Kahuku (Malaekahana)
Exploratory Wells

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96843
PHONE (808) 527-6180
FAX (808) 533-2714

May 12, 1997

RECEIVED
'97 MAY 12 P2:03
OFC. OF ENVIRONMENTAL QUALITY CONTROL

Mr. Gary Gill, Director
Office of Environmental Quality Control
State of Hawaii
State Office Tower, Suite 702
235 South Beretania Street
Honolulu, Hawaii 96813

Dear Mr. Gill:

Subject: Final Environmental Assessment for the Kahuku (Malaekahana) Exploratory Wells Project, Malaekahana, Oahu, Hawaii, TMK: 5-6-07: 01

We request the subject Final Environmental Assessment be published in the May 23, 1997 Office of Environmental Quality Control (OEQC) Bulletin. A Finding of No Significant Impact is declared for the project. Please find the completed OEQC Bulletin Publication Form and four (4) copies of the document attached for your use.

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

Very truly yours,

FOR RAYMOND H. SATO
Manager and Chief Engineer

Attachment

cc: Dan Lum, Water Resource Associates

1997-05-23-OA-FEA- Kahuku (Malaekahana) Exploratory Wells

FINAL

ENVIRONMENTAL ASSESSMENT

KAHUKU (MALAEKAHANA) EXPLORATORY WELLS

Malaekahana, Oahu, Hawaii
Tax Map Key: 5-6-7:01

Proposing Agency
City & County of Honolulu
Board of Water Supply

Water Resource Associates
Honolulu, Hawaii

FINAL

ENVIRONMENTAL ASSESSMENT

Submitted pursuant to
Chapter 343, Hawaii Revised Statutes

KAHUKU (MALAEKAHANA) EXPLORATORY WELLS

Malaekahana, Oahu, Hawaii
Tax Map Key: 5-6-7:01

Proposing Agency
City & County of Honolulu
Board of Water Supply

Water Resource Associates
Honolulu, Hawaii

May 1997

CONTENTS

CONTENTS (Cont'd)

CONTENTS (Cont'd)

FIGURES

Chapter 1. EXECUTIVE SUMMARY

1.1 *Introduction*

The Honolulu Board of Water Supply (BWS) a semi-autonomous county agency responsible for developing and operating a financially self-supporting municipal water system for the City & County of Honolulu, has carried out a series of planning efforts to locate and develop new groundwater sources in windward Oahu to meet the area's projected water needs. In 1988, as an integral part of these efforts, the BWS prepared an Environmental Impact Statement (EIS) which presented a regional plan for various water system improvements in an area of approximately 150 square miles, extending from Makapuu northward to Malaekahana (BWS, 1988).

The proposed water system improvements included the exploration and development transmission pipelines and storage tanks. One of the proposals in the EIS was for the exploration and development of up to three exploratory wells (two operating and one standby) in the Malaekahana area, located between Laie and Kahuku towns.

1.2 Proposing Agency and Proposed Action

The City & County of Honolulu, Board of Water Supply (BWS) proposes to drill, case, and test two exploratory wells on a parcel of undeveloped land identified as Tax Map Key 1-5-6-07:1 and located 1¾ miles inland of Malaekahana Bay on the south side of Malaekahana Gulch in windward Oahu. The proposed wells will be drilled within an approximately 100 ft. x 200 ft. site in a secondary forest area. The site is accessible from Kamehameha Highway via an existing coral and dirt road that begins just south of Kahuku town.

The purpose of the proposed action is to locate a new municipal source of water supply to serve the area of windward Oahu extending from Malaekahana to Kahuku. The construction and testing of the first well will provide the necessary geological and hydrological data to determine the characteristics of the expected underlying basal aquifer and the quantity and quality of ground water available for a new source of supply.

The two exploratory wells are located at an approximate elevation of 170 feet and will have a design depth of 370 feet. The wells will have a cased section consisting of 12-inch inside diameter steel casing to a depth of 220 feet (-50 ft., msl) and an open-hole section consisting of an 11-inch diameter uncased drill hole. The cased section of the well will be grouted in the annular space surrounding the casing.

1.3 Purpose of This Environmental Assessment

This environmental assessment (EA) has been prepared pursuant to Chapter 343 of the Hawaii Revised Statutes (HRS). Under Chapter 343, HRS, an EA is required because the proposed action of drilling, casing, and testing of two exploratory wells at Malaekahana will require the use of County (BWS) funds.

This final environmental assessment and issuance of the accompanying Finding of No Significant Impact by the BWS satisfies the provisions of Chapter 343, HRS. By this statement, the BWS affirms that the proposed action will have no significant impact on the environment and therefore does not require the preparation of an environmental impact statement.

1.4 Benefits of Proposed Action

The data gathered from the proposed exploratory wells will provide a valuable addition to Oahu's hydrogeological data base. This data will also be valuable in estimating the availability and quality of basal groundwater resources in the Malaekahana area. If the pumping test results are satisfactory, the exploratory

wells will eventually be converted into production wells and provide a needed new source of municipal supply for the Malaekahana-Kahuku area.

1.5 Alternatives Considered

The no-action alternative, the delayed action alternative, and site alternative are discussed in this environmental assessment and also in the BWS's EIS for Windward Oahu Regional Water System Improvements (BWS, 1988).

The no-action alternative was not pursued because it would be contrary to the BWS's legal mandate to provide for growing consumer demand for municipal water. The proposed action is part of the BWS's overall groundwater development program to increase municipal water supplies to meet Oahu's growing water demand, including that of windward Oahu. If the BWS's ground water development program is curtailed, the BWS will not be able to adequately plan and provide for the municipal water needs of the future, which may result in unnecessary emergencies, water use restrictions, and water shortages.

1.6 Probable Impacts and Mitigation Measures

The proposed action of drilling, casing, and testing of two exploratory wells at Malaekahana are expected to have no significant effect on the ground water and surface water resources of the Koolauloa aquifer system. The wells will be drilled and completed in a manner that will protect the basal aquifer from surface contamination and the impact of pump testing the wells will be limited to a short-term, recoverable effect on the aquifer. Without benefit of the well testing results, it is anticipated from hydrologic experience in similar hydrogeologic areas, that conversion of the exploratory wells to production wells will in all likelihood produce no long-term adverse effects on the Koolauloa aquifer system. This is primarily because the anticipated withdrawal of one to two mgd is very small when compared to the 35 mgd sustainable yield or the 17.277 mgd unallocated sustainable yield of the aquifer system. Primarily, because of these comparative numbers and

the several miles distance, the future use of the wells probably will have no measurable effect on the wetlands north of Kahuku.

The construction and testing of the two exploratory wells will have no effect on the intermittent surface water resources in Malaekahana and adjacent streams.

Construction and testing of the exploratory wells will have minor, short-term impacts on noise and air pollution, but which may not impact anyone because of the remote and almost isolated location of the project. The Contractor will, however, comply with the conditions of a required noise permit.

Site clearing and grading work for mobilizing a drilling rig onto the project site will be mitigated by the contractor.

The ground water pumped during well testing will be clear potable water and will not introduce any pollutants into the environment. The contractor will be required to properly dispose the pumped water using a temporary pipeline and appropriate discharge outlet to preclude any soil erosion or sediment load in the Malaekahana Stream channel. In addition, Best Management Practices will be implemented during the well construction phase to prevent drilling by-products and petroleum products from heavy equipment from entering the stream. A National Pollution Discharge Elimination Permit is not required for the disposal of pumped water from well pumping tests.

1.7 Required Permits and Approvals

A well construction permit will be required from the State Commission on Water Resource Management (CWRM), Department of Land and Natural Resources, for the drilling and testing of the two proposed exploratory wells.

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

If the well tests are successful and the exploratory wells are to be converted into production wells, an application for a Development Plan Public Facilities Map amendment must be made to the City & County of Honolulu Planning Department and approval by the City & County of Honolulu City Council will be required. In

addition, conversion to production wells will require pump installation and water use permits from the CWRM and their use will require approval from the State Department of Health in accordance with the provisions of Hawaii Administrative Rules, Title 11, Chapter 20. A separate Environmental Assessment for the production facility will also be prepared to fulfill the requirements of Chapter 343, HRS.

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.

(1) Commission on Water Resource Management, Department of Land and Natural Resources:

(2) Environmental Management Division, Department of Health

(3) Office of Environmental Quality Control, Department of Health

(4) City and County of Honolulu, Planning Department

(5) City and County of Honolulu, Department of Land Utilization

The following government agencies, groups, and individuals were provided a copy of the draft environmental assessment and requested to provide comments.

- Federal Agencies
  - U.S. Army Corps of Engineers, Pacific Ocean Division
  - U.S. Department of the Interior:
    - Fish and Wildlife Services
    - Geological Survey, Water Resources Division
- State 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 & County of Honolulu Agencies:
  Planning Department
  Department of Land Utilization
  Department of Public Works

- Others:
  City Council District 2, Member Steve Holmes
  Kamehameha Schools/Bishop Estate
  Koolauloa Neighborhood Board No. 28, Chair Sam Langi
  Sierra Club, Hawaii Chapter
  James Campbell Estate
  Office of Hawaiian Affairs, Louis Manrique

Chapter 2. PURPOSE AND NEED FOR PROPOSED ACTION

2.1 Introduction

The Honolulu Board of Water Supply (BWS), a semi-autonomous county agency responsible for developing and operating a financially self-supporting municipal water system for the City and County of Honolulu, has carried out a series of planning efforts to locate and develop new groundwater sources in windward Oahu to meet the area's projected water needs. In 1988, as an integral part of these efforts, the BWS prepared an Environmental Impact Statement (EIS) which presented a regional plan for various water system improvements in an area of approximately 150 square miles, extending from Makapuu northward to Malaekahana (BWS, 1988).

The proposed water system improvements included transmission pipelines, storage reservoirs, and source developments. One of the proposals for new source developments was the exploratory drilling of up to two operating and one standby wells at Malaekahana, located just north of Laie town.

Municipal water use on Oahu has increased steadily over the years. In 1980, the average municipal water use on Oahu amounted to 130 mgd, and in the BWS's 1982 *Oahu Water Plan* municipal water use was projected to increase to 156 mgd by 1990. In 1990, the actual potable water use by the BWS averaged 156 mgd, which was the projected amount. The average municipal water use on Oahu is projected to reach 177 to 186 mgd by the year 2000 and between 197 and 206 mgd by the year 2010, depending upon whether or not the upper limit of the City & County of Honolulu's General Plan population projections for Oahu are attained (Oahu Water Management Plan, review draft, 1995, in preparation). Therefore, the BWS must plan and explore for new sources of potable ground water throughout Oahu, including windward Oahu.

The average municipal water use by the BWS in the Koolauloa aquifer system, where the proposed project is located, was 1.5 mgd in 1980 and 1.8 mgd in 1988 with a projection of 2.4 to 2.6 mgd, or an increase of 33% to 44% by the

year 2000 and 2.5 to 2.6 mgd by the year 2010, or an increase of 39% to 44% over the year 1988 (Table 4-3, Oahu Water Management Plan, review draft, 1995, in preparation). Thus, the BWS needs to pursue the proposed project of drilling and testing the two proposed exploratory wells at Malaekahana.

2.2 State Water Code and Commission on Water Resource Management

The proposed action to explore for a new source of ground water at Malaekahana will require various approvals by the State Commission on Water Resource Management (CWRM) because it is located in the Koolauloa Water Management Area designated in 1992.

In 1987, the State Legislature passed the State Water Code (Section 174-C, HRS) which created the CWRM within the Department of Land and Natural Resources for the purpose of managing the water resources of the State.

To date, a number of reports relating to water resource planning and management have been prepared or funded by the CWRM and include the following:

(a) Water Resource Protection Plan
(b) County Water Use and Development Plans
(c) Water Quality Plan
(d) State Water Projects Plan

These reports have compiled basic data, established guidelines, and delineated hydrologic sectors and aquifer systems for management of groundwater resources throughout the State.

Under the State Water Code, the CWRM has the power to establish or designate *water management areas* for the regulation and control of all water use (surface and ground water) therein. Control of water use is primarily effected by the requirement for various types of permits, but complete control is effected by the designation of water management areas (WMA).

2.3 Hydrologic Sectors and Aquifer Systems on Oahu

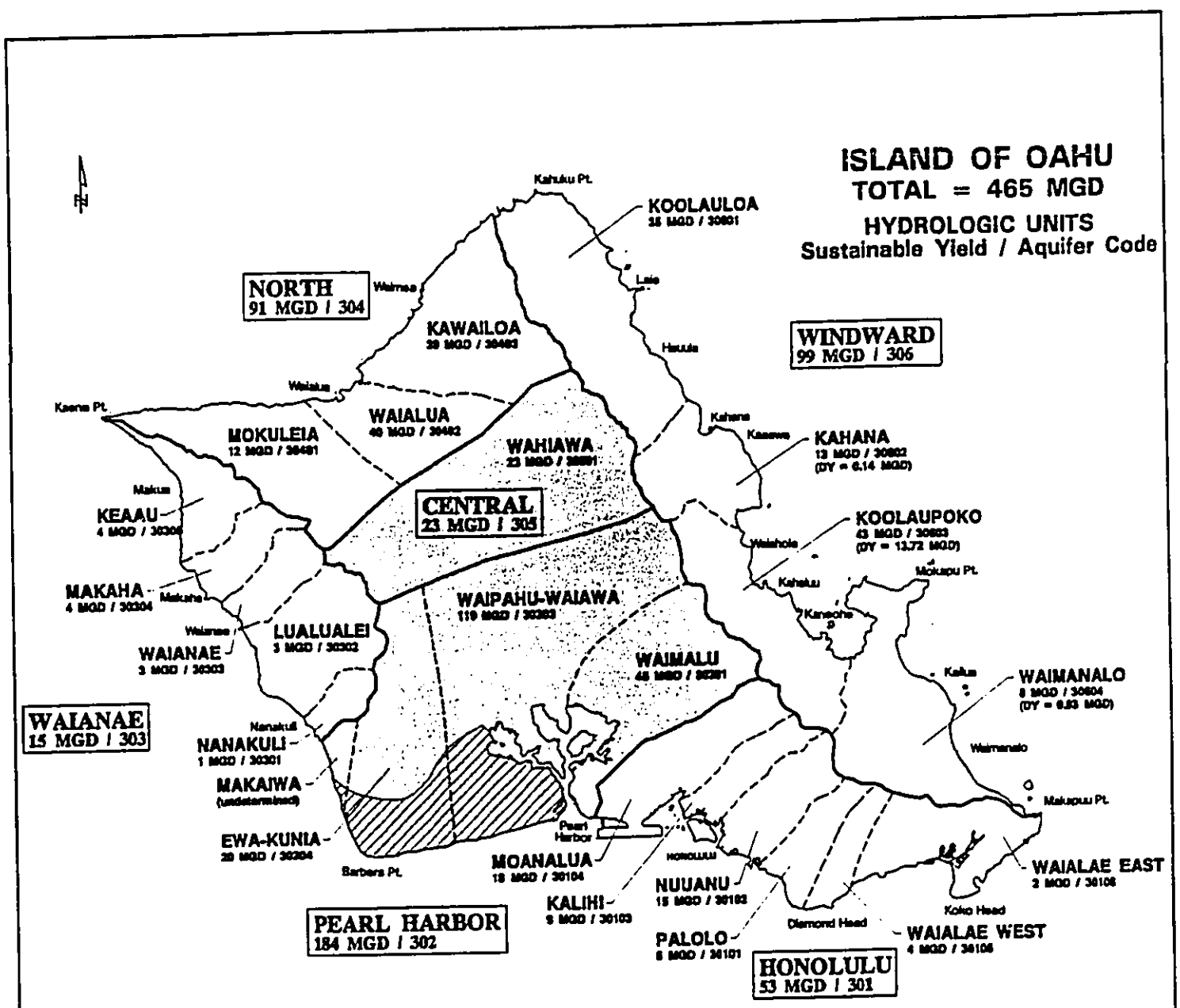
The CWRM has delineated hydrologic sectors and aquifer systems throughout the State. On Oahu, six hydrologic sectors have been established, namely, the Honolulu, Pearl Harbor, Central, North, Windward and Waianae Sectors. Five of the six hydrologic sectors have been subdivided into two or more aquifer systems. The exception is the Central Sector (see Figure 1).

The CWRM has designated the aquifer systems in all of these hydrologic sectors as Water Management Areas for ground water management and control except for those in the Waianae Sector. The aquifer systems on Oahu most recently designated as Water Management Areas were those comprising the Windward Hydrologic Sector, namely, the Waimanalo, Koolaupoko, Kahana, and Koolauloa Aquifer Systems. These systems were designated by the CWRM on May 5, 1992 (Lenore Nakama, personal communication, January 1996).

2.4 Koolauloa Water Management Area

The proposed action is located within the Koolauloa Water Management Area designated by the CWRM. Within a designated water management area, all exploratory drilling and groundwater withdrawals and uses are subject to regulation and control by the CWRM through the issuance of well construction, pump installation, and water use permits. In such areas, one of the major concerns is that the total permitted water use does not exceed the sustainable yield.

In the same action that the CWRM designated the Koolauloa aquifer system as a water management area (WMA), the CWRM also adopted a sustainable yield of 35 mgd for the Koolauloa WMA (Lenore Nakama, personal communication, January 1996). A full discussion of the Koolauloa WMA, its established sustainable yield of 35 mgd, and its current (January 1996) permitted water uses which total 17.723 mgd are presented in Section 4.3, Hydrology, of this report.



Environmental Assessment
Malaekahana Exploratory Wells
City & County of Honolulu - Board of Water Supply

AQUIFER SYSTEMS OF OAHU

Water Resource Associates
066

Source: Commission on Water Resource Management, 1995

0 5 miles 10 miles

Figure 1

2.5 Recommended Water System Improvements

In the *EIS for Regional Water System Improvements for Windward Oahu*, the BWS evaluated a number of water system improvements which included new source developments, transmission pipelines, and storage reservoirs.

Within the Koolauloa aquifer, the BWS identified potential sites for water source development in the Malaekahana and Laie areas. Up to two operating wells and one standby well were proposed at Malaekahana (TMK 5-6-07:1), one operating and one standby well at Laie (TMK 5-5-07:1), and one operating and one standby well at Wailele (TMK 5-5-07:1). In the 1988 EIS, the proposed Malaekahana exploratory wells were planned, but not included in the BWS budget.

