools in Kapalama. Further information on the BWS's water system in the Honolulu Sector and Kalihi Aquifer may be found in the *Regional Environmental Impact Assessment for Development of Wells, Reservoirs, Transmission Lines and Appurtenances at Honolulu, Hawaii* (1984).

Records for the Kalihi Aquifer for 1990 indicate that the BWS withdrew a total of about 8.43 mgd from its nine wells, while private users withdrew a total of about 1.56 mgd from the remaining nine wells, for a total of about 10 mgd. The CWRM has set the authorized water use for the Kalihi Aquifer System at 12.2 mgd, more than 3 mgd above the estimated sustainable yield for this aquifer.

The two Kapalama Exploratory Wells are proposed to be 325 feet deep and reach a depth of 125 feet below msl, and will draw water from the basalt.

If the test pumping results indicate that the quality or quantity of the water from either or both of the two exploratory wells is unsatisfactory, the unsatisfactory exploratory well (or wells) will be capped and/or sealed to prevent malicious or accidental contamination of the underlying groundwater aquifers.

4.3.3 Surface Water Hydrology

The Kalihi Valley drainage basin flows into two perennial streams, Kalihi Stream and Kapalama Stream. Kamaikai Stream, a tributary that feeds into Kalihi Stream, is located in the upland area between Kalihi and Kapalama streams. Kapalama Stream is the closest stream to the BWS site, and is located about 400 to 500 feet to the northwest. Kapalama Stream in this vicinity has an invert of about 170 feet above msl and is perched over low-permeability alluvium. The layers of low-permeability alluvium serve to isolate the near-surface groundwater flowing into Kapalama Stream from the basaltic groundwater found at considerably lower depths. The Kapalama Wells are proposed to be cased to a depth of 225 feet (about 25 feet below msl) within the basalt with the uncased intake portion extending from 25 feet below msl to the bottom of the well. The water withdrawn from the basalt from 25 feet below to 125 feet below msl due to the pumping of this well is not expected to affect the near-surface water flowing into Kapalama Stream because of the 195 feet separating the intake section of the wells from the stream's invert and because of the intervening layer of alluvium.

Both Kalihi Stream and Kapalama Stream are lined at the lower reaches. About 3/4 miles *makai* of the BWS site, Kapalama Stream flows into the channelized Kapalama Drainage Canal. Gaging information exists for Kalihi Stream but not for Kapalama Stream (CWRM, 1990). The U.S. Geological Survey stream flow gage (No. 229300) in the lower reach of Kalihi Stream is located about a mile upstream from the mouth of the stream. The average flow for the Kalihi Stream was 10.3 cubic feet per second (cfs) (6.6 mgd) for the period from 1962 to 1991.

Water from the test pumping will be discharged into the existing storm drainage system in Makuakane Street. It is expected that the water that will be discharged will be clean, and therefore will not introduce any pollutants into the environment. The existing drainage system feeds into Kapalama Stream. Kapalama Stream becomes the lined Kapalama Drainage Canal about 3/4 mile downstream and empties into Kapalama Basin in Honolulu Harbor. Care will be taken in disposing of the test water to preclude the possibility of flushing debris or resuspending sediments and other pollutants in the 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 were:

- **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 Kalihi and Kapalama Streams were both classified as Construct-Alter Streams. Kalihi Stream is a continuous perennial stream with a length of about 11.2 miles, of which about 3 miles of the channel were modified with elevated culverts and revetments from 1927 to 1969. Kapalama Stream is an interrupted perennial stream with a length of about 5.6 miles. All 5.6 miles have been modified with linings, removal of vegetation and realignments, elevated culverts, revetments, blocked or filled-in sections, and extensions of culverts from 1938 to 1965.

In 1991, the CWRM published the *"Hawaii Stream Assessment, A Preliminary Appraisal of Hawaii's Stream Resources"* 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 stream-related are 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.

In the *Hawaii Stream Assessment*, resource categories were ranked as outstanding, substantial, moderate, and limited. Kalihi Stream was identified as having moderate aquatic resources and moderate recreational resources. Kapalama Stream was identified as having moderate recreational resources.

Kalihi Stream's moderate aquatic resource ranking was due to the observance of *oopu nakea*, *Awaous stamineus*, a native fish; four other native species (which may have included two stream and two marine fishes, one shrimp, and one snail); and five introduced species (including noxious, non-native stream animals that may prey upon and/or out-compete with native species). Kalihi Stream's moderate recreational resources ranking was due to fishing, swimming, and hunting resources. Kalihi Stream was not ranked as one of the seven streams on Oahu that have outstanding aquatic resources and was not ranked as one of the two streams on Oahu that have outstanding recreational resources.

Kapalama Stream's moderate recreational resources ranking was due to fishing and nature study. Kapalama Stream was not ranked as one of the two streams on Oahu that have outstanding recreational resources.

There is no potential for adverse impacts to Kalihi Stream because of its 2,000-foot distance away from the proposed exploratory wells site. Kapalama Stream is located between the proposed exploratory wells site and Kalihi Stream and is about 400 to 500 feet away from the proposed BWS site. There is no potential for significant impacts on Kapalama Stream's aquatic, riparian, or cultural resources because no significant resources of these types have been identified for Kapalama Stream. Potential adverse impacts to significant recreational resources at Kapalama Stream are not likely. Kapalama Stream's recreational resources were identified as having only moderate significance.

There is no potential for adverse impacts to the three wetland areas in the Honolulu Sector: Paiko Lagoon, Diamond Head Crater, and Kaau Crater. No significant impacts are

anticipated because of the great distances separating the exploratory wells site from Paiko Lagoon, Diamond Head Crater, and Kaaui Crater, and because these wetlands are not located in the same aquifer system as the site for the two exploratory wells (U.S. Army, 1977).

4.3.4 Project Impacts

No adverse impacts to the geological formations underlying the drilling site for the exploratory wells 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.

There is no potential for adverse impacts to Kalihi Stream because of its 2,000-foot distance from the exploratory wells site. Impacts to flow within Kapalama Stream are expected to be nonexistent because of the elevation difference between the water in the wells and the invert of the stream, the intervening layers of low-permeability alluvium, and because the stream is about 400 to 500 feet away. There is no potential for impacts on Kapalama Stream's aquatic, riparian, or cultural resources because significant resources of these types have not been identified for Kapalama Stream. Potential adverse impacts to recreational resources at Kapalama Stream are not likely. Kapalama Stream's recreational resources were identified as having only moderate significance.

There is no potential for adverse impacts to the three wetland areas in the Honolulu Sector: Paiko Lagoon, Diamond Head Crater, and Kaaui Crater. No significant impacts are anticipated because of the great distances separating the exploratory wells site from Paiko Lagoon, Diamond Head Crater, and Kaaui Crater, and because these wetlands are not located in the same aquifer system as site for the two exploratory wells.

4.3.5 Mitigation Measures

A National Pollution Discharge Elimination Permit (NPDES) Permit is not required for the discharge of water from well test pumpings and is currently not regulated by the State DOH. However, a Best Management Practices (BMP) plan will be implemented. This will include carefully disposing the test water to preclude the possibility of flushing debris or resuspending sediments and other pollutants in Kapalama Stream.

If the test pumping results indicate that the quality or quantity of the water from either or both of the two exploratory wells is unsatisfactory, the unsatisfactory exploratory well (or wells) will be capped and/or sealed to prevent malicious or accidental contamination of the underlying groundwater aquifers.

No monitoring of Kapalama Stream is warranted since pumpage of these wells will not affect stream flows within Kapalama Stream because of the expected elevation difference between the water in the wells and the invert of the stream, the intervening layers of low-permeability alluvium, and because the stream is about 400 to 500 feet away.

4.4 Natural Hazards

4.4.1 Flood Zones

The proposed Kapalama Exploratory Wells site is located at an elevation of about 200 feet above msl at the lower portion of Kamehameha Heights. The site is about 400 to 500 feet southeast of Kapalama Stream in the Flood Insurance Rate Map (FIRM) Zone X in an area determined to be outside the 500-year flood plain.

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 Kapalama project area where the exploratory wells are proposed is located in Census Tract 48, which generally comprises the area *mauka* of School Street, east of Kalihi Street, and below the Alewa Heights residential area. According to U.S. Census reports, the population for this tract decreased 3 percent from 1980 to 1990 from 6,146 to 5,991. In

1990, the U.S. Census reports showed that there were 1,681 housing units in this tract. Employment in this tract includes commercial retail services at Kamehameha Shopping Center, retail and commercial activities along School Street, government services at the Hawaii Housing Authority, Maluhia Hospital, and the Hawaii Department of Health Clinic, and teaching and administration jobs at the Kamehameha Schools.

4.5.2 Project Impacts

The proposed Kapalama Exploratory Wells 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 Kapalama 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

Makuakane Street, a City and County of Honolulu roadway, will be the primary vehicular access to the site. Makuakane Street also serves as the south entry into Kamehameha Schools and can be accessed by Likelike Highway or from School Street.

Likelike Highway is a four-lane State highway with a speed limit of 35 mph. Between School Street and Kalihi Street, Likelike Highway has additional lanes for turning and an additional *mauka* bound lane leading to Kalihi Street. School Street is a four-lane City and County of Honolulu roadway with a speed limit of 30 mph.

