BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU

630 SOUTH BERETANIA STREET

HONOLULU, HAWAII 96843

July 3, 1990

Dr. Marvin T. Miura, Director
Office of Environmental
Quality Control
State of Hawaii
Kekuanaoa Building, #104
465 South King Street
Honolulu, Hawaii 96813

Dear Dr. Miura:

Subject: Environmental Impact Assessments for: (1) Kawailoa Exploratory Well and (2) Mokuleia Exploratory Well

We request that our proposed projects be published in the EQC Bulletin as a Negative Declaration.

Attached are four copies of the assessment of each project for your use.

If you have any questions, please contact Lawrence Whang at 527-6138.

Very truly yours,

KAZU HAYASHIDA
Manager and Chief Engineer

Attachment

1990-07-23-OA-FEA

FILE COPY

Environmental Assessment
for
* Kawailoa Exploratory Well *

Kawailoa, Oahu, Hawaii

BOARD OF WATER SUPPLY
Honolulu, Hawaii

June 1990

ENVIRONMENTAL IMPACT ASSESSMENT

FOR AN EXPLORATORY WELL

AT KAWAILOA, OAHU, HAWAII

Tax Map Key: 6-1-06:1

Proposing Agency:

BOARD OF WATER SUPPLY
City and County of Honolulu
630 South Beretania Street
Honolulu, Hawaii 96843
Contact: Lawrence Whang, Tel.
527-6138

Prepared by:

WILSON OKAMOTO & ASSOCIATES, INC.
1150 South King Street, Suite 800
Honolulu, Hawaii 96814

June 1990

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CHAPTER 1

INTRODUCTION

Chapter 343, Hawaii Revised Statutes (HRS), requires that proposed actions be assessed to determine potential adverse environmental impacts, and that these impacts be documented. Chapter 200 of Title 11, State of Hawaii Department of Health Environmental Impacts Statements, sets forth the requirements for documentation of the environmental impacts. [Ref. 1 and Ref. 2]

This Environmental Assessment (EA) has been prepared to meet the requirements of Chapter 343 HRS and Chapter 200 of Title 11 by documenting the environmental effects from the development of the Kawailoa exploratory well project proposed by the City and County of Honolulu Board of Water Supply (BWS). Agency and public consultation on this project is documented in Appendix A.

The environmental impacts from construction and operation of this well have been previously examined in the Waialua to Kahuku Regional Water System Improvements Final Environmental Impact Statement (EIS) (accepted August 1989). Relevant portions of the Waialua to Kahuku EIS are incorporated by reference in this EA. [Ref. 3]

CHAPTER 2

PROJECT DESCRIPTION

2.1 INTRODUCTION

The BWS is responsible for the management, control and operation of the municipal water system for certain areas of Oahu. As part of this responsibility, the BWS first identifies potential well sites based on the subsurface geologic and groundwater characteristics of the area. If the site appears promising as a source of groundwater, the BWS then conducts exploratory drilling and certain tests to determine the suitability of the well for eventual production of potable water. The Kawailoa well site has been identified as such a potential source.

2.2 PROJECT LOCATION

Kawailoa is located on the North Shore of Oahu, about 30 miles north of the central city of Honolulu. Other nearby communities include Waialua and Haleiwa. The Kawailoa exploratory well site is located on land owned by the Bishop Estate about one-mile south of Kamehameha Highway and immediately north of Ashley Road at about 400 feet elevation in an area used for production of sugarcane. Access to the well site is via Kamehameha Highway and Ashley Road, an unimproved public road. Figure 1 shows the project location and Figure 2 the well site as seen from Ashley Road.

Since the well site is already accessible, a separate BWS access road for equipment and supplies used in the exploratory drilling and testing will not be required.