Chapter 3. PROJECT DESCRIPTION

3.1 Site Location

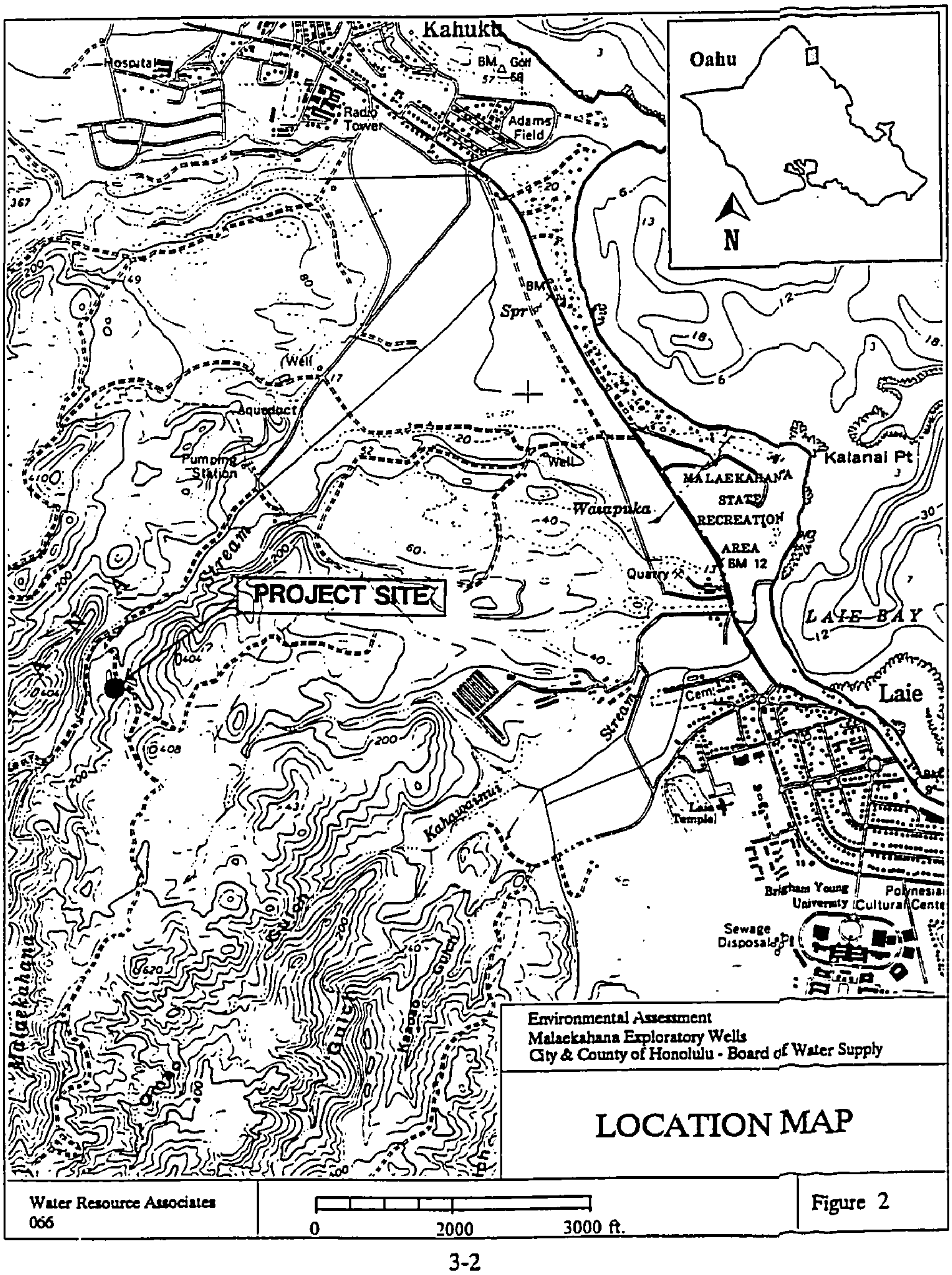
The proposed exploratory well site is located approximately 1¾ miles inland from the coast at Malaekahana an elevation of approximately 170 feet (see Figure 2). The site is situated on a small terrace of undeveloped land which lies about 400 feet from and 100 feet above Malaekahana Stream. The site lies in a disturbed secondary forest area composed largely of Java plum trees and is underlain by deeply weathered basalt (saprolite) with a thin to moderate residual soil cover. During field studies, the project site and adjacent areas were noted to have been bulldozed and graded as well as fenced. Evidence of recent horse grazing was also noted.

The project site is accessible from Kamehameha Highway via a mile of improved coral road that begins at the south edge of Kahuku town, a ½-mile of unimproved dirt road, and a ¼-mile of overgrown dirt road. The unimproved dirt road crosses Malaekahana Stream from the north side to the south side via a concrete ford.

The two proposed Malaekahana exploratory wells will be located within an approximately 100 x 200 ft. area within a parcel of land owned by the Campbell Estate and identified as Tax Map Key 1-5-6-07:1 (see Figure 3). It is also designated Agriculture on the Koolauloa Development Plan Land Use Map.

3.2 Exploratory Well Characteristics

The BWS is proposing in this environmental assessment to drill, case, and test two exploratory wells (one operating and one standby) within an approximately 100 ft. x 200 ft. sites to locate a new municipal source of supply to serve the Windward Oahu area extending from Laie to Kahuku, including replacing and supplementing old private wells that now serve the Kahuku area.

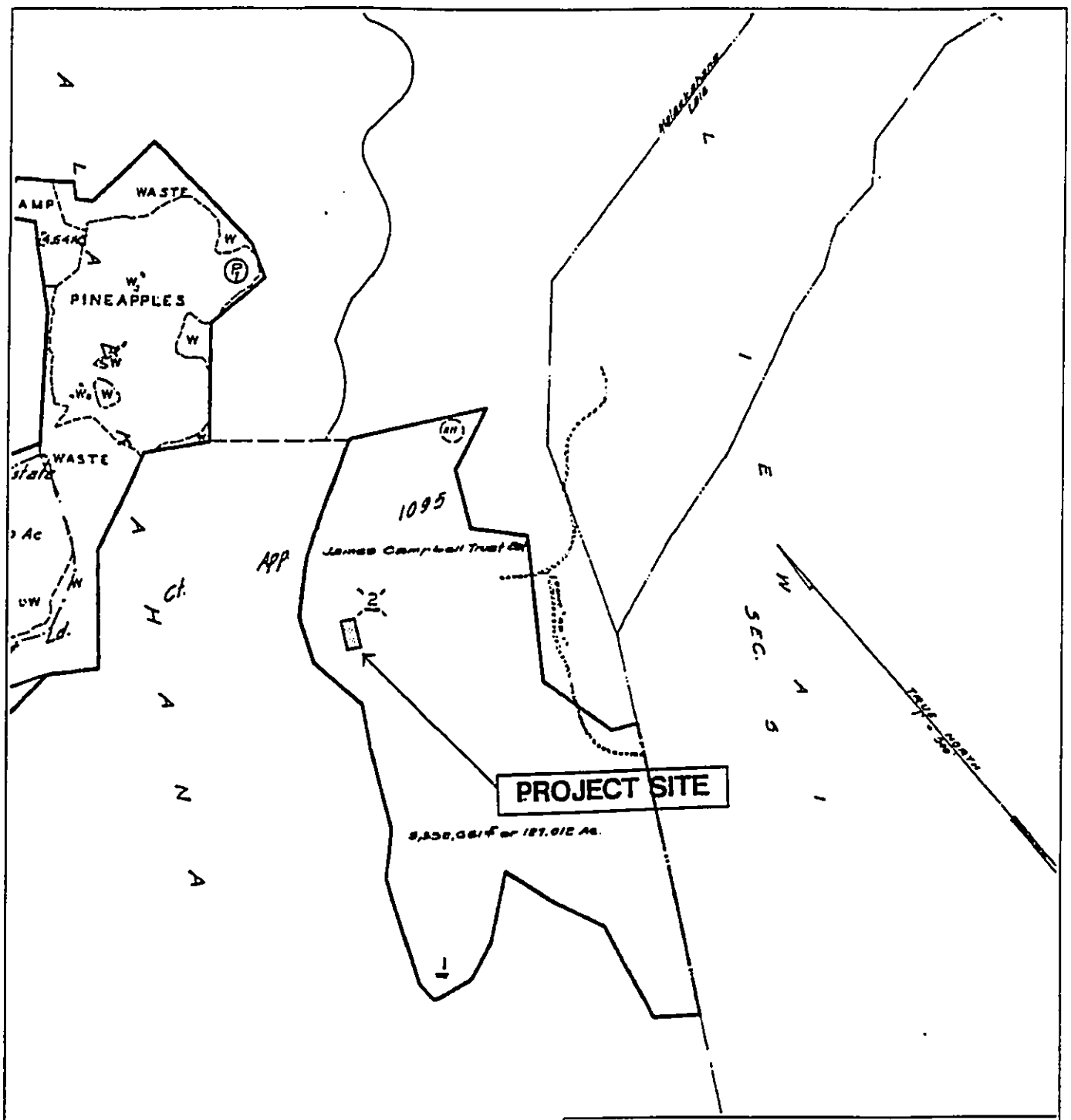


Environmental Assessment
Malaekahana Exploratory Wells
City & County of Honolulu - Board of Water Supply

LOCATION MAP

Water Resource Associates
066

Figure 2



Environmental Assessment
Malaekahana Exploratory Wells
City & County of Honolulu - Board of Water Supply

TAX MAP KEY

Water Resource Associates 066	Malaekahana Wells Site, Oahu (TMK 5-6-07:1)	Figure 3

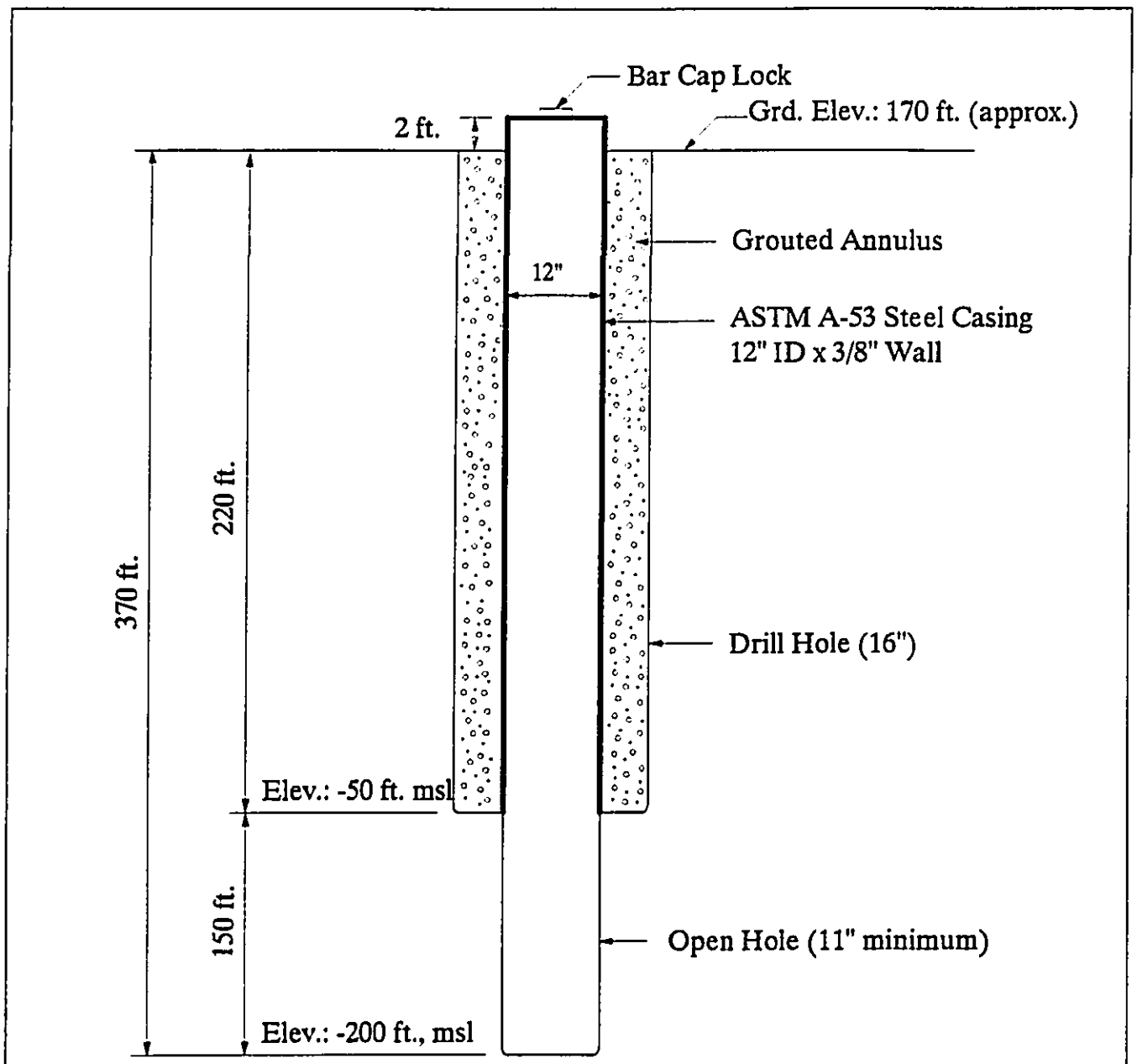
Both wells are proposed to be approximately 370 feet deep, or about 200 feet below mean sea Level (based upon an approximate ground elevation of 170 feet). The wells will be cased with 12-inch (inside diameter) solid steel (ASTM A-53) casing with 3/8-inch wall thickness to a depth of about 220 feet, or -50 feet, mean sea level. The annular space between the casing and the 16-inch diameter drill hole will be grouted to protect the casing and prevent surface contamination of the well. Each well will have with approximately 150 feet of 11-inch diameter open hole below the cased depth (see Figure 4) for the yield of potable water from the underlying basal aquifer in basaltic lava flows.

The proposed exploratory wells will be drilled with a percussion or rotary drilling rig, depending upon the lowest bidder, and will require a work space of 100 ft. x 200 ft. to accommodate a typical 8 ft. x 40 ft. drilling rig, appurtenant equipment and tools, and handling of well casing and test pump equipment.

3.3 Well Testing Procedures

Depending upon the method of drilling used, the drilling, casing, grouting, and testing of each well is expected to require six to nine months to complete. After the casing has been installed and static measurements made, a test pump unit, equipped to measure pumping rate and drawdown, will be installed in order to develop the aquifer formations and perform pumping tests which are used to determine yield and other aquifer characteristics.

First, a step-drawdown test will be conducted in which each well will be pumped at different rates between 500 and 1,000 gallons per minute for set intervals of time, while the drawdown of the water levels in the well are measured and samples of the pumped water are taken for water quality analysis. After the step-drawdown test is completed and the water level in the well has fully recovered, each well will then be pumped at a selected constant rate for a period of normally 5 to 7 days. The rate of pumping for the constant-rate test will be determined from the results of the step-drawdown test. Well drawdown will be monitored either continuously or at appropriate intervals and water samples taken at appropriate intervals for water quality analyses.



Not to Scale

Environmental Assessment
Malaekahana Exploratory Wells
City & County of Honolulu - Board of Water Supply

PROPOSED WELL SECTION

Water Resource Associates
066

ASTM - American Society for Testing and Materials
msl - Mean Sea Level

Figure 4

The pumped water will be clear, potable ground water and the contractor will be required to properly dispose it into Malaekahana Stream using Best Management Practices (BMP). This will include a temporary discharge pipeline, outlet, and baffle system that will dissipate flow velocities and thereby prevent erosion and excessive turbidity. BMPs will also be utilized to preclude any debris or pollutants, including drilling by-products and petroleum products from heavy equipment, from entering the stream channel. In general, an attempt will be made to schedule all work for dry months to minimize site runoff and the aforementioned impacts.

3.4 Project Schedule and Cost

Construction funds will be budgeted for Fiscal Year 1996-97 and it is anticipated that construction and testing of the first exploratory well would begin as early as late 1996 or early 1997. Each well will take six to nine months to complete and cost an estimated $200,000. If pumping test results and water quality analyses are successful, the exploratory wells will be converted to production wells in later phases of planning and development of a water production facility at the project site. Construction funds have not been budgeted for the second exploratory well at this time, but may be included in the design and construction phase of a production facility at the site. The second well is needed to serve as a standby and supplemental well source.

Conversion of the Malaekahana exploratory wells to production wells would require pump installation and water use permits from the State Commission on Water Resource Management (CWRM) and an amendment to the Development Plan Public Facilities Map to show the wells as a "site determined, water well facility programmed for construction within 6 years." A water production facility would include permanent pumps, appurtenant controls, a control building, and transmission pipelines connecting to Kamehameha Highway, urban areas, and public facilities (Kahuku High School, Kahuku Hospital, and Malaekahana State Park) in the Malaekahana-Kahuku area.

Chapter 4. ENVIRONMENTAL SETTING, PROBABLE IMPACTS, AND MITIGATION MEASURES

4.1 Climate

A. Temperature

The Malaekahana area, situated between Laie and Kahuku in the northern part of windward Oahu enjoys a mild and generally uniform climate, like all of the Hawaiian Islands. At Kahuku town, located two miles from the project site, the average annual temperature is 74.9° Fahrenheit with average monthly temperatures ranging from 72 to 79 degrees Fahrenheit. Temperatures are moderated by northeast trade winds which prevail most of the time, resulting in an average annual wind speed just over 10 miles per hour (Blumenstock, 1961). Humidity averages about 70 percent a year.

B. Rainfall

The project site has a median annual rainfall of about 55 inches per year. A mile and a half toward the coast, median annual rainfall is 40 inches (unpublished map, CWRM, 1990). However, due largely to its orographic origin, rainfall is most abundant in the mountain areas and is more or less coincident with the topography. Consequently, toward the Koolau Mountain range, median annual rainfall increases rapidly and over the crest of the range at the head of Malaekahana Stream, median annual rainfall amounts to 150 inches.

C. Probable Impacts and Mitigation Measures

The drilling, casing, and testing of the two proposed exploratory wells is not expected to have any significant effect on the existing climate of the area.

No mitigation measures are proposed or required.

4.2 Geology

A. Regional Geology

The Malaekahana project site is situated in the northern part of windward Oahu, amidst the lower slopes of basaltic lava flows that dip beneath a flat, mile-wide coastal plain of sedimentary deposits. The Koolau Range, some 1900 feet high, occurs in the background three miles inland.

The crest of the Koolau Range forms the interior boundary of windward Oahu, whose present-day rugged topography represents the remnant of a deeply eroded shield volcano. About 2.5 million years ago, the core of this volcano called Koolau had a broad, dome-like shape formed by innumerable thin-bedded, permeable basalt lava flows which poured out of a major rift zone extending from Makapuu northwestward to Waialee and Kawela on the north shore of Oahu and a caldera centered in the Kaneohe-Waimanalo region. The lava flows in the rift zone, situated beneath the Koolau Range, became intruded by numerous dikes formed from solidified magma in the linear vertically oriented fissures through which lavas erupted at the surface. The dikes are typically dense and much less permeable than the intruded lava flows, a geologic condition which profoundly affects groundwater hydrology.

Subsequently, the northeastward dipping slopes of the Koolau volcano were largely eroded away by persistent orographic rainfall, which ultimately formed the interior boundary (crest of the Koolau Range) and topography of windward Oahu. During the long period of erosion and volcanic quiescence, sediments from the land were being deposited with coral, reef, and other marine sediments along a changing coastline caused by deposition and major changes in sea level during world-wide glacial and interglacial periods. The accumulation of these sedimentary deposits formed the present-day coastal plains of windward Oahu and elsewhere in Hawaii. These deposits, collectively called the "caprock formation" have an overall low permeability and, as a result, have a generally significant effect on coastal hydrology in the Malaekahana area as well as elsewhere on Oahu.