According to the Hawaii Department of Transportation, average daily traffic on Likelike Highway in 1991 amounted to 72,239 in the section from School Street to Kalihi Street. Traffic on Likelike Highway is 75 percent southbound during the morning peak hour and 85 northbound during the afternoon peak hour. Likelike Highway traffic consists of a mix of automobiles, trucks, and buses and is one of only two trans-Koolau highways currently in operation. Average daily traffic on School Street west of Likelike Highway in 1991 amounted to 19,457; east of Likelike Highway, average daily traffic in 1991 amounted to 17,724.

Since traffic on School Street is lighter than on Likelike Highway, the preferred access to Makuakane Street and the BWS site will be via School Street.

There are more than a dozen residences that utilize Makuakane Street. Traffic on Makuakane Street can be heavy during the morning and afternoon peaks when students, parents dropping off or picking up students, shuttle buses, and employees of the Kamehameha Schools use Makuakane Street to get into or out of Kamehameha Schools.

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 Likelike Highway, School Street, or Makuakane Street are expected with this project.

4.6.3 Mitigation Measures

To minimize traffic impacts to the residents and to the Kamehameha Schools, the contractor will schedule heavy truck activity between the hours of 8:30 am to 2:30 pm on weekdays and will exclude State holidays. The contractor will also schedule heavy truck traffic to avoid using Likelike Highway as much as possible during the morning or afternoon peak periods.

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 C of the South Shore View Shed. In this view shed, Nimitz Highway, located about 1-1/2 miles *makai* of the project site, is identified as the closest coastal roadway with a significant continuous and intermittent views of Honolulu Harbor. The closest public recreational area to the proposed project site is Decorte Playground, which is located off Kalihi Street about 1/4 mile to the north of the project site. The *Coastal View Study* also identifies significant stationary views from various points at Sand Island Park, providing vivid viewing opportunities laterally, both east and west, and in the *mauka* direction.

4.7.2 Project Impacts

The proposed project site is not visible from Nimitz Highway or from Sand Island Park. The significant coastal views identified in the *Coastal View Study* from Nimitz Highway and the *mauka* views from Sand Island Park will not be affected.

Since the project site and the DeCorte Playground are separated by a distance of about 1/4 mile, the DeCorte Playground recreational area 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 July 29, 1994. The results of the archaeological reconnaissance survey and related research are found in Appendix A of this report.

The *makai* portion of the property, which is adjacent to an existing house lot, has been bulldozed as part of the adjacent residential development.

The *mauka* portion of the property appears to be the only part of the property in its original condition although there are signs of modern use, particularly construction debris on the surface of the ground. Further upslope at the northeast boundary is a bulldozed berm of large boulders and poorly sorted soil which may have been constructed as a drainage control berm to protect the residential areas *makai* of the property. Given the location of the site adjacent to the steep slope to the east, the site was probably never used for commercial agriculture.

Sites of Oahu shows only one site recorded in the upper regions of Kapalama, a stone/possible phallic rock in the shape of a crouching animal when viewed from the west. The stone is not near the project area but is located to the northwest on the ridge above Kapalama Stream.

The archaeologist's field inspection extended beyond the limits of the project area. No archaeological sites were encountered within the project area or in adjacent areas. A rock shelter was found about 60 feet from the site's eastern end. The shelter measures 104" long by 52" wide and from 2 to 3 feet tall. No cultural material was encountered in the test pit and screening process, and the shelter was determined not to be an archaeological site.

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 test 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 August 20, 1994. The results of the survey and related research are found in Appendix B of this report.

The proposed project site is in an urban setting. It is undeveloped but has been extensively disturbed and is covered almost exclusively by alien species. *Koa-haole* and Guinea grass scrub cover most of the project site except for a small swale area that is covered mostly with dense California grass and kiawe trees. Other plants at the site include Christmas berry, *honohono*, and Chinese violet.

The residences along Makuakane Street are landscaped with common species of grassy lawn, yard plantings, trees, and weeds. The site's *mauka* boundary with Kamehameha Schools consists of a grassy lawn with coconut and be-still trees. A small vegetable garden lies *makai* of the site.

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: two vines, *huehuee* and *koali*. 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.

No resident land birds were observed. Only two species of resident land birds may on rare occasions visit this area, the short-eared *Pueo* (*Asio flammeus sandwichensis*), and the common *Amakihi* (*Hemignathus virens*). The *Pueo* is listed as an endangered species on Oahu by the Hawaii State Division of Forestry and Wildlife; it forages in agricultural lands as well as forests. The common *Amakihi* is not confined to native forests and can often be seen in second growth exotic forest areas. The common *Amakihi* rarely descends to forage to the lower elevations similar to this site's, preferring the higher elevations.

No wetland habitat suitable for waterbirds was found at this site. No waterbirds would be expected in this area. No seabirds were observed at this site. The White Tern (*Gygis alba*), a "threatened" waterbird listed by the Hawaii State Division of Forestry and Wildlife, has been known to nest in large trees in downtown Honolulu and Kapiolani Park but was not seen in this area.

No migratory shorebirds were observed at this site. The habitat in this area is too overgrown with tall grass and brush and is unsuitable for shorebirds. The Pacific Golden-Plover (*Pluvialis fulva*), which is not endangered or threatened, will likely use the mowed lawn area adjoining the road into Kamehameha Schools during the months from August to April.

A total of 11 species of exotic birds were recorded, although other species of exotic birds probably also occur in this area. None of these exotic species are endangered or threatened.

One non-native Small Indian Mongoose (*Herpestes auropunctatus*) was seen on the site. Rats, mice, and feral cats are undoubtedly numerous in this area.

It is not known whether or not the endemic and endangered Hawaiian Hoary Bat (*Lasiurus cinereus semotus*) utilize Kalihi Valley. This species are known to roost solitarily in trees and occur in upland forests as well as in coastal habitats, however data on the bat's distribution and behavior are extremely limited. The bat is insectivorous and forages at dusk. No bats were encountered in the survey.

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

No mitigation measures are proposed or required for either botanical and faunal resources.

4.10 Air Quality and Noise

4.10.1 Air Quality and Noise

Air quality on Oahu is, in general, relatively clean and low in pollution, except where there are large numbers of motor vehicles or stationary sources. In the vicinity of the BWS project site at the end of Makuakane Street, pollution contributed from vehicles travelling on Likelike Highway and School Street is minimal because of the distance separating these roadways from the project site and the predominance of the northeast trade winds. Air pollution resulting from vehicles on Makuakane Street is usually minimal but will be slightly elevated during the morning and afternoon peak traffic periods when there is increased traffic into and out of Kamehameha Schools. However, with the absence of stationary sources, the air quality in this portion of Kapalama near the project site is usually good.

Ambient noise at and around the project site is also usually low and results mainly from vehicular movements on Makuakane Street, from the classroom activities at the nearby school buildings, and from the residents in the adjacent homes. Ambient noise levels are higher in the morning and afternoon peak traffic periods, due to the increased number of cars and buses that travel into and out of Kamehameha Schools via Makuakane Street.

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 some impact upon the nearby school buildings and adjacent 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 will have noise impacts at the nearby school buildings and adjacent residents. Clearing, grading, heavy equipment moving, construction, and the drilling of the exploratory well will have noise that will be intrusive to the adjacent residents and may be intrusive at the nearby school buildings. Noise will also result from the operation of the diesel engine driving the drill.

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 and dust screens, will 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 operating condition and will be repaired or replaced as needed. Drilling operations will be restricted to the hours of 7:30 am to 3:30 pm on weekdays, and will exclude State Holidays. Temporary surface pumps will be installed with mutes, or subsurface pumps, which will reduce the pump noise considerably, may be used.

If the wells are converted to permanent production wells, surface pumps will be installed with mutes, or subsurface pumps will be installed, which will reduce the pump noise to levels below the regulatory limit.

Chapter 5
Relationship to Land Use Designations and Controls

5.1 State Land Use Designations

The subject property is located within 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.

**5.2 City and County of Honolulu
Land Use Designations and Controls**

The subject parcel is designated Public Facility 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.

If either or both of the two exploratory wells are converted to production wells, 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 permanent production wells, the well site, as delineated by its property line boundary, must be shown as a "site determined, water well facility 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.

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

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.

This project is part of an overall groundwater development program intended to increase the municipal water supply to meet growing demand. If the BWS's new water source program is curtailed, the BWS would not be able to provide adequately for the water needs of the future population of the island, which may result in restrictions in new development as well as regional water shortages within the existing developed areas.

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 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 potable groundwater source sites in the Honolulu Sector, where virtually all of the prime groundwater sources are under restricted allocations of the CWRM.

For the Honolulu Sector, the BWS analyzed 21 potential sites for additional potable wells within the Honolulu Sector in the *Regional Environmental Impact Assessment for Development of Wells, Reservoirs, Transmission Lines and Appurtenances at Honolulu, Hawaii* (BWS, 1984). These alternative sites offer opportunities as new groundwater supply sources, but are considered by the BWS to be additions, rather than alternatives, to the proposed well testing program.