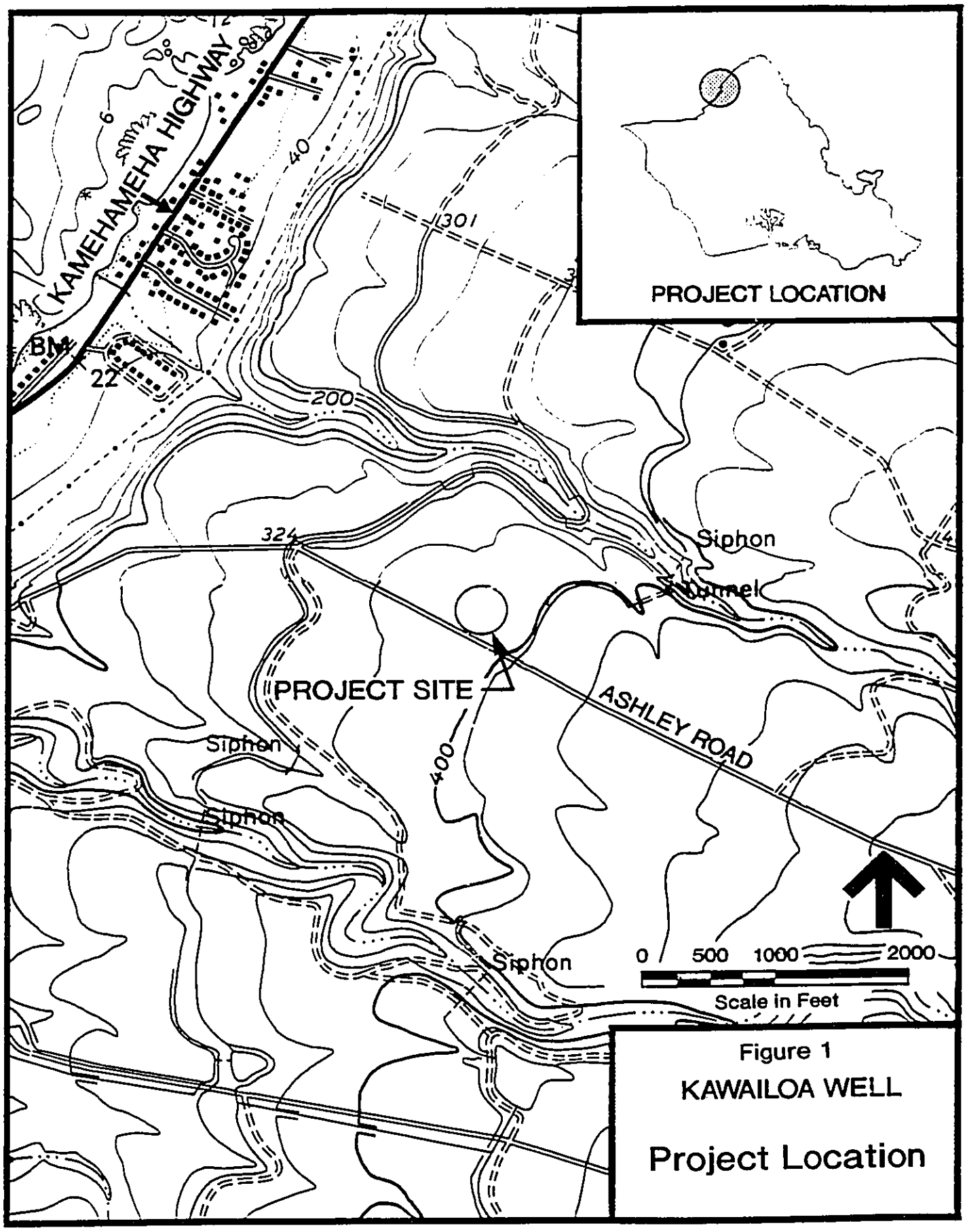
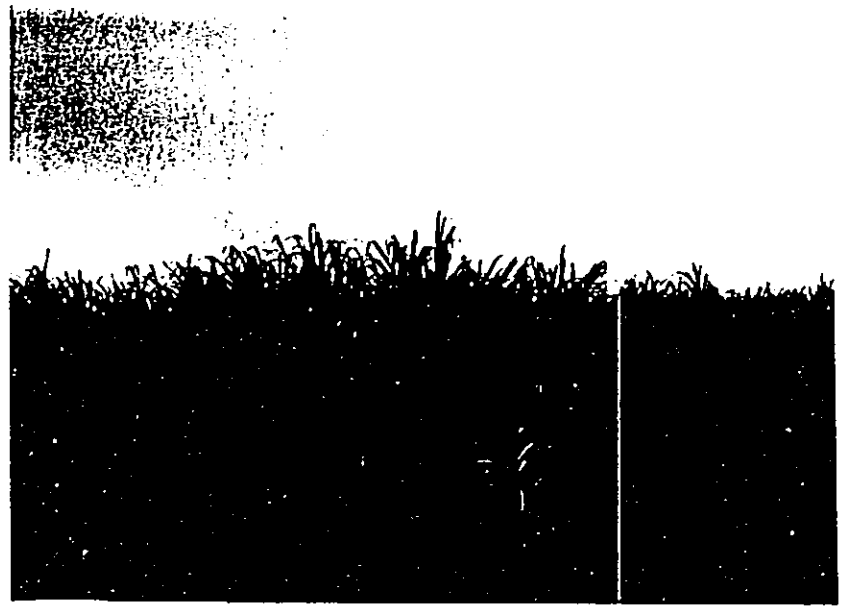


Figure 1

KAWAILOA WELL

Project Location

View of the project area looking north.



Close up of the site.

View down Ashley Road. The project site is to the right (not visible here).