The Koolau volcano experienced renewed volcanism following the erosional period, producing lava flows collectively called the Honolulu series. However, the

Malaekahana area did not experience any of this post-erosional volcanic activity. The nearest activity in windward Oahu occurred in the Kaneohe area.

B. Site Geology

In the Malaekahana area, the windward Koolau slopes consist of thin-bedded, permeable basalt lavas that flowed in a northeastward direction, more or less at right angle to the zone of fissures centered beneath the present-day Koolau Range. This zone of fissures is about two miles wide and is mapped as "dike zone" in Figure 5. The project site lies outside of the dike zone in dike-free lavas which extend and dip 5 to 10 degrees northeastward away from the dike zone. These lava flows dip beneath the coastal plain caprock sediments makai of the project site and extend offshore. The wedge-like caprock formation varies in thickness from tens of feet to several hundred feet at stream transections and serves as a general impediment to the seaward discharge of ground water in the basalt lava flows. At Malaekahana the average depth of the caprock formation is about 220 feet below sea level (CWRM, Revised 1990, p 9).

C. Probable Impacts and Mitigation Measures

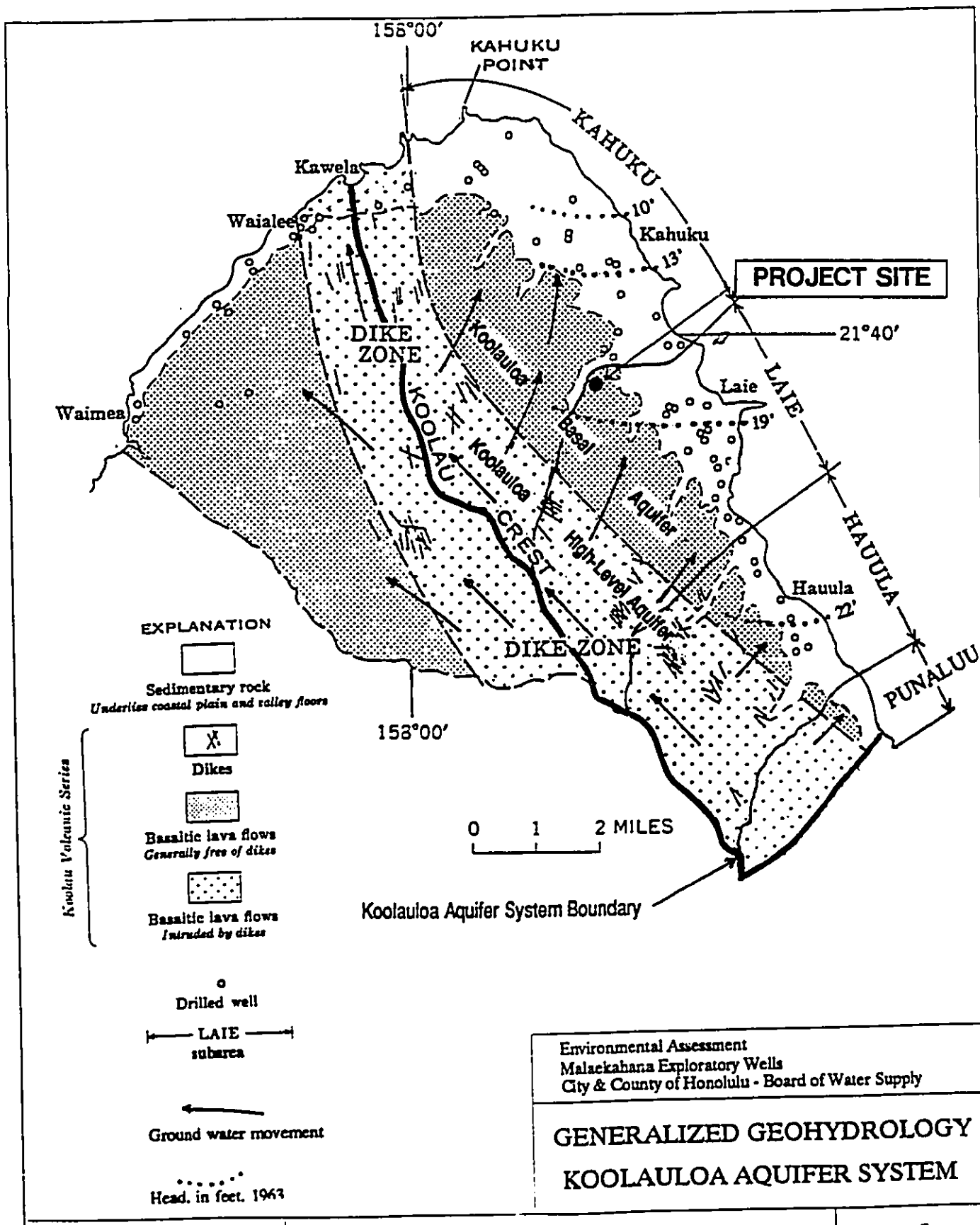
The drilling, casing, and testing of the two exploratory wells are not expected to have any significant effect on the soils and basalt formations underlying the project site.

No mitigation measures are proposed or required.

4.3 Hydrology

A. Ground Water

Koolauloa Aquifer System. The project site lies within the Koolauloa Aquifer System (Water Resources Protection Plan, 1990) which comprises the



Environmental Assessment
Malaekahana Exploratory Wells
City & County of Honolulu - Board of Water Supply

GENERALIZED GEOHYDROLOGY
KOOLAULOA AQUIFER SYSTEM

Water Resource Associates
066

Map adapted from Takasaki and Valenciano, 1969

Figure 5

northern part of windward Oahu from Punaluu Valley to Kahuku Point. The aquifer system covers about 32 square miles and is bounded on the interior by the crest of the Koolau Range. The system includes a high-level aquifer in dike-intruded basalts that occur within the Koolau rift zone, a basal aquifer in dike-free basalts which lies seaward of the high-level aquifer, a generally nonpotable basal aquifer in the coastal caprock formation.

The occurrence of ground water in the aquifer system is greatly influenced by three major geologic features in the region—the moderate yield dike-intruded basalts in the Koolau dike zone, the high-yield dike-free basalts located seaward of the dike zone, and the generally low to moderate-yield coastal caprock formation (see Figure 5).

High-level ground water probably is highest in the southern part of the Aquifer System where the median annual rainfall reaches a peak of 300 inches over the Koolau Crest (unpublished rainfall map, CWRM 1990). Coincident with the distribution of rainfall, water levels in the dike zone presumably diminish from high-level water heads of several hundred feet or more at Punaluu, to current (1996) basal water heads of about 14 and 19 feet in the Kahuku and Kawela coastal areas, respectively. As reported by Takasaki and Valenciano (1969), the basal head in the Kahuku coastal area was 10 feet in 1963 (see Figure 5), or 4 feet lower than the current level of 14 feet. The lower head may have been due in large part to groundwater withdrawals by the former Kahuku Sugar Plantation. Leeward of the high-level water bodies in the dike-intruded lavas of the dike zone, ground water occurs as basal water in dike-free basalts. Based upon data in other geologically similar areas, the dike water heads become progressively lower, probably in step-like fashion within the dike zone, but with a sharp drop in head to a basal level of a few tens of feet in the adjacent dike-free lava flows. At the project site, the basal head in the underlying aquifer is expected to be about 16 to 18 feet.

Plausibly, the bulk of ground water in the Koolauloa basal aquifer moves in an overall northward direction toward the Kahuku coastal area where median annual rainfall decreases to 40 inches a year and where a substantial amount

of ground water discharges at the surface into low-lying coastal marsh lands under an artesian head of about 14 feet. Undoubtedly, some basal ground water moves directly seaward from the Koolau Range to the windward coastline and discharges through and possibly beneath shallower thicknesses of the coastal caprock formation. The interpreted basal heads and direction of groundwater movement in the Koolauloa basalt aquifer are shown in Figure 5.

Groundwater Recharge. One of the methods used to estimate the availability of ground water in an area is to calculate its hydrologic water budget based upon reasonable geologic and hydrologic assumptions for the recharge area, and the use of long-term averages of rainfall, evapotranspiration, and runoff. Groundwater recharge is the net amount of rainfall that is able to percolate deep enough below the surface to become ground water. Groundwater recharge is calculated by using the following equation:

$$I = R - ET - RO$$

Where, I = Recharge
R = Rainfall
ET = Evapotranspiration
RO = Runoff

However, largely because the boundary of the recharge area cannot be accurately determined in the Koolau dike zone, where the bulk of recharge to the Koolauloa aquifer system occurs, any estimate of recharge for the Koolauloa aquifer system is difficult and, at best, approximate. Runoff was estimated by Takasaki (1965) as a percentage of total rainfall and presumably includes the groundwater portion of streamflow for those streams with perennial base flows to the ocean. Published estimates of groundwater recharge for the Koolauloa aquifer system are listed below.

Water Budget Estimates for Koolauloa Aquifer System

Subarea	Recharge Estimate By Takasaki and Valenciano (1969)	Recharge Estimate By Mink (1982)
Punaluu	9	9
Hauula	27	24
Laie	17	17
Kahuku	12	20
Total	65 mgd	70 mgd

Takasaki and Valenciano used pumping test data and the flow equation, Q = TIL, to corroborate their recharge estimate for the Hauula area. Mink also used the flow equation to calculate his estimate of 70 mgd (million gallons per day).

Sustainable Yield. Of the estimated 65-70 mgd recharge, only a fraction can be developed on a sustained or long-term basis. This fractional amount is called the sustainable yield of an aquifer. In other words, sustainable yield is commonly used to describe the amount of ground water that can be developed from a basal aquifer without adversely affecting the long-term ability of the aquifer to produce acceptable quality water from existing and new sources. Adverse effects may relate to drilling wells too deep, localized upconing of salt water caused by excessive pumping rates, or by shrinkage of the basal lens due to excessive total pumpage over the long term. Sustainable yield is always less than recharge. It also refers to the overall or total withdrawal from an aquifer and does not, in general, take into account individual well characteristics or localized salt-water upconing.

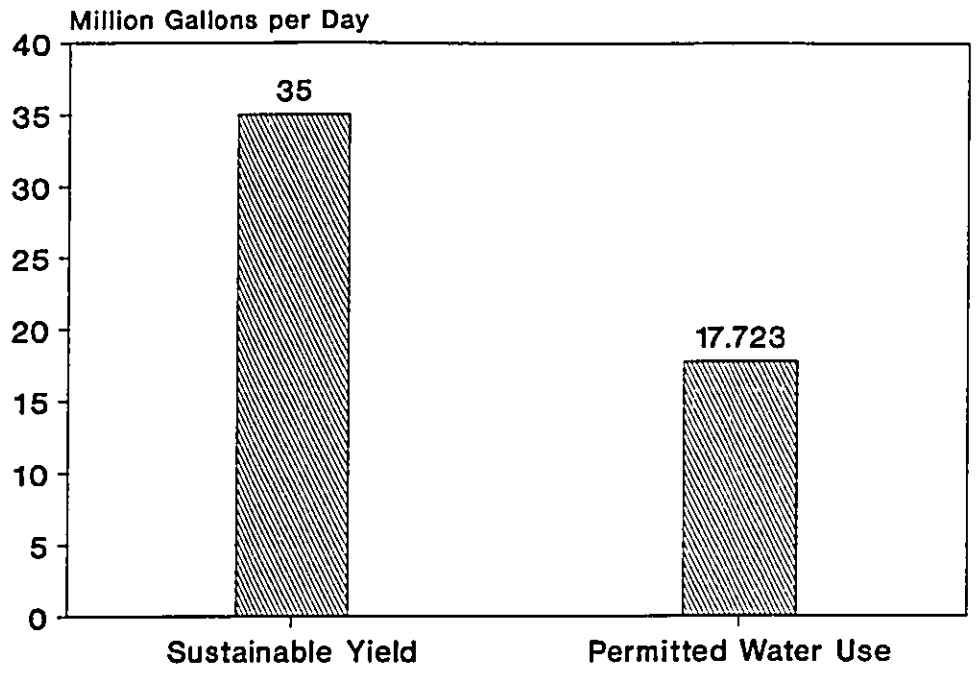
Sustainable yield has been estimated by analyzing the historical records of heads and pumpage in the Koolauloa Aquifer, for which reasonably good records were kept by the former Kahuku Plantation during the 40-year period from 1931 to 1970. Mink (1982), page 50, indicates that average annual pumpage in the aquifer reached an equilibrium of about 35 mgd. Assuming that heads in the aquifer had also reached equilibrium and that salinity of wells throughout the aquifer had remained at acceptable levels throughout the 40-year period, a sustainable yield of 35 mgd was indicated in the report.

In a 1983 report, the Department of Land and Natural Resources also estimated a sustainable yield of 35 mgd for the Koolauloa aquifer. On May 5, 1992, the State Commission on Water Resource Management (CWRM) designated windward Oahu as a water management area and established the 35 mgd as the sustainable yield of the Koolau Aquifer System. The CWRM action became effective on July 15, 1992.

Permitted Water Uses. The CWRM has allocated a total water use of 17.723 mgd within the Koolauloa Aquifer System. This total amount compares with a sustainable yield of 35 mgd and is based upon 43 approved water use permits issued to 10 applicants. Of the 10, the Honolulu Board of Water Supply and Campbell Estate have by far the largest allocation of water uses, totaling 8.915 mgd and 8.008 mgd, respectively. A list of the approved water use permits is presented in Appendix D. It should also be noted that there are 15 pending water use permit applications totaling 3.54 mgd currently before the CWRM in a contested case hearing.

In summary, approximately 50 percent, or 17.277 mgd of the Koolauloa Aquifer System's 35 mgd sustainable yield is available for future development and allocation (see Figure 6). The proposed action calls for the drilling and testing of two one-mgd exploratory wells (one for standby and supplemental use), or potentially two mgd of water use. This amount represents 5.7 percent of the aquifer's 35 mgd sustainable yield, or 11.6 percent of the 17.277 mgd available for allocation.

Nearby Existing Wells. Existing wells located within a one-mile radius of the proposed project site include: Pumps 3 and 3A (Well Nos. 3957-01 and 3957-03) situated approximately 0.7 mile hydrologically down-gradient on the north side of Malaekahana Stream, Pump 6 (Well No. 3957-07) situated across the stream on the south side, and Pumps 12 and 12A (Well Nos. 4057-07 and 4057-10) situated 0.3 mile makai of Pump 3, or one mile from the project site. Pumps 3 and 3A have a combined permitted use of 2.134 mgd, whereas Pump 6, located approximately 900 feet southeast across the stream, has a small 0.006 mgd permitted use. Pumps 12 and 12A have a combined permitted use of 1.309 mgd.



Environmental Assessment
Malaekahana Exploratory Wells
City & County of Honolulu - Board of Water Supply

SUSTAINABLE YIELD & PERMITTED WATER USE
Koolauloa Aquifer System

Water Resource Associates
066

Source: Commission on Water Resource Management, 1995

Figure 6

These wells, located within a mile of the proposed project site on land owned by Campbell Estate, have a total permitted use of 3.449 mgd. They produce mostly nonpotable ground water for irrigation purposes. According to the Groundwater Index and Summary Data of the CWRM, these wells have, in the past, ranged in chloride content from roughly 50 to 250 parts per million and have depths ranging from about 300 to 370 feet below sea level.

Largely because the withdrawals of ground water from these wells are reasonably spaced and limited to 3.449 mgd, it is reasonably expected that their utility as nonpotable sources will not be significantly affected by the withdrawal of approximately 1 mgd from the proposed project site. Heads in the basal aquifer tapped by these existing wells and to be explored by the proposed Malaekahana exploratory wells are estimated at greater than 15 feet, indicating the occurrence of a thick basal lens capable of providing an additional 1.0 mgd, or so, from the proposed wells.

B. Surface Water

All streams in the Malaekahana area are intermittent, from low elevations to their upper reaches in the Koolau Range, based upon the USGS topographic map and the fact that streamflow depends primarily upon rainfall. The streams typically have steep gradients and cut into gently sloping basalt lava flows.

Malaekahana Stream is a losing stream below an elevation of 400 feet. However, between the elevations of 400 and 600 feet high-level dike-confined ground water probably occurs at or near the surface, coincident with the suspected boundary of the dike zone at approximately the 400-foot elevation (Takasaki and Valenciano, 1969, pl. 1). Also shown in Plate 1 of Takasaki and Valenciano is a graphical profile of miscellaneous streamflow measurements made on October 23, 1964. These measurements show that Malaekahana Stream on that day was a gaining stream, the short stretch of the stream between just above to just below the 400 ft. elevation. However, Malaekahana was a losing stream below that particular stretch, with measured flows declining from 0.34 mgd steadily to 0.02 mgd.

Thus, evidence indicates that high-level ground water occurs about a mile inland of the project site and that a basal water aquifer underlies the project site.

The flow characteristics of Malaekahana Stream and the hydrogeologic characteristics of the drainage basin can be shown by the flow-duration curve of its daily flows. Based upon the flow-duration curve of daily flows in 1964-65 at gage No. 3089.9 situated at elevation 450 feet, Malaekahana Stream, in its lower reach, does not have any sustained or perennial flow during dry weather periods, or in other words 99 percent of the time streamflow at the gage equaled or exceeded a mere 0.01 mgd (Takasaki and Valenciano, 1969).

Being an intermittent, normally dry stream below approximately 400 feet elevation, Malaekahana Stream has no significant aquatic, riparian, or recreational resources. Furthermore, the stream, which flows through lands owned by the James Campbell Trust Estate, consists of a manmade channel along its coastal plain section. Finally, there are no historical records of natural wetland areas at Malaekahana.

C. Probable Impacts and Mitigation Measures

Impacts of the proposed project on the groundwater resources of the area are expected to be insignificant. The exploratory wells will be cased with 3/8-inch thick steel casing and grouted with cement from ground surface to 50 feet below sea level so that the basal aquifer will be completely protected from any surface contamination around the outside of the casing. After the well is tested, it will be sealed with a weather-proof steel cap and locked to prevent well contamination and vandalism. The pumping tests that are to be performed will have a short-term, temporary effect on the basal aquifer, but no long-term effect.

The construction and testing of the proposed exploratory wells are not expected to have any significant impact on existing wells located within a one-mile radius. Pump testing will be a temporary, short-term event designed to gather information on basal aquifer conditions and characteristics. It is anticipated that the results of pump testing will corroborate hydrologic estimates that the withdrawal of 1.0 mgd, or so, from production wells will have no significant impacts on nearby existing wells.

Because the basal aquifer lies below the profiles of Malaekahana and adjacent streams, the exploratory wells will have no effect on intermittent streamflows or

surface water resources in the area. This aspect should be confirmed by the long-term pumping test. However, in the highly unlikely event that stream flow is affected, an amendment to the instream flow standard will be obtained from the CWRM prior to any diversion of streamwater.

If the exploratory wells are later converted to production wells, the withdrawal of 1.0 mgd, or so, is not expected to lower the basal heads of the aquifer to a degree that would threaten the potable quality of the source and nearby existing wells, or adversely impact the aquifer's overall sustainable yield of 35 mgd.