The *Regional Environmental Impact Assessment for Development of Wells, Reservoirs, Transmission Lines and Appurtenances at Honolulu, Hawaii* evaluated the potential for an additional potable groundwater well at the Jonathan Springs well site in the Kalihi Aquifer. Two potential well sites in the Kalihi Aquifer were evaluated for possible use as nonpotable groundwater sources; one potential nonpotable groundwater well site was evaluated at the Palama Settlement Caprock Well site; and three potential nonpotable groundwater sites were evaluated in the Kalakaua School Caprock Well site. The three locations for nonpotable groundwater wells within the Kalakaua School Caprock Well site were situated at Kalakaua Intermediate School, Farrington High School, and the BWS Kalihi Pump Station.

6.4 Alternative Sources

Alternative source development has been and is being pursued by the BWS. The BWS analyzed potential potable water source alternatives other than groundwater in its 1984 study. These alternatives include desalinization, the development of surface and brackish groundwater sources, and the recycling of treated wastewater.

However, there are a number of problems associated with the development of alternative potable water sources. Typically, these alternative sources have comparatively high development costs and greater technical challenges. For instance, the use of surface water such as from Kapalama Stream or Kalihi Stream has a high potential for health and safety problems and would require installation of a costly water treatment plant. The BWS, although pursuing alternative source development, does not consider these alternatives as feasible or practical for development as potable water sources. Thus, BWS's emphasis for obtaining potable water for municipal use will continue to focus on the development of groundwater resources.

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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 Health
 - Environmental Management Division
 - Office of Environmental Quality Control

City and County of Honolulu Agencies

- Planning Department
- Land Utilization Department

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Appendix A

**Archaeological Reconnaissance Survey of
the Exploratory Well Site at
Kapalama, Kona, O'ahu TMK 1-6-22:007**

by

Hallett H. Hammatt, Ph.D.

for

CH2M Hill

Cultural Surveys Hawaii
September 1994

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I. INTRODUCTION

Introduction

The purpose of this report is to describe the results of an archaeological reconnaissance survey conducted at the exploratory well site at Kapalama, Kona, O'ahu (TMK 1-6-22:007). The Board of Water supply is proposing to develop a well facility at this site to include a well, a pump, control building, piping, a transmission main, and electrical equipment as well as an access road.

Description of the Property

The project area which consists of approximately 1.023 acres (44,541 sq. feet) is located at the *mauka* end of Makuakane Street near the Makuakane Street entrance to Kamehameha Schools (Figs. 1, 2, and 3). It lies on the east side of Ke Ala Mano Drive adjacent to the school entrance security guard station at approximately the 160-200 ft. elevation. The project area consists of a long curved lot perpendicular to Makuakane Str. extending from the street 235 ft. to the southeast; and then turns east for approx. 350 ft. Most of the land is level or gently sloping and vegetated with California grass, *Koa haole* and *Kiawe* trees. The slope increases to the northeast where the property climbs to the side of a steep slope. On the lower edge of the steep slope, at the NE boundary is a bulldozed berm of large boulders and poorly sorted soil which was constructed probably as a drainage control berm for the surrounding development to protect the residential areas *makai* of the property. The project area is surrounded by residential development on the south and southeast sides. To the north and northwest is the entryway to Kamehameha Schools and the security guard house with associated open landscaped areas bordering the project area.

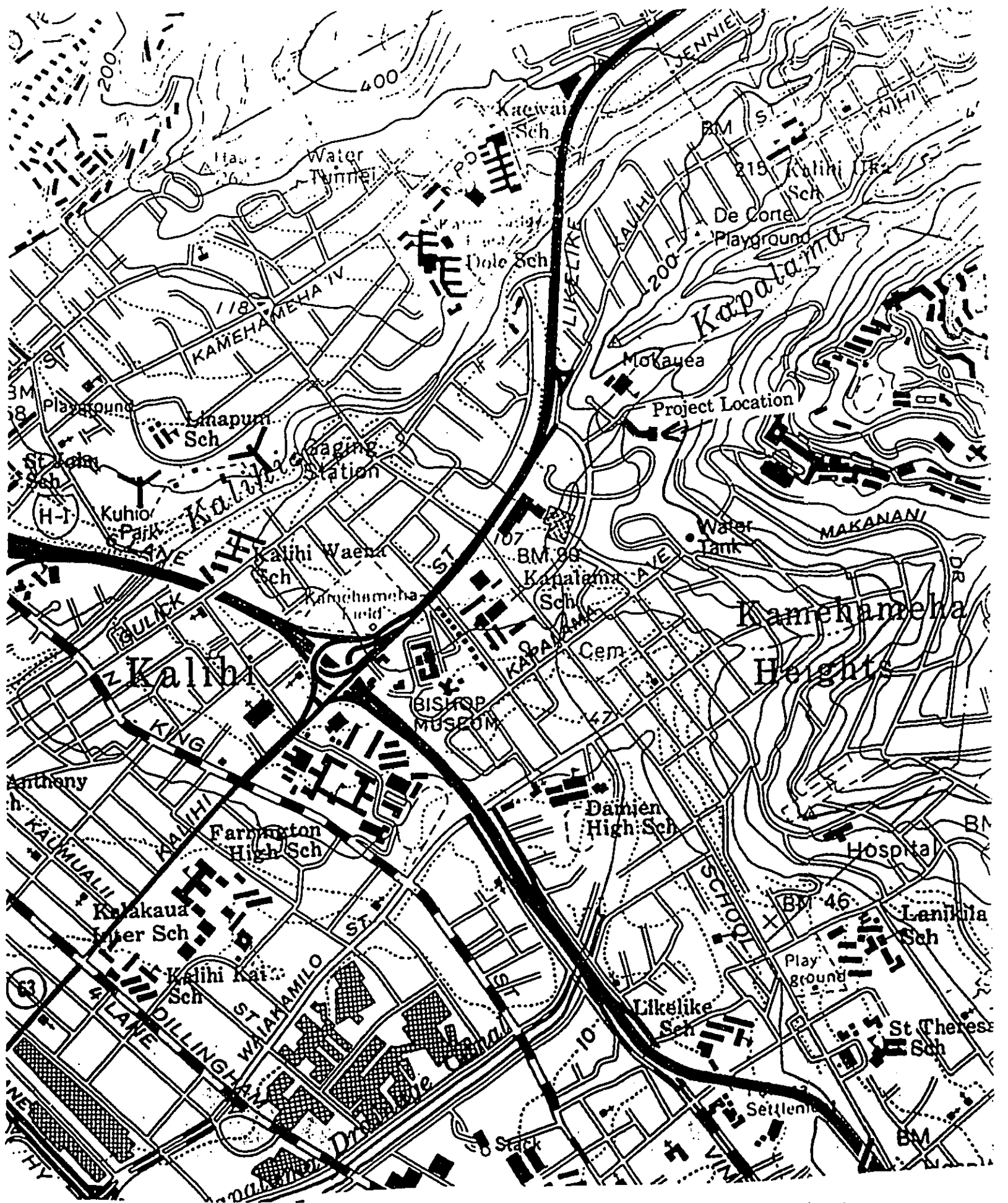


Fig. 1 USGS 7.5 Minute Series Topographic Map of Honolulu Quad, Showing Project Location (outlined)