Figure 2

2.3 PROJECT FEATURES

The following table describes the features of this exploratory well site:

Item	Kawailoa
Tax Map Key (TMK)	6-1-06:1
Total parcel area (acres)	2,050.0
Total area needed for site (acres)	.75 to 1.0
Flood Insurance Rate Map (FIRM) Flood Zone	Undetermined
State Land Use District	Agricultural
State Water Management Area	Waialua
City and County of Honolulu Development Plan	Agriculture
City and County of Honolulu Development Plan Public Facilities Map	Site Determined, (within 6 yrs.)
City and County of Honolulu Zoning	Agriculture (AG-1)
Approximate depth to aquifer	400 FT
Estimated yield of production well	.1 to 1 mgd*
Type of Aquifer	Basal
Land Owner	Bishop Estate
Nearest Access	Ashley Road

* million gallons per day

2.4 PROJECT CONSTRUCTION

An area of about .75 to 1.0-acre will be cleared and graded at the project site to accommodate well drilling and support equipment, and necessary supplies. All excess material from the clearing and grading the project site will be disposed at an approved location for this type of material. Once the area has been cleared, a temporary fence may be erected to secure the project site.

Construction shall be limited to the hours between 7:30 am and 3:30 pm. No work shall be done during any other hours or on Saturdays, Sundays, or holidays unless approved by the Board of Water Supply.

Once the site has been cleared and secured, if necessary, a truck or trailer-mounted well drilling rig and other support equipment will be brought to the project site for the exploratory drilling operation. The truck engine or a self-contained engine will be used to provide power for the well drilling rig. A single well hole about 16 inches in diameter will be drilled at the project site to reach the groundwater source.

One of two existing types of drilling methods, either cable tool or rotary, will be used. The cable tool drilling method is performed by repeatedly raising and dropping a heavy drill bit until the desired depth has been reached.

All waste material from the cable tool drilling operation is bailed from the hole and collected in a pit constructed on the project site or discharged on the surface. In either case, the waste material will be disposed off site in an approved manner. The waste material generated from this drilling method does not contain any contaminants. Depending on the depth and lava formations encountered, the well drilling may require up to a maximum of six months to complete.

If the rotary drilling method is used, a drill bit rotating at moderate speed will bore the well while drilling fluid is pumped down the drill stem to the bit at the bottom of the hole. The drilling fluid, bentonite, a fine clay material, is then forced back up the hole carrying drill cuttings to the surface where they are removed from the drilling mud by a screen. The mud is then collected for recirculation in a mud tank located to the side of the drill rig. The mud is not considered a hazardous material. No surface runoff of the drilling mud will be permitted. When the drilling is complete, the remaining drilling mud will be taken off the project site and disposed in an approved manner.

Once the water table is reached, instead of drilling fluid, an air compressor will pump air down to the drill bit to lift cuttings to the surface. This will ensure that the drilling mud does not enter the aquifer. This rotary drill method of drilling may require up to three to four months to complete.

Upon completion of the drilling operation, a 12-inch diameter steel casing will be grouted into the drilled hole and a test pump will be installed.

2.5 PUMPING TEST

Two types of pumping tests will be conducted after the drilling operation is completed. The initial test, a step-drawdown or yield-drawdown test, involves pumping water from the well at various pumping rates to determine the specific capacity (number of gallons withdrawn per foot of drawdown) of the well. The drawdown will be measured for each pumping rate. Once the drawdown has stabilized, the pumping rate will be changed and a new drawdown measured. A step-drawdown test may last up to five hours, and will be performed from about 9:00 AM to 2:00 PM on a weekday.

After the step-drawdown test has been completed, a five-day, or 120-hour, sustained pumping test will be undertaken. This test is designed to determine the sustainable capacity of the well, monitor water quality, and to measure aquifer parameters by monitoring nearby observation wells, if any. (Sustainable capacity is the rate at which the well can be continuously pumped without adverse salinity changes or impact to nearby existing wells.)

In addition to monitoring nearby wells, streams, if nearby, will also be monitored to identify adverse effects from the pumping. The BWS normally contracts the U.S. Department of Interior Geological Survey to monitor streams during the test period.

Water pumped during the pumping test will be collected and tested for organic compounds as required by the U.S. Environmental Protection Agency (EPA); heavy metals; minerals; hazardous materials; coliform and standard plate count for bacteria. The tests are performed by the BWS, certified commercial chemical laboratories, and, in some cases, by the State of Hawaii Department of Health. The water pumped during the five-day test will be disposed as surface runoff. The water will not be considered a source of drinking water according to the State of Hawaii Department of Health (DOH) Potable Water Systems Regulation set forth in Title 11, Chapter 20, DOH Rules.