4.4 Natural Hazards

A. Floods/Tsunamis

The proposed Malaekahana Exploratory Wells site is located at an elevation of approximately 170 feet above mean sea level on a small terraced area on the south side of Malaekahana Stream. The site, approximately 100 ft. x 200 ft. in size, lies about 100 feet above and 400 feet away from the streambed. Consequently, the project site likely lies outside of the 500-year flood plain, although the Flood Insurance Rate Map does not cover the project site. However, the access road lies within the 100-year flood zone.

According to the Civil Defense Tsunami Evacuation Map, the tsunami inundation area at Malaekahana lies makai of Kamehameha Highway. Therefore, the proposed project site and access road are not subject to tsunami inundation.

B. Seismic Activity

Under the Uniform Building Code (UBC), the island of Oahu is designated as Seismic Zone 1, which on a scale of 1 to 4, is the zone having the lowest potential for ground motion created by seismic activity. The UBC establishes minimum design standards for structures within each of the four seismic zones to resist the effects of seismic ground motion. In the interest of public health and

safety, the BWS has adopted the stricter standards for Seismic Zone 3 for all of its structures, including this project.

C. Probable Impacts and Mitigation Measures

The proposed project is estimated to be outside of the 500-year flood plain and is therefore not expected to be affected by flooding. However, the access road is subject to flooding. Any flooding of the access road will be of very short duration and can be mitigated by re-scheduling construction work.

The proposed project will not likely be affected by seismic activity because the project lies within Seismic Zone 1, the lowest category of seismic activity, and because the BWS uses the stricter standards set for structures in Seismic Zone 3.

4.5 Demographics

A. Population, Housing, and Employment

Based upon U.S. Census data, the 1980 population of the Koolauloa Development Plan Area (DPA) was 10,983. This area encompasses a total of 37,035 acres of which 20,757 acres (56.0 %) is designated Preservation, 13,809 acres (37.3%) is designated Agricultural, 802 acres (2.2%) is designated Residential, and 297 acres (0.8%) is designated Resort (Oahu Water Use and Development Plan, Technical Reference Document, 1989). The remaining 1370 acres (3.7%) are designated for park, public, commercial, and other uses. In this 1989 report, the projected population of the Koolauloa DPA in the year 2010 ranges between 13,000 and 14,000.

The Laie to Kahuku area will continue to accommodate tourist related activities with a limit of 300 visitor units, but will remain primarily a residential community.

B. Probable Impacts and Mitigation Measures

The proposed exploratory well drilling and testing project will involve specialized construction work and, therefore, will most likely be conducted largely by workers living outside of the Koolauloa area. If successful, the exploratory wells will provide a new source of potable water supply to meet the demands of future population growth in the Malaekahana-Kahuku area. Also, existing water users such as Malaekahana State Park, Kahuku High School, and Kahuku Hospital will be provided a more reliable and adequate water supply.

No mitigation measures are proposed or required.

4.6 Roadways and Traffic

A. Existing Conditions

Vehicular access to the project site will be via Kamehameha Highway (State Highway 83) and a privately owned road that leads from the highway about 1¾ miles inland to the project site.

Kamehameha Highway is a coastal highway that traverses windward Oahu from Kaneohe to Kahuku and on around the north shore to Waialua. It hugs the coastline for most of its route and is only several hundred feet from Malaekahana Beach which is situated between the towns of Laie and Kahuku. Between Laie and Kahuku, Kamehameha Highway has only two lanes. According to the State Department of Transportation (DOT) the average daily traffic on this 3.3-mile section of the highway amounted to 10,157 vehicles in 1991 (DOT, 1991).

The privately owned road leading inland from Kamehameha Highway to the project site intersects the highway at the southern edge of Kahuku town. The private road intersects the highway at an angle of about 45° such that access onto the private road from the north or Kahuku town can be safely made as a right turn from the highway. However, coming from the south, or Laie town, access onto the private road requires a sharp left turn from a two-lane highway.

The privately owned road leads straight southwest to the project site (see Figure 2). The first mile consists of improved coral roadway and the remaining 3/4 mile consists of an unimproved dirt road, sections of which have been improved with coral aggregate. The road, as well as the project site, is on land owned by the Campbell Estate and is utilized by several local farmers and other lessees of the Campbell Estate. Traffic on the access road is occasional.

B. Probable Impacts and Mitigation Measures

The proposed exploratory wells project will create a slight and temporary increase in medium to heavy truck traffic. However, no significant impacts to traffic on Kamehameha Highway or the private access road are expected.

As a mitigative measure, the contractor will schedule heavy truck activity in a manner that will, as much as possible, avoid use of Kamehameha Highway during the morning and afternoon peak periods.

4.7 Visual and Recreational Resources

A. Existing Conditions

The project site is located approximately 1¾ miles inland of Malaekahana Bay State Park and the rural community at Malaekahana. In the Malaekahana area, makai views from Kamehameha Highway are very limited due to thick vegetation and earth mounds that block out most coastal viewing opportunities. This natural vegetation and the agricultural use of the surrounding lands, however, are important elements in retaining the rural character of the area.

The significant stationary views in the area are from the shoreline at Malaekahana Bay State Park and Hukilau Park at Laie Bay which provide vivid scenery of Malaekahana Bay, Laie Bay, Mokuauia Island, and Laie Point. Even the encroachment of a few residential structure along the shoreline and on Laie Point, pedestrian views appear vivid and unified. The visual isolation of Kamehameha Highway is a positive factor in enjoying this portion of the coastal viewshed.

Significant roadway views are the intermittent views of open space and landscape and view corridors at Hukilau park.

B. Probable Impacts and Mitigation Measures

The proposed project site is not visible from Kamehameha Highway or any residences, due to its isolated location in a disturbed forest area, 1¾ miles inland from the coast. Thus the significant coastal views identified in the *Coastal View Study* (C&C, 1987) will not be affected.

No mitigation measures are proposed or required.

4.8 Historical and Archaeological Resources

A. Existing Conditions

An archaeological reconnaissance survey of the access road and project site was conducted by Cultural Surveys of Hawaii on November 13, 1995. The results of the survey and related research are presented in Appendix A of this report.

The survey found evidence of bulldozing in the northeast corner of the 100 x 200 ft. project site as indicated by scarred boulders and moved piles of soil. No archaeological remains were encountered.

The survey also extended beyond the project site at least 200 to 300 feet in all directions. No archaeological sites were observed in any of these areas.

The access road to the project site is an existing ranch and farm road and for this reason a specific no new route needed to be surveyed.

Historical research (see Appendix A) was conducted for the purpose of providing context and explanation for the lack of any record of archaeological sites in the upland area of Malaekahana. Handy and Handy mention terraces in the Ahupa'a irrigated by "Kaukana Stream" which is not shown on the USGS topographic map. It is assumed to be a tributary of Malaekahana Stream.

In 1850, Malaekahana was conveyed to Charles Hopkins for Malaekahana Ranch and sometime before 1889 James Campbell purchased Malaekahana Ranch;

and in 1889, leased several tracts to Oahu Railway and Land Co. for sugar cane and railway development. The mauka lands of Malaekahana remain under the ownership of the Campbell Estate as current pasture and ranch land.

Wetland agriculture was not developed in Malaekahana, as indicated by Land Commission claims (1840-1854). Claimants mention using Malaekahana for dryland cultivation and gathering purposes. Yent and Griffin (1980) described the pattern of use of the shoreline as a seasonal one in which there was heavy use during good fishing seasons. February to March was a planting period during which much time was spent in the more mauka agricultural lands.

Additional archaeological survey work was conducted in the area just makai of the proposed well site by William Barrera, Jr. in December 1983 and January 1984 (BWS, 1988, Appendix F, p. F2-F6). No archaeological findings were reported.

B. Probable Impacts and Mitigation Measures

The results of the archaeological survey and historical research indicate that the project site and immediate area have no archaeological resources. The proposed project, consequently, will have no impact to archaeological resources.

No further archaeological investigation is warranted at this time. However, in the unlikely event that any archaeological remains are encountered during any ground disturbance activities, the work will be stopped in that area and the State Historic Preservation Division, Department of Land and Natural Resources should be immediately contacted at 587-0047 to determine the significance and treatment of the findings.

4.9 Biological Resources

A. Botanical Resources

A botanical reconnaissance survey of the project site and access road was conducted by Char and Associates on November 13, 1995. The results of the survey are presented in Appendix B of this report.

The project site and access road are located in a rural setting dominated by introduced species of Java plum, koa-haole, guava, Hilo grass, etc. The project site lies in a disturbed forest composed largely of Java plum trees.

None of the plants found during the field study are listed, proposed, or candidates for threatened and endangered species (U.S. Fish and Wildlife Service 1994a, 1994b, 1995) or considered rare and vulnerable (Wagner et al, 1990).

There are no sensitive native plant-dominated vegetation types within the project site, along the access road, or immediately adjacent areas.

During the field survey, two native species were observed outside of the project site on a nearby hill (see Appendix B). Both species are fairly common and occur in similar habitats throughout Oahu and some of the other islands.

B. Faunal Resources

Faunal (bird and mammal) reconnaissance surveys were conducted by Phillip L. Bruner, Environmental Consultant, on November 13 and 18, 1995. The results of these faunal surveys are presented in Appendix C of this report. The field surveys were conducted during the early morning hour of 6:30 a.m. and counts were made of all birds seen or heard at nine census stations to obtain estimates of relative abundance (Table 1, Appendix C).

No native resident land birds were observed during the surveys. However, the only species in this category which may occasionally occur in the area is the short-eared owl, or Pueo, which is listed as an endangered species on Oahu by the State of Hawaii Division of Forestry and Wildlife.

No resident waterbirds were observed during the surveys. However, the Black-crowned Night Heron has been occasionally seen roosting along streams in the area at other times (Phillip Bruner, personal observations). Habitat suitable for waterbirds does not occur within the proposed project site, although lower-lying lands nearby do contain some wetland habitat in the floodplain of stream drainages.

No seabirds were observed during the field surveys. The project site is unsuitable for seabirds due to predator access and human disturbance. The migratory shorebird, Wandering Tattler, can be found foraging along streams and

more commonly along rocky shorelines in the area, but it is not a threatened or endangered species.

A total of 12 species of exotic birds were recorded during the field surveys (Table 1, Appendix C). In addition, the Barn Owl and Ring-necked Pheasant may also occur in the area.

The only feral mammals observed during the field surveys include two small Indian Mongoose, but no trapping was conducted to assess the relative abundance of feral mammals in the project area. Rats, mice, and feral cats are common in the Kahuku area and feral pigs are occasionally seen in the region particularly at higher elevations (Phillip Bruner, personal observations).

No endemic and endangered Hawaiian Hoary Bats were seen during the survey. Although they are known to roost solitarily in trees and occur in upland forests as well as coastal habitats, data on the bat's distribution and behavior are extremely limited. No published data exists to show that this endangered species occur in this area of Oahu.

C. Probable Impacts and Mitigation Measures

The botanical survey revealed the project site and adjacent access road to be located in a disturbed forest area having no sensitive native plant-dominated vegetation. No plants considered rare, vulnerable, threatened or endangered were found. The avifaunal and feral mammal surveys revealed no native birds or mammals or habitat essential to native birds were found in the area of the project site and access road.

Consequently, the proposed project will have no negative impacts on the botanical resources and bird and mammal populations of the area.

Therefore, no mitigative measures are proposed or required, except that it is recommended that areas disturbed by the project be grassed over as soon as possible after the work is completed to prevent soil erosion. Hilo grass, which is abundant in the area, could be used for revegetation.

4.10 Air Quality and Noise

A. Existing Conditions

In general, air quality on Oahu, especially on windward Oahu, is clean and very low in pollution which stems primarily from vehicular traffic and stationary sources. In the Malaekahana area where the proposed project site lies approximately 1¾ miles inland from Kamehameha Highway, air quality is normally excellent because the northeast trade winds steadily sweep in from the ocean and dissipate the low amount of pollution generated primarily by modest vehicular traffic on Kamehameha Highway. Few, if any, stationary sources of pollution exist in the Malaekahana coastal stretch of windward Oahu, situated between Laie and Kahuku towns.

Ambient noise in the area of the proposed project site is also normally very low. However, short-term noise may be experienced from occasional mechanized farm activity.

B. Probable Impacts and Mitigation Measures

The proposed project of drilling and testing two exploratory wells will require the use of heavy vehicles and equipment to improve parts of the existing dirt road for all-weather use by medium and heavy truck and to clear and grade a roughly 100 ft. x 200 ft. site for a conventional drill rig and its operation. Such activity will be short-term and create a small amount of fugitive dust and pollutants from exhaust emissions, but no long-term impacts on air quality will result, once the proposed project is completed. Air quality and ambient noise levels will be affected off and on during the period of drilling and testing operations by the operation of diesel and gasoline-powered equipment.

Located in an isolated, rural setting downwind of the prevailing tradewinds and with no residences within approximately a mile distance, the proposed project is expected to have no negative impacts relative to air quality and ambient noise. However, the Hawaii Department of Health (DOH) has set standards for noise levels in various zoning districts. The project site is located within the State Land

Use Agricultural District and zoned AG-2 by the County. DOH standards in Agricultural Districts AG-1 and AG-2 are 70 dBA for both daytime hours (7:00 am - 10:00 pm) and nighttime hours (10:00 pm - 7:00 am). A noise permit may be required from the Noise and Radiation Branch of the Department of Health, in the unlikely event that persons are affected.

No mitigation measures relative to air quality and noise are proposed for or expected to be required by the proposed project. However, the contractor will be required to reduce excessive fugitive dust levels by water sprinkling and reduce exhaust emissions by properly maintaining diesel and gas-powered equipment and complying with Department of Health rules, as necessary. Soundproofing of the test pump motor during 24-hour constant-rate testing has been used successfully in the past in residential areas and will be used on the proposed project, if necessary.

Chapter 5. POSSIBLE ALTERNATIVES

5.1 No Action Alternative

The no-action alternative was not pursued because it would be contrary to the BWS's legal mandate to provide for growing consumer demand for water. The proposed project, as a part of an overall groundwater development program to meet anticipated increases in consumer demands for potable water in windward Oahu, seeks to provide an additional source of municipal water supply to meet anticipated water demands in the Malaekahana-Kahuku area. Under the "no action" alternative, this objective would not be achieved. If the BWS's new water sources program is curtailed, it would not be able to adequately provide for the growing water needs of a growing population, which may result in water shortages and restrictions in new development.

5.2 Delayed Action

The delayed-action alternative was considered, but not pursued because this alternative would delay the BWS's implementation schedule and would have essentially the same environmental considerations as the "no action" alternative. Also, delayed construction may result in water shortages and higher costs due to inflation.

5.3 Alternative Sites

Alternative well sources in the northern part of windward Oahu have been and are being pursued by the BWS. These sites are located two to four miles south between Laie and Hauula and were evaluated in the FEIS for Windward Oahu Regional Water Systems Improvements (BWS 1988). Several of the well sites have

been drilled in the Hauula area, but two exploratory sites in the Laie area are pending the outcome of a contested case hearing before the CWRM. The Malaekahana exploratory wells site was also evaluated in the 1988 FEIS and it is being proposed at this time because it is expected to have a more than adequate yield of excellent quality water and is readily accessible via existing roadways and available as a source development from the landowner, the Campbell Estate. The alternate well sites may offer opportunities for groundwater development in the future. In this sense, they represent potential additional projects rather than alternatives to the proposed Malaekahana exploratory wells site.

Chapter 6. DETERMINATION

In accordance with Chapter 343, HRS, the Board of Water Supply has determined that an Environmental Impact Statement is not required for the proposed Kahuku (Malaekahana) Exploratory Wells project. This determination is based on the minimal impacts to the environment and a review of the submitted public comments, all of which have received a response.

There will be some negative impacts, but these can be minimized or alleviated by the suggested mitigative measures. The identified impacts have been determined to be insignificant in comparison to the potential benefits that may be provided by the exploratory wells.

A Finding of No Significant Impact is therefore declared for the proposed project.

Chapter 7. LIST OF PREPARERS

This environmental assessment was prepared for the City & County of Honolulu, Board of Water Supply by Water Resource Associates. The following list identifies individuals and organizations who were involved in the preparation of the report.

Water Resource Associates:

Dan Lum, President and Project Manager

Technical Consultants:

Phillip L. Bruner, PhD (Avifauna and Mammals)
Char and Associates (Botany)
Cultural Surveys Hawaii (Archaeology)

Chapter 8. REFERENCES

Blumenstock, D.I. 1961. *Climates of the States—Hawaii: U.S. Weather Bureau, Climatography of the United States, No. 60-51.*

City & County of Honolulu, Board of Water Supply. July 1982. *Oahu Water Plan.*

_____, _____. March 1982. *Koolauloa Water Resources Assessment.* Prepared by John F. Mink.

_____, _____. 1984. *Regional Environmental Impact Assessment for Development of Wells, Reservoirs, Transmission Lines and Appurtenance at Honolulu, Hawaii.*

_____, _____. August 1988. *Final Environmental Impact Statement for Windward Oahu Regional Water System Improvements.*

_____, Department of Land Utilization. 1987. *Coastal View Study.* Prepared by Michael S. Chu and Robert B. Jones.

_____, Planning Department. September 1989. *Oahu Water Use and Development Plan, Technical Reference Document.* Prepared by Wilson Okamoto & Associates, Inc.

_____, _____. *Oahu Water Management Plan.* 1995 Review Draft (In preparation).

MacDonald, Gordon A., et al. 1990, 2nd edition. *Volcanoes in the Sea: The Geology of Hawaii.*

State of Hawaii, Department of Land and Natural Resources, Commission on Water Resource Management. 1990. *Hawaii Stream Assessment, A Preliminary Appraisal of Hawaii's Stream Resources.*

_____, _____. February 1990. *Report on the Hydrologic Investigation of Groundwater and Surface Water Conditions in the Windward Oahu Water Management Area, Oahu.* Prepared by George A.L. Yuen and Associates, Inc.

_____, _____. June 1990. *Water Resources Protection Plan, Volume I and II.* Prepared by George A.L. Yuen and Associates, Inc.

_____, _____. May 1992 Review Draft. *Hawaii Water Plan, Oahu Water Management Plan.* Prepared by Wilson Okamoto & Associates, Inc.

State of Hawaii, Department of Transportation, Highways Division. 1991. *Traffic Summary, Island of Oahu.*

U.S. Department of the Interior, Geological Survey. 1969. *Water in the Kahuku Area, Oahu, Hawaii, Geological Survey Water-Supply Paper 1874.* Prepared in cooperation with the State of Hawaii Department of Land & Natural Resources, Division of Water & Land Development, By K.J. Takasaki and Santos Valenciano.

University of Hawaii, Department of Geography. 1983. *Atlas of Hawaii.*

Appendix A

ARCHAEOLOGICAL RECONNAISSANCE FOR PROPOSED MALAEKAHANA EXPLORATORY WELLS MALAEKAHANA, O'AHU

by

Hallett H. Hammatt, Ph.D.