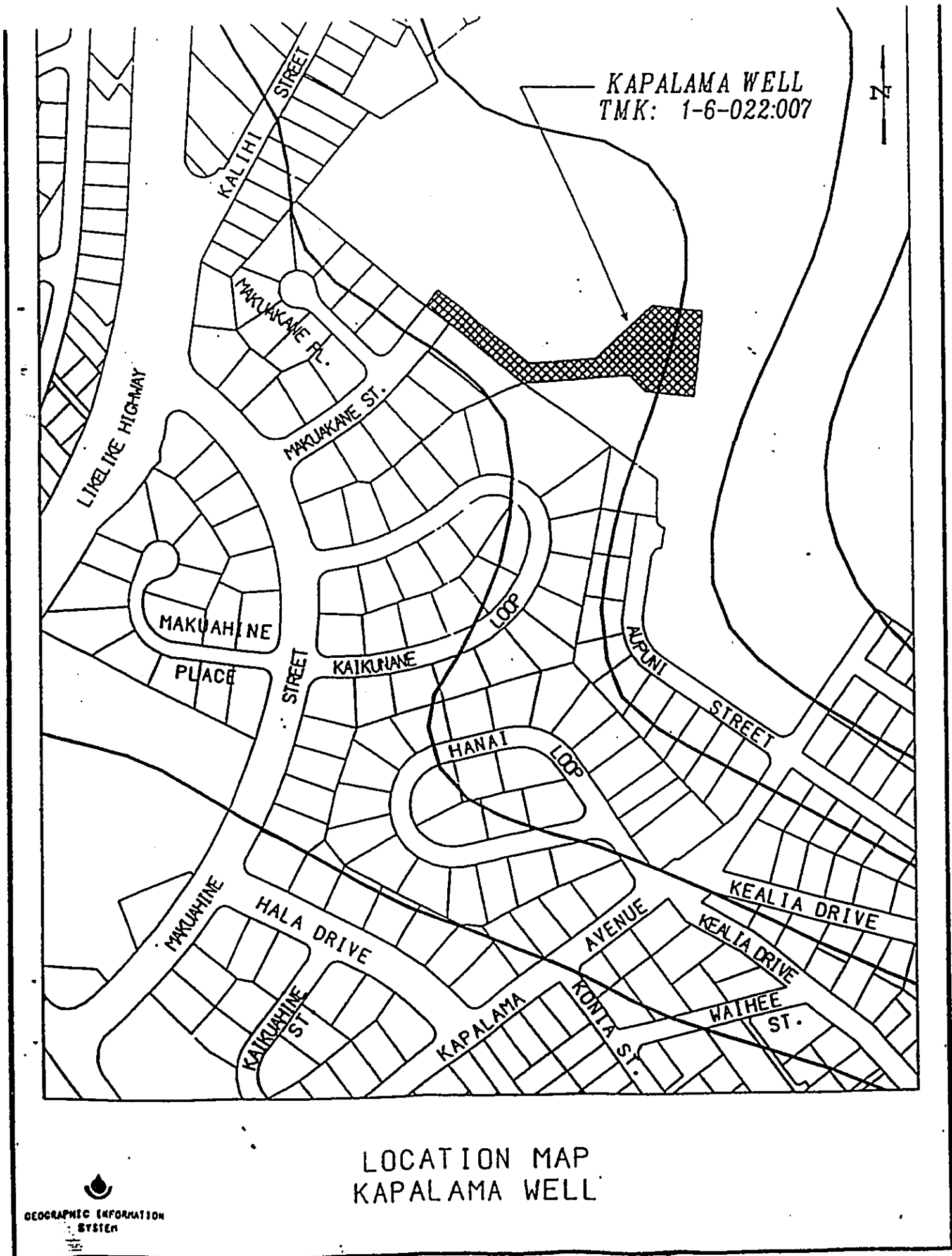


Fig. 2 Street Map Showing Location of Kapalāma Exploratory Well Site Area

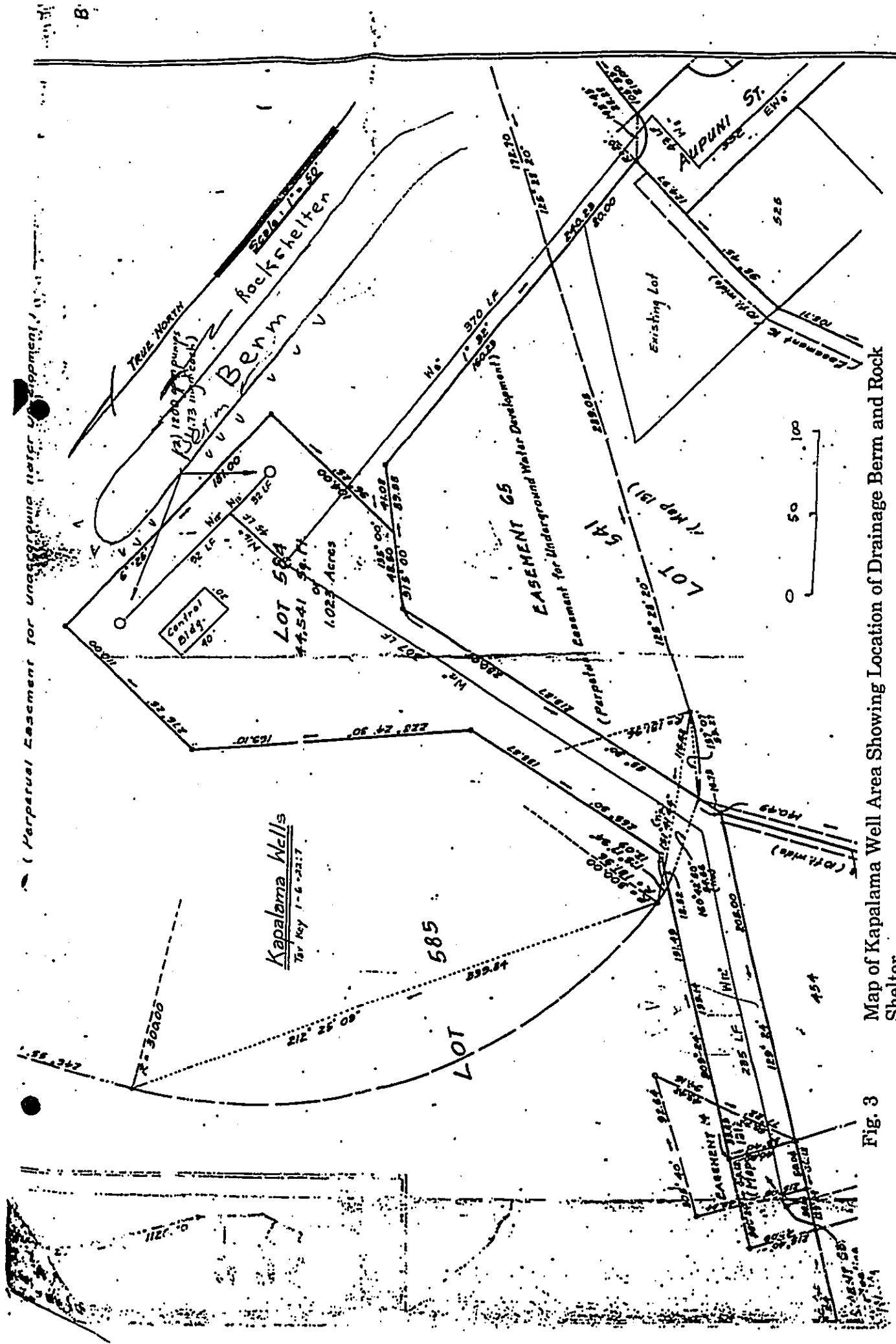


Fig. 3 Map of Kapalama Well Area Showing Location of Drainage Berm and Rock Shelter

History of the Property

The lower (*makai*) portion of the property which is adjacent to an existing house lot and lies perpendicular to the Kamehameha Schools' entrance has been bulldozed as part of the adjacent residential development. The portion of the property extending *mauka* (east) appears to be in its original condition and has probably not undergone extensive grading although there are signs of modern use, particularly construction activities on the surface of the ground. These activities were probably associated with the adjacent residential lots (to *makai*). Farther upslope, within 20-30 feet of the eastern boundary of the property there has been extensive modification in the form of a 7-10 ft. high berm which was constructed for drainage control. Given the location of the property adjacent to the steep slope to the east it was probably never used for commercial agriculture. An 1897 M.D. Monsarrat map of Honolulu and adjacent areas shows no residential activity or other use of any kind this far *mauka*, with the exception, of course, of Kalihi Road, which lies on the northwest side of the ridge. On this map, the Kamehameha Schools are shown in their original location just above King Street. The Kapalama Heights ridge lies entirely outside the developed area of 1897 Honolulu.

The new campus of Kamehameha Schools was developed in Kapalama Heights over a long portion of the first part of this century. The entrance road on the 'Ewa side of the school campus, Ke Ala Mano Drive, became the main entrance to the school within the last 15 years.

Previously Recorded Archaeological Sites

An inspection of Sterling and Summers (1978) shows only one site recorded in the upper regions of Kapalama within the District of Kona which is described as a

stone/possible phallic rock in the shape of a crouching animal when viewed from the west;
Site 411 (Sterling and Summers 1978:321). The stone is described as being located "in a
direct line between Violet Street in Kalihi and the last building of the Kamehameha
Schools in Kapalama halfway down the west side of the ridge of Kapalama Valley." (*ibid.*)
If this locational information is accurate the stone is not near the project area but is
located to the northwest of the project area on the ridge above Kapalama Stream.

II. ARCHAEOLOGICAL FINDINGS

Archaeological Fieldwork

Archaeological fieldwork was conducted on July 29, 1994 by author and consisted of a 100% surface survey of the approximately 1 acre project area. This survey took about four hours. It was observed that the *makai* portion of the property, that fronting the house lot on Makua Kane Street had been previously bulldozed with the surface covered by various construction debris, probably associated with the adjacent residential development. The upslope portion of the project area appeared to be fairly undisturbed by grading, except for a 7-10 ft. high berm for drainage control which was located just outside the upslope limits of the project area.

No archaeological sites were encountered within the project area or in adjacent areas. Because of the small size of the project area and the fact that the boundaries were not clearly marked, the field inspection was extended beyond the limits. During the author's inspection of the steep slope outside the eastern end of the project area, a rock shelter was encountered. This rock shelter, consisting of a level area of thin soil under a basalt overhang measured 260 cm. long and 130 cm. wide. The height of this shelter varied from 60 cm. in the back to 90 cm. in the front. The shelter overlooks Kapalama Valley to the west. Because of the possibility of this rock shelter being an archaeological site and the possibility of human habitation, and particularly in view of the presence of bone fragments on the surface of the shelter, a test pit was placed within the soil deposit on August 9, 1994. This 1 m. by 50 cm. pit was excavated in the center of the shelter and all material was screened through 1/8 inch mesh. Solid bedrock was encountered from 4 to 10 cm. from the ground surface. The sediments consisted entirely of aeolian silt with a few fragments of natural basalt gravel that had fallen from the roof. No cultural material

was encountered and the previously encountered bone was identified as probably dog bone by the author. Because of the absence of human modification and the absence of evidence of human habitation within the thin deposits of the shelter, this overhang was determined not to be an archaeological site. This overhang is located approximately 60 ft. east of the project area boundary, just upslope of the drainage control berm previously mentioned.

Conclusions

It is clear from the results of the fieldwork, that this project area is devoid of archaeological potential. The proposal for additional development of this site, will not impact archaeological resources. For these reasons, no further archaeological investigation should be required for this project. If, however, in the unlikely event that archaeological remains are encountered during development of the exploratory well, work should cease in that immediate area and the State Historic Preservation Division of Department of Land and Natural Resources should be notified at 587-0047 to determine significance and treatment of the findings.



Figure 5 Portion of Project Area Fronting Makua Kane St., View to SE

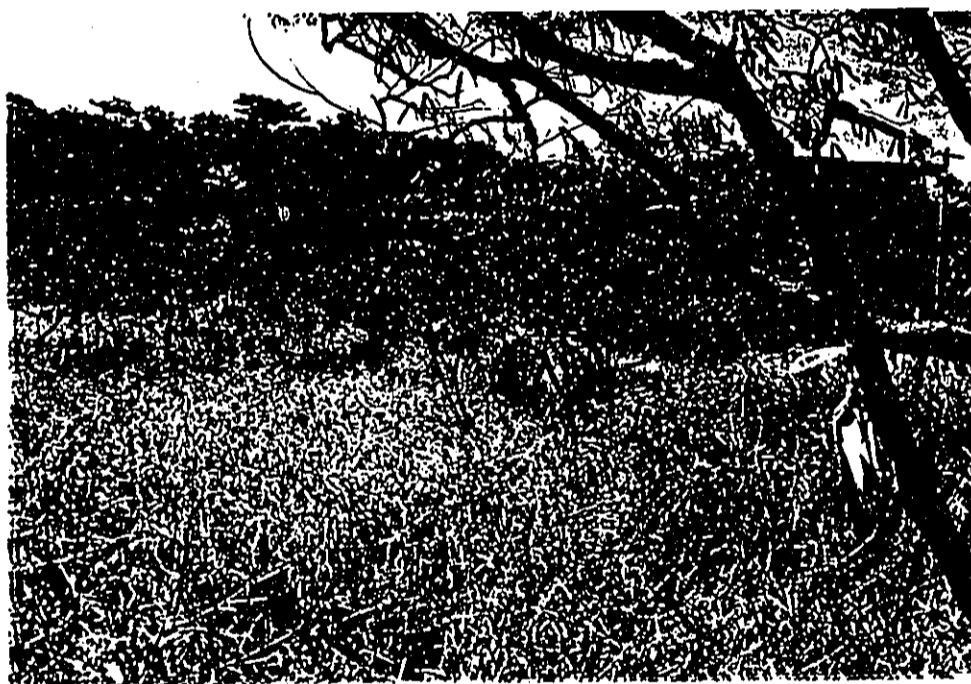


Figure 6 Portion of Project Area Showing Vegetation, View to E (upslope)

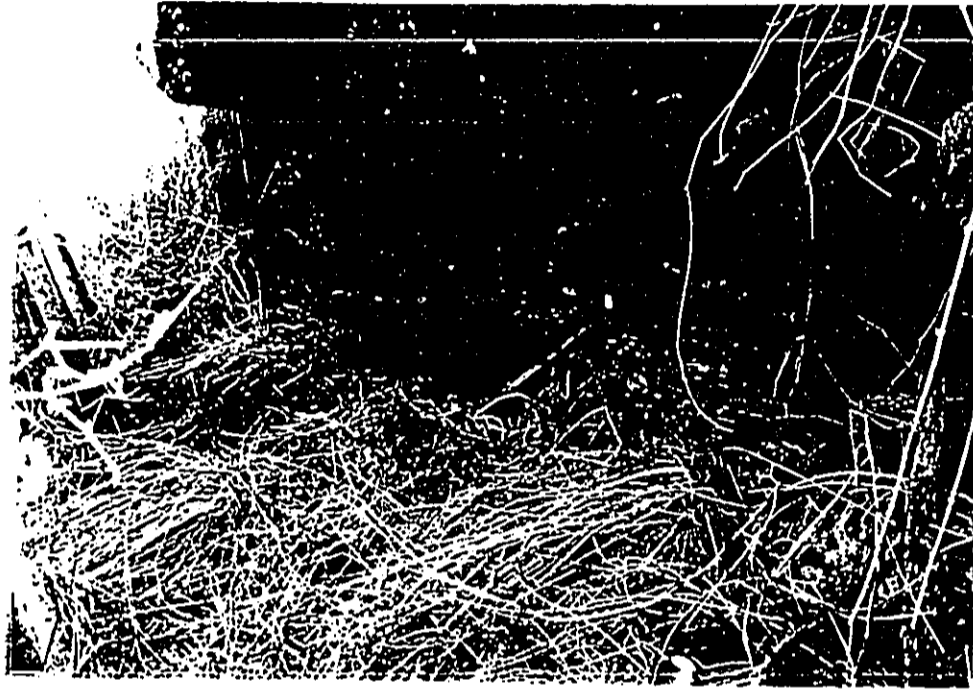


Figure 7 Rock Shelter To East of Project Area. Showing 1 m. x .50 cm. Test Pit. View to NE



Figure 8 Rock Shelter to East of Project Area Showing Closeup of Test Trench with Thin Soil Deposit and Bedrock. View to East

REFERENCES

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1978 *Sites of O'ahu*, Dept. of Anthropology, B.P. Bishop Museum, Honolulu.

Appendix B

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BOTANICAL RESOURCES ASSESSMENT KAPALAMA WELL HONOLULU DISTRICT, ISLAND OF O'AHU

INTRODUCTION

At the request of the Honolulu Board of Water Supply (BWS) and CH2M Hill, a botanical assessment survey was conducted for the Kapalama well project site on 20 August 1994. The work will include construction of a control building, installation of two pumps, transmission main, and other appurtenances. The proposed well project is needed to meet future water demands of the Honolulu area. An access road and the well site will be located on 1.023 acres of land within TMK: 1-6-22:07. The well site is located between the Kamehameha School grounds and residential lots.

The primary objectives of the botanical assessment study were to describe the vegetation on and immediately adjacent to the proposed project site, and to search for threatened and endangered species as well as rare and vulnerable plants. A walk-through survey method was used. Notes were made on plant associations and distribution, substrate types, drainage, topography, 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 taxo-

nomic treatment. The plant names used in the following discussion follow Wagner et al. (1990). Names of cultivated species not listed in Wagner et al. follow St. John (1973).

DESCRIPTION OF THE VEGETATION

A somewhat dense koa-haole (Leucaena leucocephala) scrub, 12 to 15 ft. tall, is found along the access roadway alignment. Robust clumps of Guinea grass (Panicum maximum), up to 6 ft. tall, form a dense cover between the koa-haole shrubs. Scattered among the koa-haole shrubs are a few ornamental species which have escaped and established themselves on the project site; these are mock orange (Murraya paniculata), be-still tree (Cascabela thevetia), and Mickey Mouse plant (Ochna kirkii). In places, coral berry or rouge plant (Rivina humilis) may form small patches. Wild jasmine (Jasminum fluminense), a woody climber, is locally common on the koa-haole shrubs. Other vines observed in smaller numbers are huehue haole (Passiflora suberosa), blue potato vine (Solanum seforthianum), and huehue (Cocculus trilobus), a native species.

Where the proposed access road adjoins Makuakane Street, the property is landscaped and consists of a grassy lawn composed primarily of Bermuda grass or manienie (Cynodon dactylon) with four small plantings of yellow allamanda (Allamanda cathartica) and kolomona (Senna surattensis). Also found in this area is one gunpowder or charcoal tree (Trema orientalis). Common weedy species found in the lawn area include false mallow (Malvastrum coromandelianum), coatbuttons (Iridax procumbens), common sandbur or 'ume'alu (Cenchrus echinatus), swollen fingergrass or mau'u lei (Chloris barbata), hierba del cabello (Calyptocarpus vialis), and West Indian dropseed (Sporobolus indicus).

Koa-haole and Guinea grass scrub also covers most of the well

site. However, a portion of the well site is found in a small swale area where the vegetation consists of a dense mat of California grass (Brachiaria mutica) with scattered kiawe trees (Prosopis pallida), 15 to 18 ft. tall, and clumps of koa-haole shrubs; the taller, woody cover is about 30%. Other plants found in this area are Christmas berry (Schinus terebinthifolius), honohono (Commelina diffusa), Chinese violet (Asystasia gangetica), and two members of the morning-glory family, the white field bindweed (Ipomoea obscura) and the native koali (Ipomoea indica).

On the adjacent Kamehameha School grounds the vegetation consists of a grassy lawn with coconut trees (Cocos nucifera) and be-still trees. Makai of the well site is a small vegetable garden with plants such as squash (Lagenaria siceraria), banana (Musa X paradisiaca), kalamungai (Moringa oleifera), etc.

DISCUSSION AND RECOMMENDATIONS

The proposed project site is located in an urbanized area and, thus, has been extensively disturbed in the past. Strewn throughout the site are small piles of rubbish which contain lawn trimmings and household articles such as old bottles, cans, shoes, etc. The vegetation on the site is dominated by introduced or alien species such as koa-haole, Guinea grass, California grass, and kiawe.