Prepared for

Water Resource Associates

Cultural Surveys Hawaii
February 1996

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

INTRODUCTION

This project was performed at the request of Water Resources Associates to provide an archaeological reconnaissance of a location of a proposed Board of Water Supply well in the *ahupua'a* of Malaekahana. The BWS proposes to drill, case, and test two exploratory wells (one operating and one standby) within an approximately 100 ft. X 200 ft. site to locate a new municipal source of supply to serve the Windward Oahu area extending from Laie to Kahuku. The project area is located an approximate elevation of 220 ft. on the Laie side of Malaekahana Stream approximately 7,000 ft. *mauka of* Kamehameha Highway (Figure 1). The project area is gently sloping land with grass, mature trees (Formosan Koa, Macaranga, Java Plum, guava, etc.) and low shrub vegetation. The well site itself consists of approximately 1/2 acre of land. The access road would be along existing ranch and farm roads. For this reason a specific access route did not need to be surveyed.

Scope of Work

The following is the scope of work for the Malaekahana Exploratory Wells Site:

1. Field survey of the study areas to locate and briefly describe archaeological site;

2. Preparation of a report detailing results of the field study with some limited background information on history and nearby archaeological sites. If archaeological sites are found in any of the study areas, an inventory survey with full recording of sites and complete background research well be recommended for that particular study area.

Methods

Fieldwork was performed by the author on Nov. 13, 1995 accompanied by Ms. Winona Char, a botanist. The survey of the well site itself was accomplished in two north/south sweeps. The access to the property was along a coral gravel covered road paralleling Malaekahana Stream, and then by a connected dirt road which led south directly to the proposed well site. The dirt road lies directly to the north and east of the well site.

Historical Research

Historical research consisted of investigation of previously recorded sites within the *ahupua'a*, inspection of some recent archaeological studies, limited research on Land Commission Awards (LCAs) and a brief history of ranching and cane and pineapple cultivation. The purpose of this work was to provide context and explanation for the lack of sites in the project area.

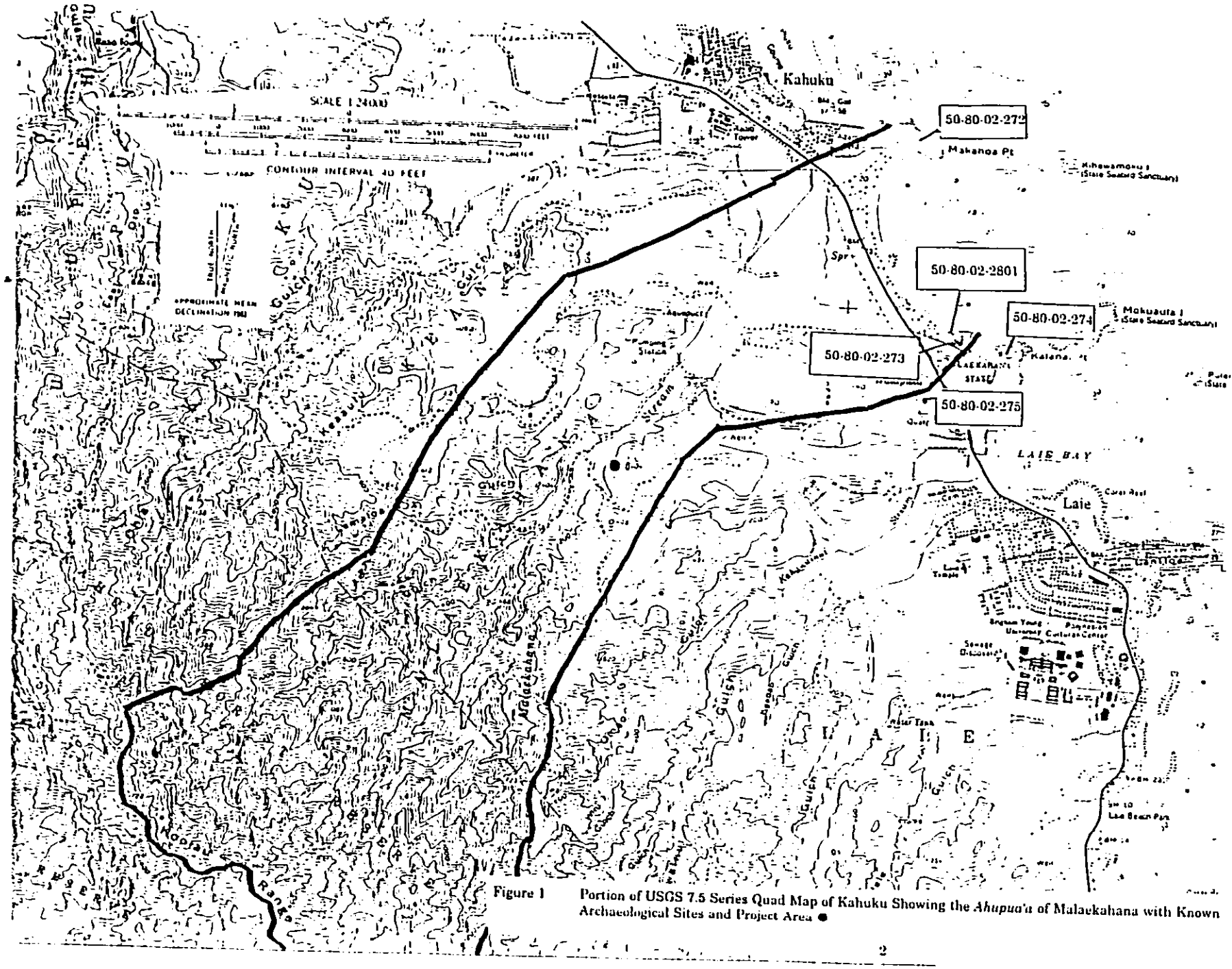


Figure 1 Portion of USGS 7.5 Series Quad Map of Kahuku Showing the *Ahupua'a* of Malaekahana with Known Archaeological Sites and Project Area ●

HISTORIC BACKGROUND

Archaeological Sites:

There are four sites (State sites 50-80-02-272 to 275) recorded by McAllister (1930) in Malaekahana. All of these sites occur along the shoreline and are shown in Figure 1. They are described as follows:

Site 272 A few rocks at Makahoa, all that remain of a fishing shrine which was on the point. The fish brought here were the oio.

> Formerly a fishpond was located near the point and was known as Waipunaea. There are traditions about the mullet coming to this point from Pearl Harbor. To this day schools of mullet come around the island to this northern point of Malaekahana. They go no farther, and their apparent disappearance still mystifies the Hawaiians.

Site 273 - Foundation of the house (kahuahale) of Manuwani, keeper of the god of Malaekahana.

> Only a few large rocks remain by the site of the railroad track, but the site has great importance in the eyes of the natives because of the prominence of the kahuna Manuwahi. About this area is said to have been a rather large Hawaiian settlement, which formerly was level land, but which owing to the removal of flora has formed into dunes The site was pointed out by a descendant of Manuwahi, Kaniona Apuakehau, a very old Hawaiian living in Laie. The Hawaiians are still proud that the distinct of Malaekahana was never conquered by Kamehameha I. This is not recorded in Hawaiian history so far as I know.
>
> The legend collect by Rice (Hawaiian Legends pg 113) tells the story of Kamehameha's sending out Kanalaiu, who was unable to subdue Manuwahi because this powerful kahuna was aided in battle by the gods. After the battle, Kanalaiu joined forces with Manuwahi and is still spoken of by the older natives as the chief who revolted against Kamehameha. Many skeletons were unearthed in plowing the cane fields of the region and in digging the foundations for the beach houses, indicative, some think, of many battles in the region.

Site 274 - Site known to Hawaiians as a fishing shrine on the land known as Kalanai, which is now included in the division of Laie but formerly belonged to Malaekahana.

> The fish brought to this shrine were the kala and enenue. Several flat rocks have been placed on end; one is placed flat. Innumerable remains of fish were found about the stones and on the west side of the rocks.
>
> Skeletal remains were found on the northwest side at an average depth of 2

feet. The body was partially flexed. The upper portion of the body was lying on its back, with the head thrown back so that the mandible was uppermost. The legs had been flexed. The entire length of the burial, from head to knee, was 4 feet. The maximum length of the right femur was 17 inches. The head was lying toward the south, and the lower portion was toward the sea.

Site 275 - Waiapuka, a pool on the Kahuku side of Laie in Malaekahana, inland from the road in the midst of a cane field.

Waiapuka is made famous by the legend of Laieikawai. Without guidance it is difficult to find, for it is hidden from sight even from the surrounding elevations or from the tops of the highest pines which line the road. The pool is oval in shape, measuring about 30 ft. by 60 ft. with the water about 10 ft. below the level of the surrounding plain. Tides are said to affect the pool On the Laie side is a small crevice in the rock, which is said to open into the cavern in which Laieikawai was hidden. Natives of the region remember when it was possible to swim through an underwater entrance, and it is said that the chamber could accommodate three or four people. Within the last 25 years silt has filled the pool, and it is no longer possible to enter the hidden chamber. The pool is significant in the minds of the Hawaiians because it was here that Waka hid Laieikawai until she reached maturity.

In 1980 Yent and Ostioko-Griffin reported on an extensive cultural layer (Site 50-80-02-2801) occurring in the sand layers of Malaekahana State Park. This cultural layer covers large portions of the eastern portion of the park and is divided into 6 distinct geographic areas.

For the upland area no archaeological sites have been recorded, except that Handy and Handy mention terraces in this *ahupua'a* irrigated by Kaukanalaau Stream. The exact location of the stream is not apparent on the USGS stream. It is assumed to be a tributary of Malaekahana Stream.

Land Use as Indicated in LCA Claims (1840-1854)

In 1850 the *ahupua'a* of Malaekahana (3280 Acres) is claimed by A. Keohokalole, mother of King Kalākaua, Queen Liliu'okalani, Miriam Likelike Cleghorn and Wm. Pitt Leleiohoku (II) and is awarded to her in 1854. Of 21 claims for land parcels (*apana*) in Malaekahana only four *kuleana* claims are awarded. There are no claims for *lo'i* in Malaekahana. The claims often state that the area jumps around and goes from sea to mountain and therefore boundaries can't be given. The claims for Malaekahana mention 15 *kula*, 6 *mala* ,and 1 *mo'o* with no crop given, 12 *wauke* patches, 7 house sites, 6 banana patches, 3 potato patches, 5 koa trees for canoe making, and 1 *mala* each for *hala*, *noni*, *ti*, *hau*, breadfruit and tobacco. Two mountain areas are also claimed. Two house sites, 1 banana and potato land, and 1 wauke land are awarded. However, no present maps show where these awards were located. The old Malaekahana maps at the State Survey office

are missing (as reported by the survey office to Dr. V. Creed on 2/2/96). Tax maps do not show the location of these few awards.

Ranching and Commercial Agriculture

In 1850 Kaikala Kapaakea (Keohokalole's husband) conveyed Malaekahana to Charles Hopkins for Malaekahana Ranch and at the same time Kahuku for Kahuku Ranch. James Campbell purchased Malaekahana Ranch before 1889 and the deed included about 3000 head of cattle, 90 horses, 1700 sheep, etc. In 1889 Campbell then leases several tracts of land to Oahu Railway and Land Co. (ORLC) for sugar cane and railway development and a few tracts for pineapple (between 1920 and 1930) Figure 2 shows pineapple and cane fields in the central *mauka* portion of Malaekahana near the proposed well site.

In 1866, the Kahuku Ranch was purchased from Hopkins by Robert Moffitt and by 1873, H.A. Widemann had gained control and ownership of the entire Kahuku Ranch, which included the *ahupua'a* of Kaunala, Pahipahialua, 'Opana 1 &2, Kawela, Hanakaoe, 'O'io 1 & 2, Ulupehupehu, Punalau, Kahuku, Malaekahana, Keana, and a part of Laie (*Ibid.*:138). On January 19, 1874, Widemann sold Kahuku Ranch to Julius L. Richardson who in turn sold the entire ranch to James Campbell.

> In 1889, George Bowser described the Kahuku Ranch as follows:
> Kahuku Ranch. Main Road, Kahuku: Proprietor, James Campbell, Esq., of Honouliuli: Manager, W.R. Buchanan: postoffice address, Kahuku, 38 miles from Honolulu, at the northern point of Oahu: 23,608 acres occupied as a cattle ranch: extends 14 miles along the coast, in close proximity to the sea. A valuable fishery is attached to this property [Bowser 1880:409].

Although the sugar plantation became the major industry at Kahuku and adjacent *ahupua'a*, the Kahuku Ranch continued operations until the mid-20th century.

The *mauka* acreage of Malaekahana remains under the Campbell Estate as pasture and ranch land.

Malaekahana Settlement Pattern

Yent and Griffin (1980) described the pattern of use of the shoreline as a seasonal one in which there was heavy use doing good fishing seasons. February to March was a planting period during which much time was spent in the more *mauka* agricultural lands (Yent and Estioko-Griffin 1980:18). As indicated by the Land Commission claims, wetland agriculture was not developed in Malaekahana. Claimants mention tending *lo'i* in adjacent *ahupua'a*, particularly Laie, and using Malaekahana for dryland cultivation and gathering purposes. Table 1 provides a list of the 21 land claims within the *ahupua'a* of Malaekahana showing land use.

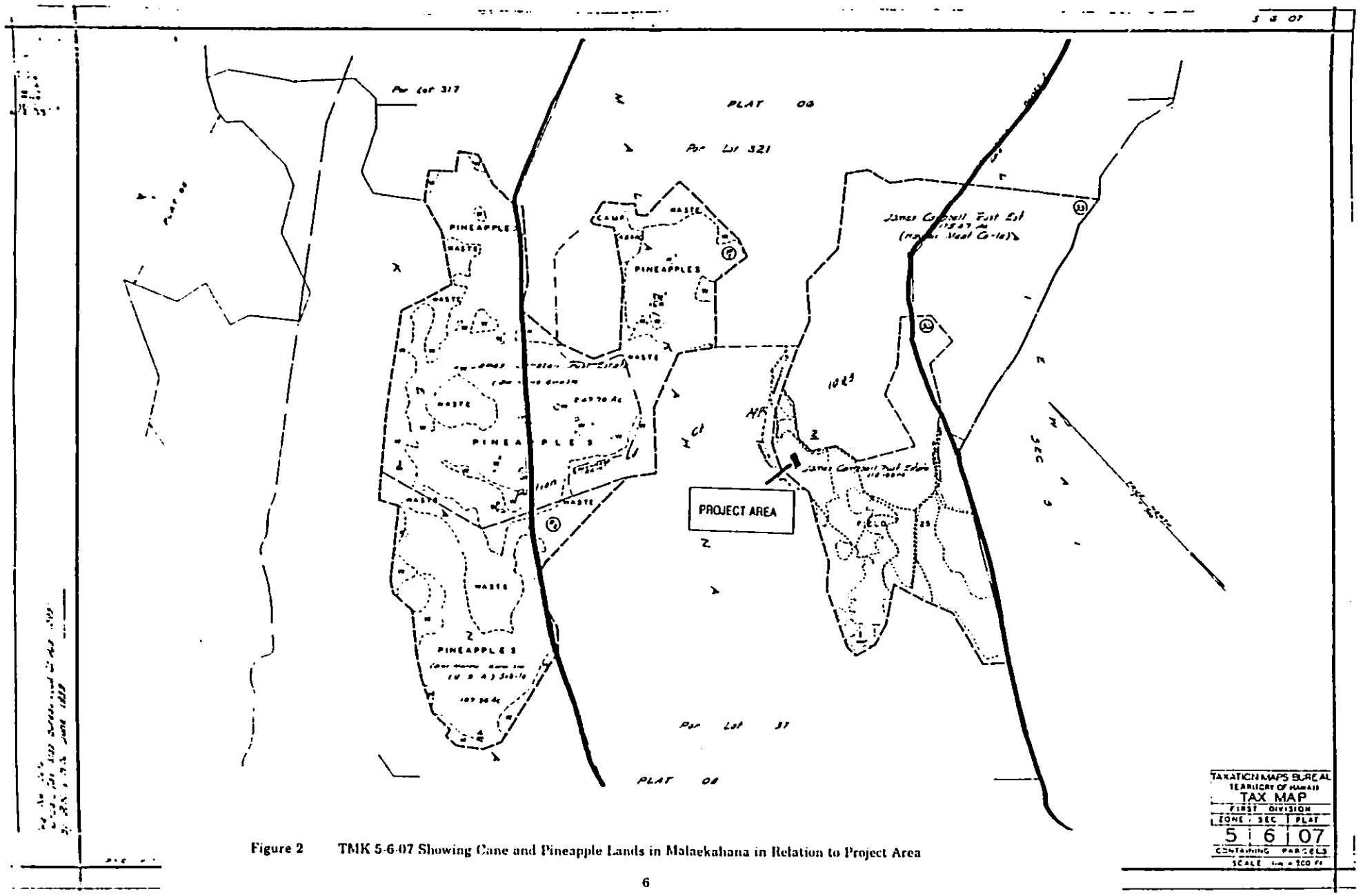


Figure 2 TMK 5-6-07 Showing Cane and Pineapple Lands in Malaekahana in Relation to Project Area

Table 1: Malaekahana Land Claims

LCA #	Claimant	Land use	Awarded or Not
2880	Kupau deceased	2 mala noni, 2 mala wauke, 2 koa canoe trees	Not awarded
3861	Pulehu	1 moo	not awarded
3870	Puu	Kula Kamapa, Mala Niu, Mala Kahakalokaha, mala Makanikeoloi, 2 mala Kalonainui, mala mt. land. (F.T. potatoes & bananas 1/2 acre)	Aw. 1 ap. .22 ac.
3999B	Kuahuia deceased	1 clump hala & house lot near seaside	?
4061	Kuku	1 kula	?
4291	Kapule deceased	kula wauke, partly in Malaekahana	?
4302	Kauaikaua	2 canoe trees	?
4329B	Kuapuhi	(See 4392)	Awarded
4336	Kekui	10 kula, 1 kula house, 1 koa tree	?
4342	KapuaoKahala deceased	kula land in 4 specific pieces, 1 wauke, other 3 in potatoes, noni, bananas, etc.	?
4346	Kawahinewiwi deceased	1 kula & 1 mountain area	not awarded
4392	Kuapuhi	mala wauke, ti, breadfruit, hau, & banana	Awarded as 4329B
6989	Kahuailua	10 kula fr. sea to mt. & house	?
7727	Paukoa deceased	wauke	Awarded

LCA #	Claimant	Land use	Awarded or Not
8355	Kakau	kula land fr. sea to far mt. bananas, wauke, house site makai	Award house site
8443	Kauhalekua	wauke	?
8452	A. Keohokalole		Awarded Ahupua'a
8537	Kahawaii deceased	mo'o kula from se to house site & to mountains, wauke	Award house site
9894	Nawai	1 moo from sea to mountain, wauke, bananas, house site	?
9895	Kekauanui	3 pieces kula land, 1 & 2 wauke & tobacco and wauke & bananas, and house site makai.	not awarded
10619	Poouahi	kula land	?