There are no remnant patches of sensitive native plant-dominated communities (Hawai'i Heritage Program 1994). Only two native species were observed during the field studies; these are the two vines, huehue (Cocculus trilobus) and koali (Ipomoea indica). Both are indigenous, that is, they are native to the Hawaiian Islands and elsewhere. Huehue also occurs from southeast Asia to the Himalayas, Malesia, and the Pacific; koali is pantropical (Wagner et al. 1990). None of the plants found during the field

studies is a listed, proposed, or candidate threatened and endangered species (U.S. Fish and Wildlife Service 1989, 1990, 1994). None of the plants is considered rare or vulnerable (Wagner et al. 1990).

There is very little of botanical interest on the site, as it has been disturbed and is covered almost exclusively by alien species. All of the plants found on the site occur in similar lowland, disturbed habitats throughout the islands; the wild jasmine (Jasminum fluminense) is considered a potential noxious species. Given the findings above, no significant negative impacts to the botanical resources are expected. The proposed project will not cause any significant damage to the total island population of any of the species involved. There are no botanical reasons to impose any restrictions, conditions, or impediments to the development of the new well site.

References

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Museum Special Publication No. 83.

Appendix C

AVIFAUNAL AND FERAL MAMMAL SURVEY FOR A BOARD OF
WATER SUPPLY EXPLORATORY KAPALAMA WELL SITE, 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 the proposed Kapalama well site, conducted on 28 July 1994 (Fig. 1). Also included are references to pertinent literature and unpublished reports.

The objectives of the field survey were to:

- 1- Document 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 quality of the site for native wildlife and note any special or unique resources.

GENERAL SITE DESCRIPTION

Figure One indicates the location of the survey. The topography upslope of the site is steep. Second growth vegetation consisting of mostly introduced species covers the property. Tall grass forms

the understory and Kiawe trees and a few other exotic trees dominate the habitat. Residential property adjoins the property.

Weather during the field survey was clear and calm. Traffic going into Kamehameha Schools on the road fronting the property was heavy. Vehicular noise could be heard throughout the proposed well site.

STUDY METHODS

Field observations were made with binoculars and by listening for vocalizations. The perimeter of the property was traversed on foot and two transects across the site were walked. Counts were made of all birds seen or heard (Table 1). Published and unpublished data of birds known from similar habitat were also consulted in order to acquire a more complete picture of the possible species that might be expected in this region (Pratt et al. 1987; Hawaii Audubon Society 1993; Tanino 1994; Bruner 1994). Data on feral mammals were limited to visual observations. No trapping was attempted nor deemed necessary.

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. The only two species which may on rare occasions occur in this area are the Short-eared Owl or Pueo (Asio flammeus sandwichensis) and Common Amakihi (Hemignathus virens). The Pueo is listed as an "endangered" species on Oahu by the State of Hawaii Division of Forestry and Wildlife. They forage in agricultural lands as well as forests. They are sometimes confused with the introduced Common Barn Owl (tyto alba). Pueo, however, are more diurnal. The Common Amakihi is one of the most abundant species of the endemic subfamily Drepanidinae. They feed on a variety of foods including nectar, insects and fruit. Common Amakihi are not confined to native forest but can often be seen in second growth exotic forest. They may rarely descend to forage at this site but generally occur at higher elevation.

Resident Waterbirds:

No wetland habitat suitable for waterbirds was found on the property. No waterbirds would be expected at this site.

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. They nest in large trees

in downtown and Kapiolani Park. None were seen at this site.

No migratory shorebirds were recorded at this site. Two factors influence this finding. First, the habitat is too overgrown with tall grass and brush and therefore, unsuitable for shorebirds. Second, at this time of year shorebirds are in the arctic on their breeding grounds. From August to April Pacific Golden-Plover (Pluvialis fulva) use the mowed lawn areas adjoining the road into Kamehameha Schools. This species is territorial and returns each year to the same site (Johnson et al. 1981). They are not "endangered" or "threatened".

Exotic (Introduced) Birds:

A total of 11 species of exotic birds were recorded during the field survey (Table 1). Pratt et al. (1987); Hawaii Audubon Society (1993); Tanino (1994) and Bruner (1994) suggest that other species which may occur in this region include: Barn Owl (Tyto alba); Cattle Egret (Bubulcus ibis); Northern Mockingbird (Mimus polyglottus); Red-billed Leiothrix (Leiothrix lutea); Japanese Bush-warbler (Cettia diphone); Java Sparrow (Padda oryzivora) and Nutmeg Mannikin (Lonchura malabarica). None of these exotic species are "endangered" or "threatened".

Feral Mammals:

One non-native Small Indian Mongoose (Herpestes auropunctatus) was seen on the west side of the property. No trapping was conducted in order to assess the relative abundance of feral mammals. In

addition rats, mice and feral cats undoubtedly also are numerous in this area.

Oahu records of the endemic and "endangered" Hawaiian Hoary Bat (Lasiurus cinereus semotus) are limited (Tomich 1986; Kepler and Scott 1990). Data on the bat's distribution and behavior are extremely limited. They are known to roost solitarily in trees and occur in upland forests as well as in coastal habitats. This species is insectivorous and forages at dusk. It is not known whether or not bats utilize Kalihi Valley. Their occurrence and abundance on Oahu would appear to be limited based on the infrequent records for this species.

DISCUSSION AND CONCLUSIONS

This field survey was necessarily brief and thus can provide only a limited perspective of the wildlife which utilize the site. 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 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 proposed well site and nearby areas were covered on foot. At several locations counts of all birds seen and heard were made. These data are presented in Table 1.
- 2- No native birds were recorded on the survey. No "endangered" or "threatened" species were found on the survey. The possible native birds which may occur in this area include: Pueo, White Tern, Common Amakihi and Pacific Golden-Plover. Only the latter species would be regularly found at this general location. This species uses the lawn habitat fronting the property. If the proposed well site is cleared and planted in grass this will be attractive to plover and in time individuals will establish their winter territories at this site.
- 3- Presently this site consists of second growth forest. Introduced birds dominate the avifauna. This property is not unique or of special importance to native wildlife. Any changes in this small area will not negatively impact native or introduced bird populations on Oahu.

TABLE 1

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

COMMON NAME	SCIENTIFIC NAME	Average Number Recorded at each Census Station
Spotted Dove	<u>Streptopelia chinensis</u>	4
Zebra Dove	<u>Geopelia striata</u>	8
Common Myna	<u>Acridotheres tristis</u>	6
Red-vented Bulbul	<u>Pycnonotus cafer</u>	12
Red-whiskered Bulbul	<u>Pycnonotus jocosus</u>	5
Northern Cardinal	<u>Cardinalis cardinalis</u>	2
Red-crested Cardinal	<u>Paroaria coronata</u>	2
Japanese White-eye	<u>Zosterops japonicus</u>	10
House Finch	<u>Carpodacus mexicanus</u>	6
White-rumped Shama	<u>Copsychus malabaricus</u>	1
House Sparrow	<u>Passer domesticus</u>	3

SOURCES CITED

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Appendix D



Appendix D
**Agencies and Others Provided a Copy of
the Draft Environmental Assessment**

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

Federal Agencies

- U.S. Army Corps of Engineers, Pacific Ocean Division
- U.S. Department of the Interior
 - Fish and Wildlife Service
 - Geological Survey, Water Resources Division

State of Hawaii Agencies

- Department of Agriculture
- Department of Business, Economic Development, and Tourism
- 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

City and County of Honolulu Agencies

- Planning Department
- Land Utilization Department
- Public Works

Others

- City Council District 6 Member Jon Yoshimura
- Kamehameha Schools/Bishop Estate
- Liliha/Kapalama Neighborhood Board Chair Curtis Won
- Sierra Club, Hawaii Chapter
- Castle and Cooke, Inc.

Appendix E

Appendix E
Comments and Responses to the
Draft Environmental Assessment

IRRB:135
BENJAMIN A. CAYetano
Governor



State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 So. King Street
Honolulu, Hawaii 96814-2512

JAMES J. NAKATANI
Chairperson, Board of Agriculture

Mailing Address:
P.O. Box 22159
Honolulu, Hawaii 96822-2159
FAX: (808) 973-9613

COPY

January 27, 1995

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

Gentlemen:

Re: Kapalama Exploratory Wells
Draft Environmental Assessment

Thank you for the copy of the Draft Environmental Assessment prepared for the above project.

The Department of Agriculture has no comments or objections to this project.

Sincerely,
James J. Nakatani

JAMES J. NAKATANI
Chairperson, Board of Agriculture

C: CH2M HILL
ARM Div.



ENGINEERING DIVISION TEL No. 808-527-6195

May 30.95 16:06 No.005 P.02

February 28, 1995

Mr. James J. Nakatani, Chairperson
Department of Agriculture
State of Hawaii
1428 South King Street
Honolulu, Hawaii 96814-2512

Dear Mr. Nakatani:

Subject: Your Letter of January 27, 1995 Regarding the Draft Environmental Assessment (EA) for the Proposed Kapalama Exploratory Wells, TMK: 1-6-22: 07, Honolulu, Oahu

Thank you for reviewing the Draft EA for the proposed Kapalama exploratory wells project.