21 Claimants, 5 awards of which 1 is for the ahupua'a

RECONNAISSANCE RESULTS

The Nov. 13, 1995 fieldwork showed the project area to be fairly open with excellent ground visibility. Bulldozing was evident in the northeast corner of the project area as indicated by scarred boulders and moved piles of soil. No archaeological remains were encountered. The survey extended outward from the immediate project area in all directions at least 200-300 ft. and no archaeological sites were observed in any of these area.

Recommendations

Based on the reconnaissance results, it is recommended that no further archaeological research be conducted. It appears that construction of a well within the project area with access provided by existing roads would have no impact to archaeological resources. If, however, during ground disturbance activities archaeological findings are encountered work should stop in that area and the State Historic Preservation Division should be contacted at 587-0047.

REFERENCES CITED

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

Dunn, Amy E. and Paul H. Rosendahl
1992 *Archaeological Inventory Survey, Laie Master Plan Project, Lands of Malaekahana and Laie, Koolauloa District, Island of Oahu*, Hilo

Foote, Donald E., E.L. Hill, S. Nakamura and F. Stephens
1972 *Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai and Lanai, State of Hawaii*, U.S. Dept. of Agriculture, U.S. Government Printing Office, Washington, D.C.

Handy, E.S. Craighill and Elizabeth G. Handy
1972 *Native Planters in Old Hawaii: Their Life, Lore, and Environment*, Bishop Museum Bulletin 233, Honolulu.

Jensen, Peter M.
1989 *Archaeological Inventory Survey, Punamano and Malaekahana Golf Courses, Lands of Ulupehupehi, Punalau, Kahuku, Malaekahana, and Laie, Koolaluloa District, Island of Oahu,* PHRI, Hilo.

McAllister, J.G.
1933 *Archaeology of O'ahu*, Bishop Museum, Bulletin 104, Honolulu.

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

Stride, Mark, Tamara Craddock and Hallett H. Hammatt
1993 *Archaeological Inventory Survey of the Proposed 785-Acre Kahuku Agricultural Park*, for M and E Pacific, Inc., Cultural Surveys Hawaii, Kailua, HI.

Wilcox, Barbara and Susan G. Monden, Herb Kawainui Kane
1975 *The Kahuku Sugar Mill Story*, Island Heritage Limited Norfolk Island, Australia.

Yent, Martha and A. Estioko-Griffin
1980 *Archaeological Investigations at Malaekahana (50-80-02-2801), Windward Oahu*, Dept. Land and Natural Resources, State of Hawaii, Honolulu.

Yent, Martha and Jason Ota
1981 *Results of Auger Coring Conducted at Malaekahana State Recreation Area, Phase II, Koolauloa, Oahu, TMK 5-6-01:24, 45-47, 49, 51, 53, 55-65*, Dept. of Land and Natural Resources, State of Hawaii, Honolulu.

Appendix B

CHAR & ASSOCIATES
Botanical / Environmental Consultants
4471 Puu Panini Ave.
Honolulu, Hawaii 96816
(808) 734-7826

December 1995

BOTANICAL RESOURCES ASSESSMENT
MALAEKAHANA WELL SITE
KO'OLAU LOA DISTRICT, ISLAND OF O'AHU

INTRODUCTION

At the request of the Honolulu Board of Water Supply and Water Resources Associates, a botanical assessment study was conducted for the proposed Malaekahana exploratory well site on 13 November 1995. The dimensions for the exploratory well site are roughly 100 ft. by 200 ft. An overgrown dirt road will be improved to provide access to the site. The well site is located at about 200 ft. elevation near the Malaekahana Stream in disturbed secondary forest composed largely of Java plum trees.

The primary objectives of the botanical assessment study were to describe the vegetation on and immediately surrounding the proposed well site and along the access road, 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, topography, past disturbances, etc. Plant identifications were made in the field; plants which could not be positively identified were collected for later determination in the herbarium (University of Hawai'i, Manoa - HAW), and for comparison with the most recent taxonomic

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

DESCRIPTION OF THE VEGETATION

The vegetation on the exploratory well site, along the access road, and on the surrounding lands is composed almost exclusively of introduced or alien species. Trees of Java plum (Syzygium cumini) along with smaller stands of Formosan koa (Acacia confusa) and Macaranga tanarius form a secondary forest, 18 to 25 ft. tall. Occasionally, stands of taller, old mango trees (Mangifera indica) can be found, especially closer to the stream area. Beneath the trees, shrubs of koa-haole (Leucaena leucocephala) and guava (Psidium guajava) form a second layer, 12 to 15 ft. tall. Other shrubs which occur here in lesser numbers include Christmas berry (Schinus terebinthifolius), two species of pluchea (Pluchea indica and P. symphytifolia), lantana (Lantana camara), and clidemia (Clidemia hirta). A few ti or ti leaf plants (Cordyline fruticosa) can be found scattered here and there.

Ground cover consists of smaller shrubs or subshrubs, grasses, and herbaceous species. Nettle-leaved vervain (Stachytarpheta urticifolia), a small shrub up to 3 ft. tall and a native of tropical Asia with rugose leaves and dark purple flowers, is locally abundant on the well site. Hilo grass (Paspalum conjugatum) is abundant throughout the well site and along the access road. Small patches of carpetgrass (Axonopus fissifolius) can be found associated with the Formosan koa trees. Spanish clover or ka'imi (Desmodium incanum) is common to abundant throughout the whole area. Other plants found here in smaller numbers include sour grass (Digitaria insularis), Asiatic pennywort (Centella asiatica), niruri (Phyllanthus debilis), hairy horseweed (Conyza bonariensis), yellow woodsorrel (Oxalis corniculata), Chinese violet (Asystasia gangetica), etc.

DISCUSSION AND RECOMMENDATIONS

The vegetation on the proposed exploratory well site, along the access road, and the surrounding area is dominated by introduced species such as Java plum, koa-haole, guava, Hilo grass, etc. Introduced or alien species are all those plants which were brought to the Hawaiian Islands by humans, intentionally or accidentally, after Western contact, that is, Cook's discovery of the islands in 1778. During the field survey, two native species were observed, but outside of the project site on a nearby hill. One plant of 'ulei (Osteomeles anthyllidifolia) and one plant of 'akia (Wikstroemia oahuensis) were found. Both species are fairly common, occuring in similar habitats throughout O'ahu and some of the other islands.

None of the plants found during the field study is a listed, proposed, or candidate threatened and endangered species (U.S. Fish and Wildlife Service 1994a, 1994b, 1995); nor is any plant considered rare and vulnerable (Wagner et al. 1990). There are no sensitive native plant-dominated vegetation types on the well site, access road, or immediately adjacent areas. This is not surprising as the heavily urbanized island of O'ahu has the lowest percentage of forest cover among the four largest Hawaiian Islands. Because of invasion by introduced plant species and the detrimental activities of feral pigs, most of the lowland wet zone does not support large areas dominated by undisturbed native forests, especially on the older, more dissected islands such as O'ahu (Cuddihy and Stone 1990). During the field study, we noted that many areas had been bulldozed and graded as well as fenced. There was evidence of horses grazing recently in the study area.

Given the findings above and the limited nature of the project, the proposed exploratory well site and improvements to the existing access road should not have a significant negative

impact on the botanical resources. There are no botanical reasons to impose any restrictions, conditions, or impediments to the proposed project. It is recommended, however, that areas disturbed by the project be grassed over as soon as possible to prevent soil erosion. Hilo grass which is already quite abundant on the site could be used for revegetation.

LITERATURE CITED

Cuddihy, L.W. and C.P. Stone. 1990. Alteration of native Hawaiian vegetation: Effects of humans, their activities and introductions. Cooperative National Park Resources Studies Unit, University of Hawai'i, Manoa.

U.S. Fish and Wildlife Service. 1994a. Endangered and threatened wildlife and plants; Endangered status for 11 plant species from the Koolau Mountain Range, Island of Oahu, HI. Federal Register 59(59): 14482-14493. March 28, 1994.

_____ . 1994b. Plants, Hawaiian Islands, Listed, proposed or candidate species under the U.S. Endangered Species Act, Updated: December 15, 1994. Unpublished list, Pacific Islands Office, Honolulu.

_____ . 1995. Endangered and threatened wildlife and plants; Proposed endangered status for twenty-five plant species from the island of Oahu, Hawaii. Federal Register 60(190): 51398-51417. October 2, 1995.

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

Appendix C

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

Prepared for

Water Resource Associates

by

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

6 December 1995

INTRODUCTION

The purpose of this report is to summarize the findings of a two day (13,18 November 1995) bird and mammal field survey of a proposed well site at Malaekahana, Oahu (Fig. 1). Also included are references to pertinent literature.

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 habitats for native wildlife and note any special or unique resources that might be adversely impacted by the proposed development.

GENERAL SITE DESCRIPTION

Figure One indicates the location of the area surveyed for birds and mammals. The habitat on and around the site proposed for the exploratory well contains second growth forest and open

grasslands. An intermitent small stream is located nearby. Weather during the survey was partly cloudy with winds 5-10 mph. from the east. Several days previous to the survey were marked with heavy rain showers.

STUDY METHODS

Field observations were made with binoculars and by listening for vocalizations. The survey was conducted during the early morning hours (06:30-09:40). Counts were made of all birds seen or heard (Table 1). Census stations were sampled to obtain relative abundance estimates (Fig. 2). Published accounts 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 area (Pratt et al. 1987; Hawaii Audubon Society 1993). Data on feral mammals were limited to visual observations.

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 species in this category which may occasionally occur in this area and at this elevation is the Short-eared Owl or Pueo (Asio flammeus sandwichensis). Pueo are listed as an endangered species on Oahu by the State of Hawaii Division of Forestry and Wildlife. None were recorded on the survey. The number of Pueo on Oahu is probably quite low and their present abundance in the area covered by this survey is unknown.

Resident Waterbirds:

No waterbirds were recorded on the survey. Black-crowned Night Heron (Nycticorax nycticorax) is occasionally seen roosting along streams in this area (personal observations). This is the only native waterbird in Hawaii that is not listed as endangered. Habitat suitable for waterbirds does not occur on the proposed well site property. Nearby lands, however, do contain some wetland habitat in the form of stream drainages.

Seabirds:

No seabirds were observed on the survey. This site is unsuitable for seabirds due to predator access and human disturbance. There are only a few locations on Oahu where seabirds are nesting, however, this is not one of them.

Migratory Indigenous (Native) Birds:

No habitat suitable for migratory shorebirds exists on the project site. Wandering Tattler (Heteroscelus incanus) can be found foraging along streams as well as more commonly along rocky shorelines. This species might use the nearby stream. Wandering Tattler are not endangered or threatened.

Exotic (Introduced) Birds:

A total of 12 species of exotic birds were recorded during the field survey (Table 1). Pratt et al.(1987) Hawaii Audubon Society (1993) confirm that this assortment of introduced birds would be expected in this area. In addition the Barn Owl (Tyto alba) and Ring-necked Pheasant (Phasianus colchicus) may also occur in this area.

Feral Mammals:

Two introduced Small Indian Mongoose (Herpestes auropunctatus) were seen on the property. No trapping was conducted in order to assess the relative abundance of feral mammals. In addition rats, mice and feral cats are common in the Kahuku area (personal observations). Feral pigs are occasionally seen in this region particularly at higher elevation.

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. None were seen on this survey. There are no published data to show this endangered species occurs in this area.

DISCUSSION AND CONCLUSIONS

This brief field survey provides only a limited perspective of the wildlife which utilize the area. The number and relative abundance of each species may vary throughout the year due to available food resources and reproductive success. Exotic species sometimes prosper only to later disappear or become a less significant part of the ecosystem (Williams 1987; Moulton et al. 1990). Long term studies could provide a more comprehensive view of the bird and mammal populations in this 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 lands (Fig. 1) were traversed on foot. Counts of birds were used to make conclusions about their estimated abundance at this location (Table 1).

2- No native birds or mammals were found on the survey. The Pueo (Hawaiian Owl), Black-crowned Night Heron and Wandering Tattler have all been seen in this region (personal observations).

3- Twelve introduced species of birds were tallied on the survey. No unexpected species were observed. These twelve species are typically found in the type of habitat present at this site.

4- The only mammal recorded was the Small Indian Mongoose. Rats, mice and feral cats and perhaps pigs also occur in the area. The endangered Hawaiian Hoary Bat was not found.

5- The proposed well should have no measurable effect on bird and mammal populations in this region of Oahu. No endangered or threatened species were recorded on the survey. No special or unique habitat essential to native birds was found on the property.

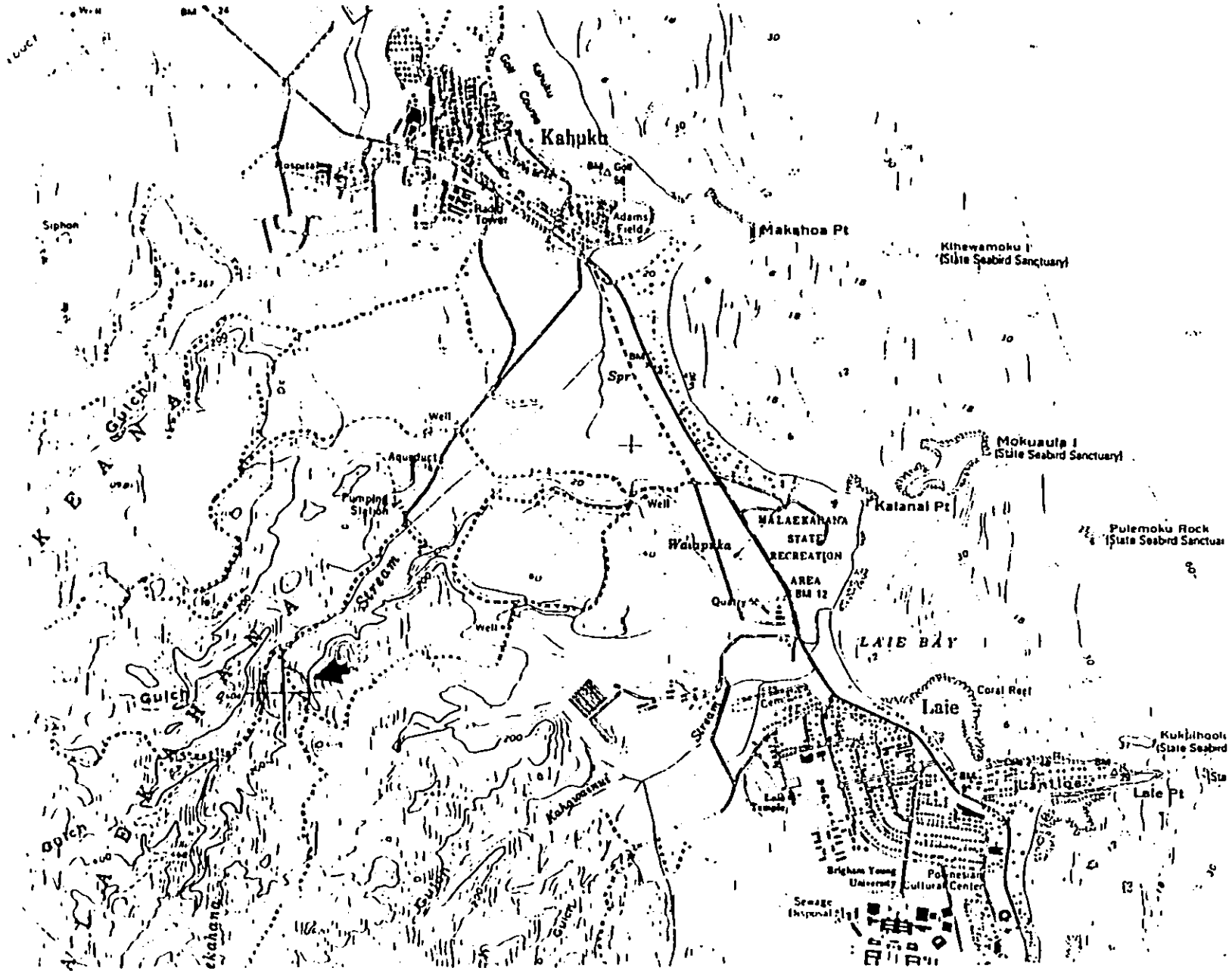


Fig. 1. Location of Malaekahana BWS proposed well site. (Arrow marks site).

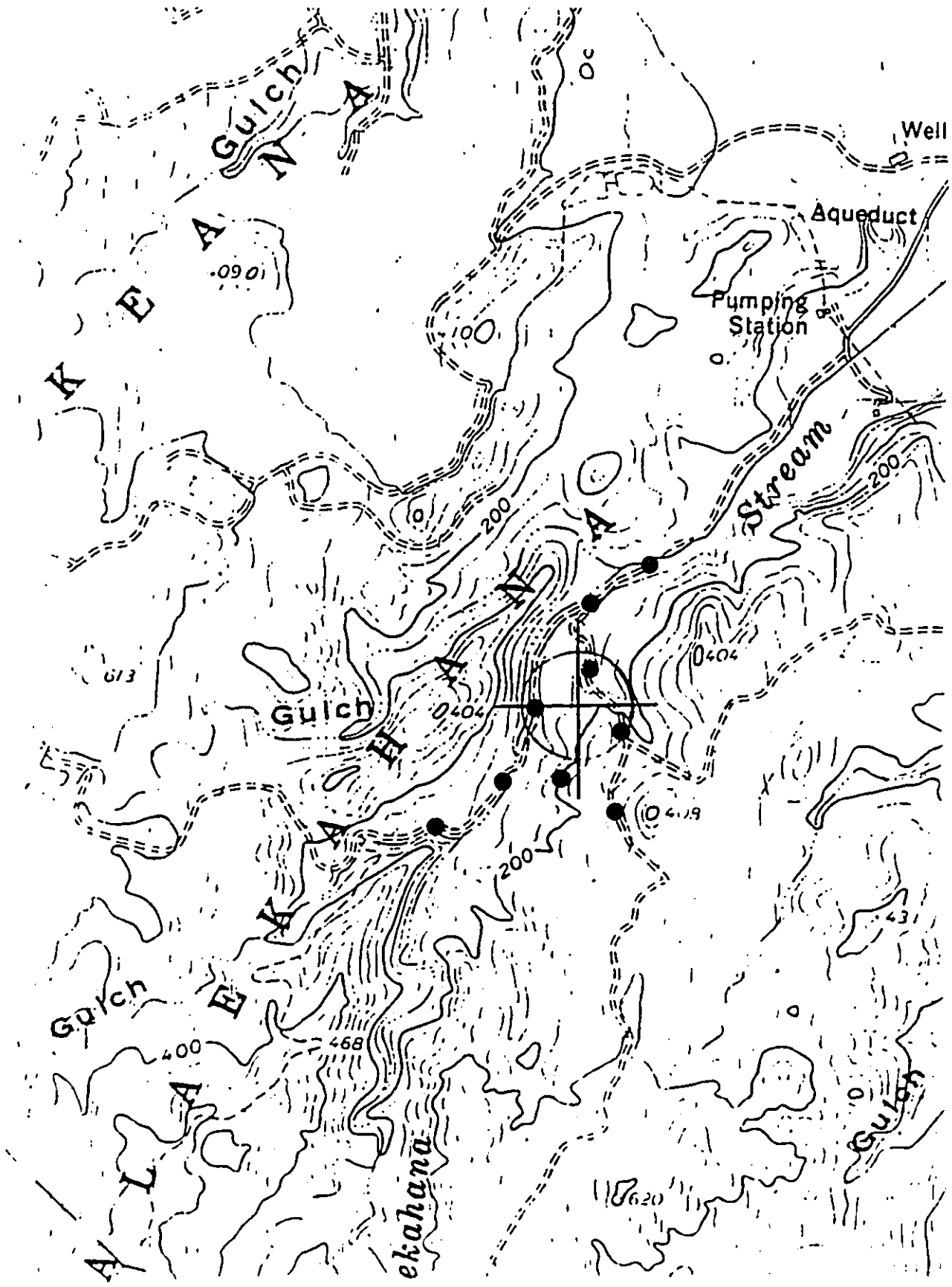


Fig. 2. Location of Malaekahana BWS proposed well site with faunal census stations marked with solid circles.