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

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

Very truly yours,
Raymond H. Sato

RAYMOND H. SATO
Manager and Chief Engineer

SM:sjs
cc: R. Sato
B. Usagawa

P-70/95

BENJAMIN J. CAIENANO
1988-09-08
DIRECTOR OF HEALTH



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

LAURENCE WILCE
DEPARTMENT OF HEALTH
DIRECTOR OF HEALTH

WRWP, please refer to:
E907

February 6, 1995

Mr. Barry Usagawa
Board of Water Supply
City and County of Honolulu
530 South Beretania Street
Honolulu, Hawaii 96842

Dear Mr. Usagawa: *Barry*

SUBJECT: COMMENTS ON THE DRAFT ENVIRONMENTAL ASSESSMENT FOR THE PROPOSED
KAPALANA EXPLORATORY WELLS, TRK: 1-6-22:07, KAPALANA, OAHU, HAWAII

We are in receipt of your Draft Environmental Assessment (EA) dated January 1995 for the subject project. We have examined the draft EA and have the following comments:

1. The draft EA states that after the two subject exploratory wells have been drilled and cased, water from each of the two wells will be evaluated individually. If the quantity and quality of the water are suitable, these two exploratory wells may be converted to production wells.
2. Hawaii Administrative Rules, Title 11, Chapter 20, Rules Relating to Potable Water Systems, Section 11-20-29, requires that all new sources of potable water serving a public water system be approved by the Director of Health prior to its use. Such an approval is based primarily upon the submission of a satisfactory engineering report which addresses the requirements set in Section 11-20-29.
3. The engineering report must identify all potential sources of contamination and evaluate alternative control measures which could be implemented to reduce or eliminate the potential for contamination, including treatment of the water source. In addition, water quality analysis, performed by a laboratory certified in the State of Hawaii, must be submitted as part of the report to demonstrate compliance with all drinking water standards. Additional tests may be required by the Director upon his review of the information submitted.

Mr. Barry Usagawa
February 6, 1995
Page 2

If you should have any questions, please contact the Safe Drinking Water Branch, Engineering Section, at 586-4258.

Sincerely,

William Wong

WILLIAM WONG, P.E., Chief
Safe Drinking Water Branch

Grl:la

cc: ✓ CH2M Hill
1585 Kapiolani Blvd., Suite 1420
Honolulu, Hawaii 96814-4530

Attn: Mr. Bennett Mark

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU



COPY

BENJAMIN J. CAVETANI RECEIVED
Governor of the BOARD OF WATER SUPPLY

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950752

Chairperson
MICHAEL D. WILSON
Board of Land and Natural Resources

Dputy Director
GILBERT COLOMA-AGARAN
Aquaculture Development
Aquatic Resources
Boating and Ocean Recreation
Bureau of Conveyances
Conservation and Environmental Affairs
Forestry and Wildlife
Historic Preservation
Land Management
State Parks
Water and Land Development

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

P. O. Box 621
Honolulu, Hawaii 96809

REF:OCEA:DKP

FILE NO.: 95-361
DOC. ID.: 5401

Honorable Raymond H. Sato
Manager and Chief Engineer
Board of Water Supply
City and County of Honolulu
630 South Beretania Street
Honolulu, Hawaii 96843

MAR 14 1995

Dear Mr. Sato:

SUBJECT: Draft Environmental Assessment (DEA): Kapalama Exploratory Wells, Kapalama, Oahu; TMK: 1-6-22: 7

We have reviewed the DEA information for the subject project transmitted by CH2M HILL's memorandum and have the following comments:

Division of Aquatic Resources

The Division of Aquatic Resources (DAR) notes the following concerns relative to the Kapalama Stream and Kalihi Stream which are both located near the project site.

It is understood that the water withdrawn from the basalt by the pumping of the wells is not expected to affect the near-surface water flowing into Kapalama Stream because of the 195 feet distance separating the intake section of the wells from the stream's invert and because of the intervening alluvium layer that isolates the near-surface groundwater from the basaltic groundwater.

The DEA indicates that care will be taken in disposing of the test water to preclude the possibility of flushing debris or re-suspending sediments and other pollutants into Kapalama Stream. However, since the aquatic resource values in both Kalihi and Kapalama Streams are considered moderate, both harboring a number of exotic species and a few native fish species in certain areas of each stream, construction activities could have potential short-term impacts such as increased turbidity and biota displacement and disturbance.

April 12, 1995

Mr. William Wong, P.E., Chief
Safe Drinking Water Branch
Department of Health
State of Hawaii
P. O. Box 3378
Honolulu, Hawaii 96801

Dear Mr. Wong:

Subject: Your letter of February 6, 1995 on the Draft Environmental Assessment (EA) for the Proposed Kapalama Exploratory Wells. TMK: 1-6-22: 07

Thank you for reviewing the Draft EA for the proposed Kapalama Exploratory Wells project and for providing the requirements for an acceptable engineering report.

We understand our proposed project is required to comply with the Hawaii Administrative Rules, Section 11-20-29, Rules Relating to Potable Water Systems. We shall comply with all Department of Health requirements, including the submission of an acceptable engineering report to obtain certification of the well if test pumping is successful.

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



COPY

Mr. R. Sato

- 2 -

File No.: 95-361

DAR suggests the following measures be incorporated to minimize erosion and siltation during construction:

1. Site work be scheduled for periods of minimal rainfall.
2. Lands denuded of vegetation be replanted or covered as quickly as possible to control erosion; and
3. Construction materials, petroleum products, and debris should be prevented from falling, blowing, or leaching into the aquatic environment.

Inasmuch as all drilling and construction activities will occur approximately 400-500 feet from these streams and provided that appropriate mitigation measures are undertaken, this project is not expected to have significant adverse impacts on the aquatic resource values in this area.

Historic Preservation Division

We reiterate the comments of the Historic Preservation Division (HPD) which were previously forwarded directly to CH2M Hill. Those comments were as follows:

"The DEPA supports our "no effect" on historic sites determination to the Commission on Water Resource Management dated April 4, 1994. The copy of the archaeological reconnaissance survey report by Cultural Surveys Hawaii has been placed in our library where it is available for public review and comment.

It is possible that historic sites, including human burials, will be uncovered during routine construction activities. Should this be the case, all work in the vicinity must stop and HPD must be contacted at 587-0047."

We have no further comment at this time. Thank you for the opportunity to comment on this matter.

Please feel free to contact Steve Tagawa at our Office of Conservation and Environmental Affairs, at 587-0377, should you have any questions.

Aloha,

MICHAEL D. WILSON

C: OEOC
Bennett Park, CH2M HILL

April 18, 1995

Mr. Michael Wilson, Chairperson
Department of Land and Natural Resources
State of Hawaii
P.O. Box 621
Honolulu, Hawaii 96809

Dear Mr. Wilson:

Subject: Your Letter of March 31, 1995 on the Draft Environmental Assessment (EA) for the Proposed Kapalama Exploratory Wells. TMK: 1-8-22: 07

Thank you for reviewing the Draft EA for the proposed Kapalama Exploratory Wells project. We have the following comments:

Division of Aquatic Resources

We acknowledge your comments that this project is not expected to have significant adverse impacts on the aquatic resource values in this area.

The following measures will be incorporated to minimize erosion and siltation during construction:

1. Best management practices will be implemented during the test pumping of the exploratory wells to minimize potential pollution of receiving waters. Care will be taken in the disposal of the test water to prevent flushing debris into the roadway storm drainage system that leads to Kapalama Stream. Flow velocities will be dissipated to reduce any scouring effects in Kapalama Stream.
2. The bulk of the site work will be scheduled during a period of low rainfall. It is expected that the bulk of the construction work on the site will be completed during the drier summer months of 1995.
3. Lands denuded of vegetation will be replanted or covered as quickly as practical to control erosion.
4. Construction materials, petroleum products, and debris will be prevented from falling, blowing, or leaching into the Kapalama Stream aquatic environment by way of the roadway drainage system.

PLN-37195

RONALD B. WELLS, CHAIRMAN
BOARD OF LAND AND NATURAL RESOURCES

- DEPUTY DIRECTOR
- AGRICULTURE DEVELOPMENT PROGRAM
- AQUATIC RESOURCES CONSERVATION AND DEVELOPMENT
- ENVIRONMENTAL AFFAIRS
- CONSERVATION AND RESOURCES DEVELOPMENT
- CERTIFICATION
- FORESTRY AND WILDLIFE CONSERVATION
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- STATE PARKS
- WATER AND LAND DEVELOPMENT

LOG NO: 13785
DOC NO: 9502EJ05



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
STATE HISTORIC PRESERVATION DIVISION
23 SOUTH KING STREET, 4TH FLOOR
HONOLULU, HAWAII 96813

COLLEEN A. CANTANO
GOVERNOR OF HAWAII

February 14, 1995

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

Dear Mr. Mark:

SUBJECT: Kapalama Exploratory Wells Draft Environmental Assessment
Kapalama, Kona, O'ahu
TRK: 1-6-22:007

Thank you for the opportunity to review the DEA for the proposed Kapalama Exploratory Wells. The DEA supports our "no effect" on historic sites determination to the Commission on Water Resource Management dated April 4, 1994. The copy of the archaeological reconnaissance survey report by Cultural Surveys Hawaii has been placed in our library where it is available for public review and comment.

It is possible that historic sites, including human burials, will be uncovered during routine construction activities. Should this be the case all work in the vicinity must stop and the Historic Preservation Division must be contacted at 587-0047.

Sincerely yours,

Don HIBBARD, Administrator
Historic Preservation Division

EJ:amk

COPY



BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU

Mr. Michael D. Wilson
Page 2
April 18, 1995

Historic Preservation Division

1. We acknowledge your determination that the proposed project will have no effect on any historic sites.
2. In the unlikely event that historic sites, including human burials are uncovered during routine construction activities, all work in the vicinity will be stopped and the Historic Preservation Division will be contacted.

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

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU



COPY

RECEIVED
BD OF WATER SUPPLY CITY AND COUNTY OF HONOLULU
850 SOUTH KING STREET
HONOLULU, HAWAII 96813

RS Mr
2 Feb 95

FEB 29 2 44 PM '95



KENNETH E. SPRAGUE
ACTING DIRECTOR AND CHIEF ENGINEER
DARRIN J. HANAMOTO
DEPUTY DIRECTOR
ENV 95-076

April 17, 1995

February 28, 1995

Mr. Don Hibbard, Administrator
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 February 14, 1995 on the Draft Environmental Assessment
(EA) for the Proposed Kapalama Exploratory Wells. TMK: 1-6-22: 07

Thank you for reviewing the Draft EA for the proposed Kapalama Exploratory Wells project.

We acknowledge your determination that the proposed project will have no effect on any historic sites.

In the unlikely event that historic sites, including human burials, are uncovered during routine construction activities, all work in the vicinity will be stopped and the Historic Preservation Division will be contacted.

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

Very truly yours,

Raymond H. Sato

RAYMOND H. SATO
Manager and Chief Engineer

cc: Mr. Bennett Mark, CH2M Hill

MEMORANDUM

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

ATTENTION: BARRY USAGAWA

FROM: *Ken* KENNETH E. SPRAGUE
ACTING DIRECTOR AND CHIEF ENGINEER

SUBJECT: DRAFT ENVIRONMENTAL ASSESSMENT (DEA)
KAPALAMA EXPLORATORY WELLS
TAX MAP KEY: 1-6-22: 07

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

- Section 1.6 Potential Impacts of the Project and Mitigation Measures: Add statement that best management practices (BMPs) will be implemented.
- Section 4.3.3 Surface Water Hydrology: Suggest deleting last two paragraphs since they appear in Section 4.3.4.
- Section 4.3.5 Mitigation Measures: Expand discussion on BMPs during construction, yield drawdown test and constant rate pumping test. Also describe some specific BMPs to minimize debris and sediment suspension.
- Obtain the following permits from the Department of Public Works:
 - Construction dewatering permit to discharge ground water into municipal separate storm sewer system (MS) resulting from drilling operation.
 - Effluent discharge permit for pump testing.

JS

Ray Sato, Acting Manager and Chief Engineer
Page 2
February 18, 1995

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU



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Should you have any questions, please contact Mr. Alex Ho at
Local 4150.

April 28, 1995

cc: CH2M Hill (Bennett Mark)

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

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

SUBJECT: YOUR MEMORANDUM OF FEBRUARY 28, 1995 ON THE DRAFT
ENVIRONMENTAL ASSESSMENT (EA) FOR THE PROPOSED KAPALAMA
EXPLORATORY WELLS. TMK: 1-6-22: 07

Thank you for reviewing the Draft EA for the proposed Kapalama Exploratory Wells project. We have the following comments to your specific concerns:

1. A statement will be added in Section 1.6 similar to Section 4.3.5, indicating that best management practices (BMP) will be implemented during the test pumping of the exploratory wells to minimize potential pollution of receiving waters.
2. Your suggestion regarding Section 4.3.3 on Surface Water Hydrology is noted.
3. Section 4.3.5 on Mitigation Measures; BMP during construction and exploratory well test pumping will be expanded to include the following measures:
 - a. Care will be taken in the disposal of the test water to prevent flushing debris into the roadway storm drainage system that leads to Kapalama Stream. Flow velocities will be dissipated to reduce any scouring effects.
 - b. The majority of the site work will be scheduled during a period of low rainfall.
 - c. Lands denuded of vegetation will be replanted or covered as quickly as practical to control erosion.



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Mr. Kenneth E. Sprague
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April 28, 1995

4. We understand that the proposed project will be required to obtain the following permits from the Department of Public Works:

- a. Construction dewatering permit to discharge groundwater into separate municipal storm sewer system (M4) if drilling operations result in discharges reaching the storm sewer.
- b. Effluent discharge permit for test pumping.

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

cc: Bennett Mark, CH2M Hill

RECEIVED
BOARD OF WATER SUPPLY
FEB 28 11 06 AM '95

JEREMY HARRIS
SAVON

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



CHERYL D. SOON
CHIEF PLANNING OFFICER
CAROLL YAMAMOTO
DEPUTY CHIEF PLANNING OFFICER

RS 1/95-0135

February 27, 1995

MEMORANDUM

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

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

SUBJECT: DRAFT ENVIRONMENTAL ASSESSMENT (DEA)
KAPALAMA EXPLORATORY WELLS

We have reviewed the Draft Environmental Assessment (DEA) for the Kapalama Exploratory Wells, as requested by CH2M HILL. We have the following comments to offer:

1. As noted in the DEA, exploratory wells do not require designation on our Development Plan Public Facilities (DPPF) map. Should the wells prove to be viable, we will work with you to add the project to the DPPF map.
2. The parcel in question is designated "Public Facility" on our Development Plan (DP) Land Use map.
3. We are concerned about maintaining an adequate water supply for Honolulu's future. While we understand the need to develop additional potable water sources, we are concerned about withdrawing more water than the estimated sustainable yield, as indicated in the DEA. A discussion of (1) why the Commission on Water Resource Management set the authorized water use above the sustainable yield and (2) the short term and long term impacts (on water quality and quantity) of withdrawing water above the sustainable yield would be helpful. It would be useful to provide any current data on water quality of Kalihi aquifer under current condition of withdrawals greater than the sustainable yield.

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Ray Sato, Manager and Chief Engineer
Board of Water Supply
February 27, 1995
Page 2

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU

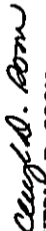


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To address the issue of water allocation, the DEA indicates that BWS intends to take Dole and Del Monte's allocations to operate the Kapalama Well. However, there is only 0.88 mgd that was unutilized by the companies in 1990. As the Kalihi Aquifer was being over-utilized in 1990, we are hesitant to support a project which may result in additional burden to the Kalihi system. A discussion of the issue of water withdrawal in relationship to sustainable yield of the Kalihi aquifer would be appropriate.

4. The DEA is based on 1990 data for water withdrawals, sustainable yields and water allocations. More current data would probably be more meaningful.

Thank you for giving us the opportunity to review the Kapalama Exploratory Wells DEA. Please call Rona Suzuki at 527-6076 if you have any questions.


CHERYL D. SOON
Chief Planning Officer

CDS:lh

cc: CH2M HILL

May 26, 1995

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

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

SUBJECT: YOUR MEMORANDUM OF FEBRUARY 27, 1995 ON THE DRAFT
ENVIRONMENTAL ASSESSMENT (EA) FOR THE PROPOSED KAPALAMA
EXPLORATORY WELLS. IMK-1-6-22-97

Thank you for reviewing the Draft EA for the proposed Kapalama Exploratory Wells project.

We provide the following comments to your concerns:

1. The parcel is currently designated "Public Facility" on the Development Plan Land Use Map. We acknowledge that the exploratory well project need not be shown on the Development Plan Public Facilities Map until plans for a permanent well station are formalized.
2. We share your concern on the detrimental water quality effects of over drafting wells beyond the aquifer's sustainable yield; however, pumpage from the Kapalama Wells will not exceed the sustainable yield. The Commission on Water Resource Management (CWRM) establishes sustainable yields of each aquifer and sets permitted uses for each water source. The sustainable yield and permitted uses for the Kalihi aquifer sub-sector were obtained from the CWRM's Oahu Water Management Plan and were established when the State Water Code was enacted in 1987. The permitted uses for Honolulu sources were allocated in the early 1980's prior to creating separate sub-sectors within the Honolulu Groundwater Control Area. The sub-sectors do not necessarily reflect distinct hydrologic units within the Honolulu area. What is important is that the permitted uses of 49.6 mgd for the entire Honolulu Water Management Area remain within the 53 mgd sustainable yield.



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Ms. Cheryl D. Soon
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May 26, 1995

The CWRM is presently reevaluating each sub-sector's sustainable yield and current pumpages relative to previously established permitted uses. Because the reevaluation is complex and time consuming, the Kapalama Wells requires a reallocation of unused permitted use from existing sources such as the caninery wells. Therefore, pumpage from the proposed Kapalama Wells will be in accordance with the permitted use as authorized and approved by the CWRM.

3. Sustainable yields and water allocations reflect the most current data available. The average day pumpage data will be updated in the Final EA.

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

/s/ Bennett Mark, CH2M Hill