TABLE 1

Introduced birds recorded at a proposed well site at Malaekahana, Oahu. Number represents an average of the totals from each census station. These data provide an estimate of relative abundance.

COMMON NAME	SCIENTIFIC NAME	AVERAGE Number Recorded at each Census Station
Spotted Dove	Streptopelia Chinensis	11
Zebra Dove	Geopelia striata	6
Common Myna	Acridotheres tristis	4
White-rumped Shama	Copsychus malabaricus	2
Red-vented Bulbul	Pycnonotus cafer	10
Northern Cardinal	Cardinalis cardinalis	5
Red-crested Cardinal	Paroaria coronata	2
Japanese White-eye	Zosterops japonicus	9
Japanese Bush-warbler	Cettia diphone	2
House Finch	Carpodacus mexicanus	4
Common Waxbill	Estrilda astrild	7
Nutmeg Mannikin	Lonchura punctulata	3

SOURCES CITED

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

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

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

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

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

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

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

Appendix D

Appendix D

Water Use Permits
Koolauloa Aquifer System

WUP No.	Applicant	Well No.	Well Name	Approved Date	Authorized Use (mgd)
219	Gentaro Ota	3453-03	Ota	09/01/93	0.006
319	Honolulu BWS	3453-06	Punaluu III	01/26/94	1.339
319	Honolulu BWS	3453-07	Punaluu III	01/26/94	0.000
313	Hanohano Enterprises, Inc.	3553-01	Hanohano	12/06/93	0.432
317	Honolulu BWS	3553-02	Punaluu I	01/26/94	0.348
318	Honolulu BWS	3553-03	Punaluu II	01/26/94	4.618
318	Honolulu BWS	3553-04	Punaluu II	01/25/94	0.000
318	Honolulu BWS	3553-06	Punaluu II	01/26/94	0.000
318	Honolulu BWS	3553-07	Punaluu II	01/26/94	0.000
318	Honolulu BWS	3553-08	Punaluu II	01/26/94	0.000
318	Honolulu BWS	3554-03	Punaluu II	01/26/94	0.000
320	Honolulu BWS	3554-04	Kaluanui	01/26/94	1.093
320	Honolulu BWS	3554-05	Kaluanui	01/26/94	0.000
224	Lemon W. Holt	3654-02	LW Holt	09/01/93	0.002
321	Honolulu BWS	3655-01	Hauula	01/26/94	0.250
362	Honolulu BWS	3655-02	Maakua	10/18/95	0.667
356	E.L.C. Foundation	3755-03	Hauula	01/25/95	0.019
264	R.E. White, Jr.	3855-05	White	10/13/93	0.013
314	George N. Nihipali, Jr.	3855-12	Nihipali	01/26/94	0.009
228	Campbell Estate	3955-01	Malaekahana	12/08/93	0.042
307	Jacob I. Kaio, Sr.	3956-07	Kaio Artesian	12/08/93	0.017
345	Campbell Estate	3957-01	Pump 3	09/03/94	0.945
357	Campbell Estate	3957-03	Pump 3A	03/01/95	1.189
238	Campbell Estate	3957-07	Pump 6	12/08/93	0.006
229	Campbell Estate	4056-01	Kawananakoa	12/08/93	0.576
246	Campbell Estate	4057-01	Pump 1	12/08/93	0.307
230	Campbell Estate	4057-06	Pump 9	12/08/93	0.670
231	Campbell Estate	4057-07	Pump 12	12/08/93	0.109
232	Campbell Estate	4057-10	Pump 12-A	12/08/93	1.200
233	Campbell Estate	4057-11	Sugar Mill Pump	12/08/93	0.028
322	Honolulu BWS	4057-15	Kahuku Battery	01/26/94	0.600
322	Honolulu BWS	4057-16	Kahuku Battery	01/26/94	0.000
239	Campbell Estate	4100-01	Palmer G.C.	12/08/93	0.206
297	Campbell Estate	4157-04	Pump 15	12/08/93	1.517
234	Campbell Estate	4157-04	Pump 15 (Army)	12/08/93	0.000
240	Campbell Estate	4157-05	USFW 1	12/08/93	0.082
241	Campbell Estate	4157-06	USFW 2	12/08/93	0.106
242	Campbell Estate	4157-07	USFW 3	12/08/93	0.107
298	Campbell Estate	4158-12	Kahuku Airbase P	12/08/93	0.103
298	Campbell Estate	4158-13	Kahuku Airbase P	12/08/93	0.000
272	Kuilima Resort Co.	4158-14	Kuilima 1	10/13/93	0.302
243	Campbell Estate	4159-01	Pump 2	12/08/93	0.814
244	Campbell Estate	4159-02	Punamano (Army)	12/08/93	0.001
		43 Permits Approved:			17.723

Source of Data: Commission on Water Resource Management, 1/18/96

Appendix E

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

The following government agencies and groups or individuals were provided a copy of the draft environmental assessment for this project and requested to provide comments.

- Federal Agencies:
  - U.S. Army Corps of Engineers, Pacific Ocean Division
  - U.S. Department of the Interior:
    - Fish and Wildlife Services
    - 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 & County of Honolulu Agencies:
  - Planning Department
  - Department of Land Utilization
  - Department of Public Works

- Others:
  - City Council District 2, Member Steve Holmes
  - Kamehameha Schools/Bishop Estate
  - Koolauloa Neighborhood Board No. 28, Chair Sam Langi
  - Sierra Club, Hawaii Chapter
  - James Campbell Estate
  - Office of Hawaiian Affairs, Louis Manrique

Appendix F

Appendix F
Comments and Responses to the
Draft Environmental Assessment

- Federal Agencies:
  - U.S. Army Corps of Engineers, Pacific Ocean Division
  - U.S. Department of the Interior:
    - Fish and Wildlife Services
    - 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 & County of Honolulu Agencies:
  - Planning Department
  - Department of Land Utilization*
  - Department of Public Works

- Others:
  - City Council District 2, Member Steve Holmes*
  - Kamehameha Schools/Bishop Estate*
  - Koolauloa Neighborhood Board No. 28, Chair Sam Langi*
  - Sierra Club, Hawaii Chapter
  - James Campbell Estate*
  - Office of Hawaiian Affairs, Louis Manrique*

*No comments received.

PLN-93/96

DEPARTMENT OF THE ARMY
PACIFIC OCEAN DIVISION, CORPS OF ENGINEERS
FORT SHAFTER, HAWAII 96858-5440

REPLY TO
ATTENTION OF

September 19, 1996

Planning and Operations Division

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

Dear Mr. Usagawa:

Thank you for the opportunity to review and comment on the Draft Environmental Assessment (DEA) for the Kahuku (Malaekahana) Exploratory Wells Project, Malaekahana, Oahu (TMK 5-6-7: 1). The following comments are provided pursuant to Corps of Engineers authorities to disseminate flood hazard information under the Flood Control Act of 1960 and to issue Department of the Army (DA) permits under the Clean Water Act; the Rivers and Harbors Act of 1899; and the Marine Protection, Research and Sanctuaries Act:

a. Based on the information provided, the proposed project will not impact Malaekahana Stream nor other waters of the U.S.; therefore, a DA permit will not be required (file number 960000363).

b. The flood hazard information provided on page 4-12 of the DEA is correct.

Sincerely,

Lawrence O. Muraoka

Lawrence O. Muraoka, P.E.
Acting Chief, Planning
and Operations Division

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96843
PHONE (808) 527-6180
FAX (808) 533-2714

COPY

April 23, 1997

Mr. Paul Mizue, Chief
Planning and Operations Division
Pacific Ocean Division
Corps of Engineers
Department of the Army
Fort Shafter, Hawaii 96858-5440

Dear Mr. Mizue:

Subject: Draft Environmental Assessment for the Kahuku (Malaekahana) Exploratory Wells Project, Malaekahana, Oahu, Hawaii, TMK: 5-6-07: 01

Thank you for reviewing and submitting comments on the Draft Environmental Assessment for the proposed exploratory wells project.

We acknowledge that a Department of the Army permit will not be required for the proposed project since it will not impact the Malaekahana Stream or other waters of the United States. In addition, we note that the flood hazard information is correct.

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

Very truly yours,

FOR RAYMOND H. SATO
Manager and Chief Engineer

cc: Dan Lum, Water Resource Associates
Office of Environmental Quality Control

PLN-106/96

United States Department of the Interior

FISH AND WILDLIFE SERVICE

PACIFIC ISLANDS ECOREGION
300 ALA MOANA BOULEVARD, ROOM 3108
BOX 50088
HONOLULU, HAWAII 96850
PHONE: (808) 541-3441 FAX: (808) 541-3470

In Reply Refer To: CAW

OCT 10 1996

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

Re: Review of the Draft Environmental Assessment for Kahuku (Malaekahana) Exploratory Wells, Malaekahana, Oahu, Hawaii.

Dear Mr. Usagawa:

The U.S. Fish and Wildlife Service (Service) has reviewed the Draft Environmental Assessment (EA) for Kahuku (Malaekahana) Exploratory Wells, Malaekahana, Oahu, Hawaii. The applicant is the City and County of Honolulu, Board of Water Supply. The purpose of the proposed project is to locate an additional 1.0 millon gallons a day of municipal water supply to serve the area from Malaekahana to Kahuku. The proposed project involves constructing two exploratory wells located at an approximate elevation of 170 feet and design depth of 370 feet and conducting pump tests to determine the sustainable yield of these wells.

Based on our review of the Draft EA, the Service does not anticipate that fish and wildlife will be adversely affected by the proposed project. The wells will be located below the perennial stream flow; therefore, there should be no effect on surface flow in the stream. The biological surveys conducted appear to be adequate and did not reveal any rare, threatened or endangered species of concern in the project area.

The Service appreciates the opportunity to provide comments. If you have questions regarding these comments, please contact Fish and Wildlife Biologist Christine Willis at 808/541-3441.

Sincerely,

for Brooks Harper
Field Supervisor
Ecological Services

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96843
PHONE (808) 527-6180
FAX (808) 533-2714

COPY

April 23, 1997

Mr. Brooks Harper, Field Supervisor
Ecological Services
Pacific Islands Ecoregion
Fish and Wildlife Service
United State Department of the Interior
P. O. Box 50088
Honolulu, Hawaii 96850

Dear Mr. Harper:

Subject: Draft Environmental Assessment for the Kahuku (Malaekahana) Exploratory Wells Project, Malaekahana, Oahu, Hawaii TMK: 5-6-07: 01

Thank you for reviewing and submitting comments on the Draft Environmental Assessment for the proposed exploratory wells project.

We acknowledge that the U. S. Fish and Wildlife Service does not anticipate adverse effects to fish and wildlife because stream flow is not expected to be impacted. The biological surveys did not reveal any rare, threatened or endangered species.

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

Very truly yours,

FOR RAYMOND H. SATO
Manager and Chief Engineer

cc: Dan Lum, Water Resource Associates
Office of Environmental Quality Control

IRRB 1306

PLN-98/96

BENJAMIN J. CAYETANO
Governor

JAMES J. NAKATANI
Chairperson, Board of Agriculture

LETITIA N. UYEHARA
Deputy to the Chairperson

Mailing Address:
P. O. Box 22159
Honolulu, Hawaii 96823-2159

FAX: (808) 973-9613

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

September 12, 1996

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

Dear Mr. Usagawa:

RE: Draft Environmental Assessment (DEA) for Kahuku (Malaekahana) Exploratory Wells, Malaekahana, Oahu, Hawaii, TMK 5-6-7:01

The Department of Agriculture has no comments, but supports the development of these wells for the Kahuku area where there is a need for an additional water source.

Sincerely,

JAMES J. NAKATANI
Chairperson, Board of Agriculture

c: Water Resource Associates
ARMD

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96843
PHONE (808) 527-6180
FAX (808) 533-2714

April 23, 1997

Mr. James J. Nakatani, Chairperson
Board of Agriculture
State of Hawaii
P. O. Box 22159
Honolulu, Hawaii 96823-2159

Dear Mr. Nakatani:

Subject: Draft Environmental Assessment for the Kahuku (Malaekahana) Exploratory Wells Project, Malaekahana, Oahu, Hawaii, TMK: 5-6-07: 01

Thank you for reviewing the Draft Environmental Assessment for the proposed exploratory wells project.

We acknowledge that the Department of Agriculture supports the development of these wells for the Kahuku area.

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

Very truly yours,

FOR RAYMOND H. SATO
Manager and Chief Engineer

cc: Dan Lum, Water Resource Associates
Office of Environmental Quality Control

STATE OF HAWAII
Department of Land and Natural Resources
DIVISION OF AQUATIC RESOURCES
October 8, 1996

MEMORANDUM

TO: William Devick, Acting Administrator
FROM: Glenn R. Higashi, Aquatic Biologist GRH
SUBJECT: Comments on Draft Environmental Assessment
Comments Requested By: Dan Lum, Water Resource Associates
Date of Request: 9/2/96 . Date Received: 9/4/96

Summary of Project

Title: Kahuku (Malaekahana) Exploratory Wells (DEA)
Project By: City & County of Honolulu, Board of Water Supply
Location: Malaekahana, Oahu, Hawaii TMK 5-6-7:01

Brief Description:

The City and County of Honolulu, Board of Water Supply proposes to drill, case, and test two exploratory wells on a parcel of undeveloped land (TMK 5-6-7:01), located 1 3/4 miles inland of Malaekahana Bay on the south side of Malaekahana Gulch in windward Oahu. The proposed wells will be drilled within an approximately 100 ft. x 200 ft. site in a secondary forest area. The site is accessible from Kamehameha Highway via an existing coral and dirt road that begins just south of Kahuku town.

The purpose of the proposed action is to locate a new municipal source of water supply to serve the area of windward Oahu extending from Malaekahana to Kahuku. The construction and testing of the first well will provide the necessary geological and hydrological data to determine the characteristics of the expected underlying basal aquifer and the quantity and quality of ground water available for a new source of supply.

The two exploratory wells are located at an approximate elevation of 170 feet and will have a design depth of 370 feet. The wells will have a cased section consisting of 12-inch inside diameter steel casing to a depth of 220 feet (-50 ft., msl) and an open-hole section consisting of an 11-inch diameter uncased drill hole. The cased section of the well will be grouted in the annular space surrounding the casing.

The ground water pumped during well testing will be clear potable water and the contractor will be required to properly dispose the pumped water using a temporary pipeline and appropriate discharge outlet to preclude any soil erosion or sediment load in the Malaekahana Stream channel.

Comments:

The drilling, casing and testing of the proposed Kahuku Wells are not expected to have significant adverse impact on aquatic resource values in the area. However, since the proposed project site is located above and 250 feet away from the Malaekahana Stream channel, mitigation measures should be taken during the wells construction (drilling and casing) and testing, to insure that drill cuttings, cutting extraction medium, petroleum products, sediment and other debris from blowing, leaching, draining or entering the streambed. Proper precautions should be taken in disposing of the test water to preclude any soil erosion or sediment loading in the stream bed, along with the following mitigation measures to minimize erosion and siltation during drilling, casing and testing operations:

1. site work be scheduled for periods of minimal rainfall;
2. use of some type of trapment (siltation basins or tanks) to remove sediments before disposing of the drill and test water into the stream;
3. petroleum products from heavy vehicles and equipment operation should be prevented from falling, blowing or leaching into the aquatic environment.

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96843
PHONE (808) 527-6180
FAX (808) 533-2714

COPY

May 1, 1997

Mr. William S. Devick, Acting Administrator
Division of Aquatic Resources
Department of Land and Natural Resources
State of Hawaii
1151 Punchbowl Street
Honolulu, Hawaii 96813

Dear Mr. Devick:

Subject: Draft Environmental Assessment for the Kahuku (Malaekahana) Exploratory Wells Project, Malaekahana, Oahu, Hawaii, TMK: 5-6-07: 01

Thank you for reviewing and submitting comments on the Draft Environmental Assessment for the proposed exploratory wells project.

We provide the following response to your concerns:

1. We acknowledge that the proposed project is not expected to have significant adverse impacts on aquatic resource values in the area. The well will be test-pumped to provide additional information on any stream flow impacts.

2. Best management practices will be implemented during construction to minimize potential pollution of Malaekahana Stream and any receiving waters. The Board of Water Supply proposes to undertake mitigative measures such as the use of filters and oil absorptive material to ensure that sediment and petroleum products will be prevented from entering the stream. In addition, flow velocities will be dissipated to reduce any scouring effects. It is expected that the bulk of the construction work will be completed during periods of low rainfall.

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

Very truly yours,

RAYMOND H. SATO
Manager and Chief Engineer

cc: Dan Lum, Water Resource Associates
Office of Environmental Quality Control

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

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

DEPUTY
GILBERT COLOMA-AGARAN

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

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

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

September 20, 1996

Dan Lum
Water Resource Associates
1188 Bishop Street, Suite 1708
Honolulu, Hawaii 96813-3302

LOG NO: 18122
DOC NO: 9609TD20

Dear Mr. Lum:

SUBJECT: Chapter 6E-8 Draft Environmental Assessment (DEA) for Kahuku (Malaekahana) Exploratory Wells
Malaekahana, Ko`olauloa, O`ahu
TMK: 5-6-7:1

Thank you for the opportunity to review this DEA which includes the results of an historic documents search and an archaeological field reconnaissance of the proposed project area. Historic maps show that the project area is located in an old sugar cane field. The field reconnaissance revealed that there are no historic sites at the project area, and yielded evidence that the project area had been graded or grubbed, consistent with its previous use as a cane field. Based on this information, we believe that this project will have "no effect" on historic sites.

If you have any questions please call Tom Dye at 587-0014.

Aloha,

DON HIBBARD, Administrator
State Historic Preservation Division

TD:jk

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96843
PHONE (808) 527-6180
FAX (808) 533-2714

April 29, 1997

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

Dear Mr. Hibbard:

Subject: Draft Environmental Assessment for the Kahuku (Malaekahana) Exploratory Wells Project, Malaekahana, Oahu, Hawaii, TMK: 5-6-07: 01

Thank you for reviewing and submitting comments on the Draft Environmental Assessment for the proposed exploratory wells project.

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

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

Very truly yours,

RAYMOND H. SATO
Manager and Chief Engineer

cc: Dan Lum, Water Resource Associates
Office of Environmental Quality Control

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

MICHAEL D. WILSON
CHAIRPERSON

ROBERT G. GIRALD
DAVID A. NOBRIGA
LAWRENCE H. MIIKE
RICHARD H. COX
HERBERT M. RICHARDS, JR.

RAE M. LOUI, P.E.
DEPUTY

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

SEP 26 1996

Mr. Dan Lum
1188 Bishop Street
Honolulu, HI 96813-3302

SUBJECT: Draft EA for Kahuku (Malaekahana) Exploratory Wells, Oahu TMK 5-6-7:01

FILE NO.: NA

Thank you for the opportunity to review the subject document. Our comments related to water resources are marked below.

In general, the CWRM strongly promotes the efficient use of our water resources through conservation measures and use of alternative non-potable water resources whenever available, feasible, and there are no harmful effects to the ecosystem. Also, the CWRM encourages the protection of water recharge areas which are important for the maintenance of streams and the replenishment of aquifers.

[X] We recommend coordination with the county government to incorporate this project into the county's Water Use and Development Plan.

[X] We are concerned about the potential for ground or surface water degradation/contamination and recommend that approvals for this project be conditioned upon a review by the State Department of Health and the developer's acceptance of any resulting requirements related to water quality.

[X] A Well Construction Permit and a Pump Installation Permit from the CWRM would be required before ground water is developed as a source of supply for the project.

[X] The proposed water supply source for the project is located in a designated water management area, and a Water Use Permit from the CWRM would be required prior to use of this source.

[X] Groundwater withdrawals from this project may affect streamflows. This may require an instream flow standard amendment.

[ ] We recommend that no development take place affecting highly erodible slopes which drain into streams within or adjacent to the project.

[ ] If the proposed project diverts additional water from streams or if new or modified stream diversions are planned, the project may need to obtain a stream diversion works permit and petition to amend the interim instream flow standard for the affected stream(s).

[ ] Based on the information provided, it appears that a Stream Channel Alteration Permit pursuant to Section 13-169-50, HAR will be required before the project can be implemented.

[ ] Based on the information provided, it does not appear that a Stream Channel Alteration Permit pursuant to Section 13-169-50, HAR will be required before the project can be implemented.

[X] An amendment to the instream flow standard from the CWRM would be required before any streamwater is diverted.

[ ] Any new development that is permitted along a stream that is not yet channelized should be based on the express condition that no streams will be channelized to prevent flooding of the development. Development in the open floodplain should not be allowed; other economic uses of the floodplain should be encouraged.

[X] OTHER:

Under the permitted uses section, page 4-8, the report should mention that there are fifteen (15) pending water use permit applications currently in a contested case hearing proceedings and that the total amount of water requested is 3.540 mgd.

On page 4-11, the report states that surface water will not be affected by these wells due to information from existing reports. The report should acknowledge that the long-term pumping test should provide further information as to the potential affects on streamflow.

If there are any questions, please contact Roy Hardy at 587-0274.

Sincerely,

RAE M. LOUI
Deputy Director

RH:ss

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96843
PHONE (808) 527-6180
FAX (808) 533-2714

May 1, 1997

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

Dear Ms. Loui:

Subject: Draft Environmental Assessment for the Kahuku (Malaekahana) Exploratory Wells Project, Malaekahana, Oahu, Hawaii, TMK: 5-6-07: 01

Thank you for reviewing the Draft Environmental Assessment for the proposed exploratory wells project.

We provide the following response to your concerns:

1. The project is included in our six-year Capital Improvement Program which is annually coordinated with the Planning Department. Should the exploratory wells be converted to a production facility, an amendment to the Development Plan Public Facilities Map will be required.

2. Should the wells be placed into production as a municipal source, an engineering report will be required under Section 11-20-29, HAR, as administered by the State Department of Health. This report will address all concerns related to potential ground and surface water degradation and contamination. The wells are being placed such that most agricultural activity occurs down gradient of the well to minimize the potential of pesticide contamination.

3. Section 1.7, Required Permits and Approvals, contains a discussion on the necessary Commission on Water Resource Management (CWRM) permits for the project. We understand Well Construction, Pump Installation and Water Use Permits are required prior to the use of the wells as a municipal source.

4. We understand that there are 15 pending Water Use Permit Applications in the Laie area of the Koolauloa aquifer totalling 3.54 mgd currently before the CWRM in a contested case hearing.

5. The long-term test pumping should provide additional information on the potential effects on stream flow. We understand that if there is a reduction of stream flow resulting from these wells, an amendment to the instream flow standard will be required.

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

Very truly yours,

RAYMOND H. SATO
Manager and Chief Engineer

PLN-95/96

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

LAWRENCE MIIKE
DIRECTOR OF HEALTH

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

In reply, please refer to:

September 19, 1996

96-145/epo

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

Dear Mr. Usagawa:

Subject: Draft Environmental Assessment
Kahuku (Malaekahana) Exploratory Wells
Malaekahana, Oahu
TMK: 5-6-07: 01

Thank you for allowing us to review and comment on the subject Draft Environmental Assessment. We do not have any comments to offer at this time.

Sincerely,

BRUCE S. ANDERSON, Ph.D.
Deputy Director for Environmental Health

c: Dan Lum (Water Resource Associates)

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96843
PHONE (808) 527-6180
FAX (808) 533-2714

April 29, 1997

COPY

Bruce S. Anderson, Ph.D.
Deputy Director for Environmental Health
Department of Health
State of Health
P. O. Box 3378
Honolulu, Hawaii 96801

Dear Dr. Anderson:

Subject: Draft Environmental Assessment for the Kahuku (Malaekahana) Exploratory Wells Project, Malaekahana, Oahu, Hawaii, TMK: 5-6-07: 01

Thank you for reviewing the Draft Environmental Assessment for the proposed exploratory wells project.

We acknowledge that you have no comments at this time.

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

Very truly yours,

RAYMOND H. SATO
Manager and Chief Engineer

cc: Dan Lum, Water Resource Associates
Office of Environmental Quality Control

BENJAMIN J. CAYETANO
GOVERNOR

GARY GILL
DIRECTOR

STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL

220 SOUTH KING STREET
FOURTH FLOOR
HONOLULU, HAWAII 96813
TELEPHONE (808) 586-4185
FACSIMILE (808) 586-4186

963175

October 8, 1996

The Honorable Raymond Sato, P.E.
Board of Water Supply
City and County of Honolulu
630 South Beretania Street
Honolulu, Hawai'i 96813

Dear Mr. Sato:

We submit for your response (required by Section 343-5(b), Hawaii Revised Statutes) the following comments on a draft environmental assessment ("DEA") for the Kahuku (Malaekahana) Exploratory Wells. The document was submitted by an August 23, 1996, letter to our office by your agency. Notice of availability of this draft environmental assessment was published in the September 8, 1996, edition of the *Environmental Notice*.

1. Section 3.4 (Project Schedule and Cost) states that "[i]f pumping test results and water quality analyses are successful, the exploratory wells will be converted to production wells in later phases of planning and development of a water production facility at the project site." Please discuss the criteria for water quality and drawdown which would make the wells acceptable as production wells.

2. One of the criteria in section 11-200-12 of the Hawai'i Administrative Rules is if an action "[i]nvolves an irrevocable commitment to loss or destruction of any natural ... resource." Please indicate in the notice of determination and final environmental assessment for the project whether the Board will prepare a separate environmental assessment when the facility is turned into a production well.

3. Section 4.5 (Demographics) states that "[i]f successful the exploratory wells will provide a new source of potable water supply to meet the demands of future population growth in the Malaekahana-Kahuku area." Please discuss where the Board is expecting future population growth in the Kahuku-Malaekahana area, what the projected population estimates are, and the direct, indirect and cumulative effects of the proposed action on population.

Please include a copy of this letter and your response (along with copies of all timely-received comment letters and responses) in the final environmental assessment and notice of determination for this project. If there are any questions, please call Mr. Leslie Segundo, Environmental Health Specialist at 586-4185. Thank you.

Sincerely,

GARY GILL
Director

c: Water Resource Associates

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96843
PHONE (808) 527-6180
FAX (808) 533-2714

COPY

April 25, 1997

Mr. Gary Gill, Director
Office of Environmental Quality Control
State of Hawaii
State Office Tower, Suite 702
235 South Beretania Street
Honolulu, Hawaii 96813

Dear Mr. Gill:

Subject: Draft Environmental Assessment for the Board of Water Supply's Proposed Malaekahana Exploratory Wells

Thank you for your letter regarding the Draft Environmental Assessment (EA) for the Board of Water Supply (BWS) proposed Malaekahana Exploratory Wells project.

We provide the following response to your concerns:

1. A discussion on water quality and test pumping is included in Section 1.7, Required Permits and Approvals, and Section 3.3, Well Testing Procedures, of the Draft EA. The purpose of the exploratory wells test pumping is to obtain water quality and drawdown data to determine if the water from the proposed wells is acceptable for production. In order for the wells to be placed into service, the water from the exploratory wells must meet the State Department of Health's (DOH) water quality standards for a production well. In accordance with Section 29 of Chapter 11-20 Hawaii Administrative Rules (HAR), an engineering report must be approved by DOH prior to activation of the proposed wells.

   Drawdown tests are used to determine the sustainable yield of the wells to ensure that the desired pumping range does not adversely impact the ability of the aquifer to provide acceptable quality water. Excessive pumping rates could result in localized upconing of salt water.

2. A separate EA will be prepared if the exploratory wells are converted to a production facility. Separate EA's for the exploratory and well station construction, are normally conducted when new facilities are proposed, such as the Malaekahana Wells. During the well drilling phase of a new project, the productivity of the well is unknown as well as land requirements, access and connecting pipelines. For additional wells to existing facilities, we feel separate EA's are not necessary in most cases, because adjacent well data is known and will be similar. In addition, land access and pipeline infrastructure are already existing and most renovation work would be exempt under Chapter 11-200(8), HAR.

Isolated source

3. The projected defacto population of the Koolauloa Development Plan Area is projected to increase from 15,350 people in 1990 to 20,400 in 2020. Resident population will range between 14,000 to 15,000 in 2020. The Koolauloa Development Plan Area extends from Kaaawa to Kawela. Water from the proposed source, however, can only be used to meet the needs of consumers in the Kahuku and Malaekahana area because the water system is physically isolated to these areas. As indicated in Section 4.5, Demographics, the proposed project is expected to serve the expansion plans of the Kahuku hospital and high school and the Malaekahana State park. Development was restricted in the Kahuku area for over 10 years due to water system capacity limitations and this well station will provide the needed source capacity.

   The BWS is required by City Charter to follow the development policy of the City's general and development plans. The distribution of the projected Koolauloa growth within the Kahuku-Malaekahana areas and the direct, indirect and cumulative impacts of this designated growth are more appropriately discussed in the development plans. The impacts associated with growth extend beyond the adequacy of water system infrastructure. In addition, improvement of the water system does not solve the other infrastructure limitations such as, flood control and sewage disposal.

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

Very truly yours,

RAYMOND H. SATO
Manager and Chief Engineer

cc: Water Resource Associates

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

JEREMY HARRIS
MAYOR

CHERYL D. SOON
CHIEF PLANNING OFFICER

CAROLL TAKAHASHI
DEPUTY CHIEF PLANNING OFFICER

MH 9/96-1820

October 4, 1996

MEMORANDUM

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

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

SUBJECT: DRAFT ENVIRONMENTAL ASSESSMENT (DEA) FOR KAHUKU (MALAEKAHANA) EXPLORATORY WELLS, MALAEKAHANA, OAHU, HAWAII, TAX MAP KEY: 5-6-7: 01

In response to Water Resource Associates' request of September 2, 1996, we have reviewed the subject DEA and have the following comments to offer:

1. The Final Environmental Assessment should state that the subject site is designated for Agriculture use on the Koolauloa Development Plan Land Use Map.

2. There are no publicly funded nor privately funded improvements designated in the general vicinity of the proposed subject site on the Koolauloa Development Plan Public Facilities Map (DPPFM).

3. We concur that should the Malaekahana exploratory wells be converted into production wells, an amendment to the Koolauloa DPPFM to add a symbol for a publicly funded well, site determined, within six years would be required for the budgeting and appropriation of funds.

4. We have no objections to the proposed Malaekahana exploratory wells project.

Should you have any questions, please contact Matthew Higashida of our staff at 527-6056.

Cheryl D. Soon

CHERYL D. SOON
Chief Planning Officer

CDS:ft

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96843
PHONE (808) 527-6180
FAX (808) 533-2714

May 1, 1997

TO: PATRICK T. ONISHI, CHIEF PLANNING OFFICER
PLANNING DEPARTMENT

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

SUBJECT: DRAFT ENVIRONMENTAL ASSESSMENT FOR THE KAHUKU (MALAEKAHANA) EXPLORATORY WELLS PROJECT, MALAEKAHANA, OAHU, HAWAII, TMK: 5-6-07: 01

Thank you for reviewing the Draft Environmental Assessment for the proposed exploratory wells project.

We provide the following response to your concerns:

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

2. The Final Environmental Assessment will indicate that the proposed site is designated for Agriculture use on the Koolauloa Development Plan Land Use Map.

3. We understand that there are no improvements designated in the general vicinity of the proposed site on the Koolauloa Development Plan Public Facilities Map (DPPFM). An amendment to the DPPFM to add a symbol for a publicly funded well, site determined, within six years, will be submitted should we convert the exploratory wells to production wells.

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

cc: Dan Lum, Water Resource Associates
Office of Environmental Quality Control

962831

DEPARTMENT OF PUBLIC WORKS

CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
HONOLULU, HAWAII 96813

JEREMY HARRIS
MAYOR

KENNETH E. SPRAGUE
DIRECTOR AND CHIEF ENGINEER

DARWIN J. HAMAMOTO
DEPUTY DIRECTOR

ENV 96-214

September 10, 1996

MEMORANDUM:

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

ATTENTION: BARRY USAGAWA

FROM: for KENNETH E. SPRAGUE
DIRECTOR AND CHIEF ENGINEER

SUBJECT: DRAFT ENVIRONMENTAL ASSESSMENT (DEA)
KAHUKU (MALAEKAHANA) EXPLORATORY WELLS
TMK: 5-6-7: 01

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

1. The DEA should address discharge of effluent during drilling including estimated rates and best management practices (BMPs) to be implemented to protect stream or other receiving waters.

2. The DEA should also address ownership of stream into which the effluent will be discharged.

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

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96843
PHONE (808) 527-6180
FAX (808) 533-2714

April 23, 1997

TO: JONATHAN K. SHIMADA, Ph.D., DIRECTOR AND CHIEF ENGINEER
DEPARTMENT OF PUBLIC WORKS

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

SUBJECT: DRAFT ENVIRONMENTAL ASSESSMENT FOR THE KAHUKU (MALAEKAHANA) EXPLORATORY WELLS PROJECT, MALAEKAHANA, OAHU, HAWAII, TMK: 5-6-07: 01

Thank you for reviewing the Draft Environmental Assessment (EA) for the proposed exploratory wells project.

We have the following response to your comments:

1. Section 3.3, Well Testing Procedures, of the Draft EA discusses effluent discharge rates and Best Management Practices. The procedures will be expanded to indicate that flow velocities will be dissipated by a baffle system to reduce erosion and to prevent flushing any debris or contaminants into the stream.

2. The Final EA will indicate that the stream into which the test pumping effluent will be discharged, is within land owned by the Estate of James Campbell Trust.

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

cc: Dan Lum, Water Resource Associates
Office of Environmental Quality Control

O'AHU GROUP
SIERRA CLUB, HAWAI'I CHAPTER
P.O. Box 2577, Honolulu, Hawaii 96803
Phone: (808) 538-6616

September 9, 1996

Raymond Sato
Board of Water Supply
630 S. Beretania St.
Honolulu, HI 96813

Dear Mr. Sato

RE: KAHUKU (MALAEKAHANA) EXPLORATORY WELLS

The O'ahu Group of the Sierra Club requests that the Board of Water Supply more thoroughly assess the cumulative impacts of the Kahuku wells project. These impacts include all growth-inducing impacts as well as impacts on the long-term sustainability of the water supply.

The Environmental Impact Statement rules require that

> in determining whether an action may have a significant effect on the environment, the agency shall consider every phase of a proposed action, the expected consequences, both primary and secondary, and the cumulative as well as the short-term and long-term effects of the action.

Hawai'i Administrative Rules 11-200-12(b) (emphasis added). Clearly, growth-inducing impacts can be anticipated. In fact, Page 4-13 of the draft environmental assessment states:

> If successful, the exploratory wells will provide a new source of potable water supply to meet the demands of future population growth in the Malaekahana-Kahuku area.

Given that the Board of Water Supply admits that this project is necessary to facilitate growth, it must assess what impacts this growth will have. Furthermore, it must assess what impact this growth will have on our water supply.

The Board of Water Supply must understand the broader implications of its actions and cannot hide behind a narrow-minded interpretation of its mission. The Board of Water Supply must recognize that its actions may very well increase consumer demand for municipal water by stimulating growth.

Sincerely,

Philip Bogetto
Chair

c. Dan Lum
OEQC

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96843
PHONE (808) 527-6180
FAX (808) 533-2714

April 28, 1997

COPY

Mr. Philip Bogetto, Chair
Oahu Group, Sierra Club Hawaii Chapter
P. O. Box 2577
Honolulu, Hawaii 96803

Dear Mr. Bogetto:

Subject: Draft Environmental Assessment for the Board of Water Supply's Proposed Malaekahana Exploratory Wells

Thank you for your letter regarding the Draft Environmental Assessment (EA) for the Board of Water Supply's (BWS) proposed Malaekahana Exploratory Wells project.

We provide the following response to your concerns:

1. The Malaekahana exploratory wells project, if feasible, will provide needed additional potable water to support expansion of existing facilities and the long range development plans of the Kahuku area. The Kahuku water system is substandard and has resulted in a development restriction for over 10 years. Existing facilities that will benefit are the expansion plans of the Kahuku hospital and high school and other private and government facilities within the Kahuku and Malaekahana area. The wells will be test pumped to determine yield, quality and any stream flow impacts. There is sufficient sustainable yield in the Koolaupoko aquifer to accommodate this project.

2. We feel that the exploratory well EA assesses all the pertinent impacts of the project and provides sufficient mitigation. The BWS is required by City Charter to follow the development policy of the City's general and development plans which designate Koolauloa as a rural area. The distribution and cumulative impacts of incremental growth are more appropriately discussed in the development plans. We understand the Koolauloa regional development plan revision will be prepared by the City Planning Department. The development plan will address all issues including other infrastructure limitations in Kahuku, such as flood control and sewage disposal, which will affect the extent of Kahuku's growth.

3. The BWS is by no means hiding behind a narrow-minded interpretation of its mission. Facing more stringent federal safe drinking water standards and higher water demand combined with a growing population, the BWS is committed to meeting the community's water needs and being responsive to their environmental concerns.

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