Upon completion of the five-day pumping test, the well driller will then remove the pump, cap the well, and clean the area, removing all excess materials. The well will be capped after testing to prevent tampering or misuse of the well such as for disposal of hazardous wastes, sewage, or household garbage. According to the U.S Environmental Protection Agency (EPA) Underground Injection Control Section, unplugged or improperly abandoned water wells can easily become receptacles for the disposal of waste which may contaminate the groundwater aquifer.

2.6 PROJECT SCHEDULE

The project schedule will depend upon the BWS' ability to obtain the property rights of entry to construct the project.

CHAPTER 3

AFFECTED ENVIRONMENT

3.1 PHYSICAL ENVIRONMENT

3.1.1 Geology

Kawailoa is located at the northern end of the Koolau Shield Volcano. Although less than a mile from shore, the Kawailoa well site is on Koolau basalt rather than on coastal plain sedimentary rock which is prevalent elsewhere along the northeast coast of Oahu. Deposited during the Great Ice Age when great fluctuations in sea level occurred, these sediments are largely responsible for the formation of caprock. The thinness of sedimentary rock in the Kawailoa area allows water to flow freely to the ocean and a large coastal swamp, Ukoa pond. [Ref. 4]

3.1.2 Soils

Soil at the well site is classified by the U.S. Department of Agriculture Soil Conservation Service as Wahiawa silty clay, 3 to 8 percent slopes (WaB). Its soil capability classification is IIe; soil with moderate erosion potential if cultivated and not protected. The Wahiawa series consists of well-drained soils found in the uplands of Oahu which developed in residuum and old alluvium derived from basic igneous rock. Runoff on this soil is slow, erosion hazard slight. This soil is commonly used for sugarcane, pineapple, pasture, and homesites. [Ref. 5]

The well site is situated in a sugarcane field. According to the State of Hawaii Agricultural Land of Importance to Hawaii (ALISH) classification, the well site is located on "Prime" agricultural lands, meaning that it has the soil quality, growing season, and moisture supply needed to produce sustained high yields economically when treated and managed properly. [Ref. 3]

The well site has also been classified in the Detailed Land Classification -Island of Oahu published by the University of Hawaii Land Study Bureau. This study evaluated the quality, or productive capacity, of certain lands on Oahu in two ways: (1) for selected crops or uses, and (2) for overall suitability in agricultural use. A five-class productivity rating was established (A,B,C,D and E) with A representing the highest and E the lowest. According to this classification, the well site has an overall productivity rating of "B". [Ref. 3]

3.1.3 Climate and Air Quality

The climate of north-central Oahu is characteristically mild. The mean temperature in the Kawailoa area is 75 degrees Fahrenheit, and humidity is generally within the 60 to 80 percent range. The entire coast receives persistent northeasterly tradewinds that blow from 4 to 12 miles per hour. [Ref. 3]

A rain gage station located at the 565-foot elevation contour, about 3/4 mile along Ashley Road southwest of the Kawailoa well site (State Key No. 895.00) indicates that at that elevation, the area receives approximately 57 inches mean annual rainfall. Most of it occurs during the winter months. [Ref. 7]

Air quality on most areas of Oahu is generally affected by vehicle traffic and stationary sources. The general lack of high volumes of vehicle traffic and stationary sources, and the normal fresh tradewind conditions indicates the air quality to be good for the North Shore area. Dust from agricultural activities in the area would be the only source of air pollutants near the well site. However, under most conditions, the tradewinds keep air quality and visibility good.

3.1.4 Hydrology

3.1.4.1 Surface Water

There are no surface water sources, flood plains, or wetlands on the well site. The closest surface water sources to well site are the Anahulu River, about three miles to the south, and the Waimea River, located about one and half miles to the northeast. Both of these rivers are continuous flowing and designated "Limited Consumptive" by State of Hawaii Department of Health. According to this water quality standard, the streams have moderate to high quality water or natural values whose use is controlled to prevent excessive modification. [Ref. 3]

The closest wetland areas to the project site are 1/2-mile north and 1/2-mile south. The vegetation of the two wetland areas are described as: marshy, scrub/shrub, broad-leaved evergreen, non-tidal, and seasonal. [Ref. 3] Figure 3 shows the wetlands near the well site.

The project site is included in the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM). It is designated as Flood Zone D-- an area of undetermined, but possible, flood hazard. [Ref. 3]

3.1.4.2 Groundwater

Most of Oahu, including the North Shore area, is underlain with permeable volcanic rock which transmits water readily. As a result, the base of the island below sea level is saturated with saline water of ocean salinity. Any fresh water penetrating the surface and accumulating will float on the saline water below as a fresh water lens in a condition known as basal groundwater. This type of control occurs below the Kawailoa well site. [Ref. 8]

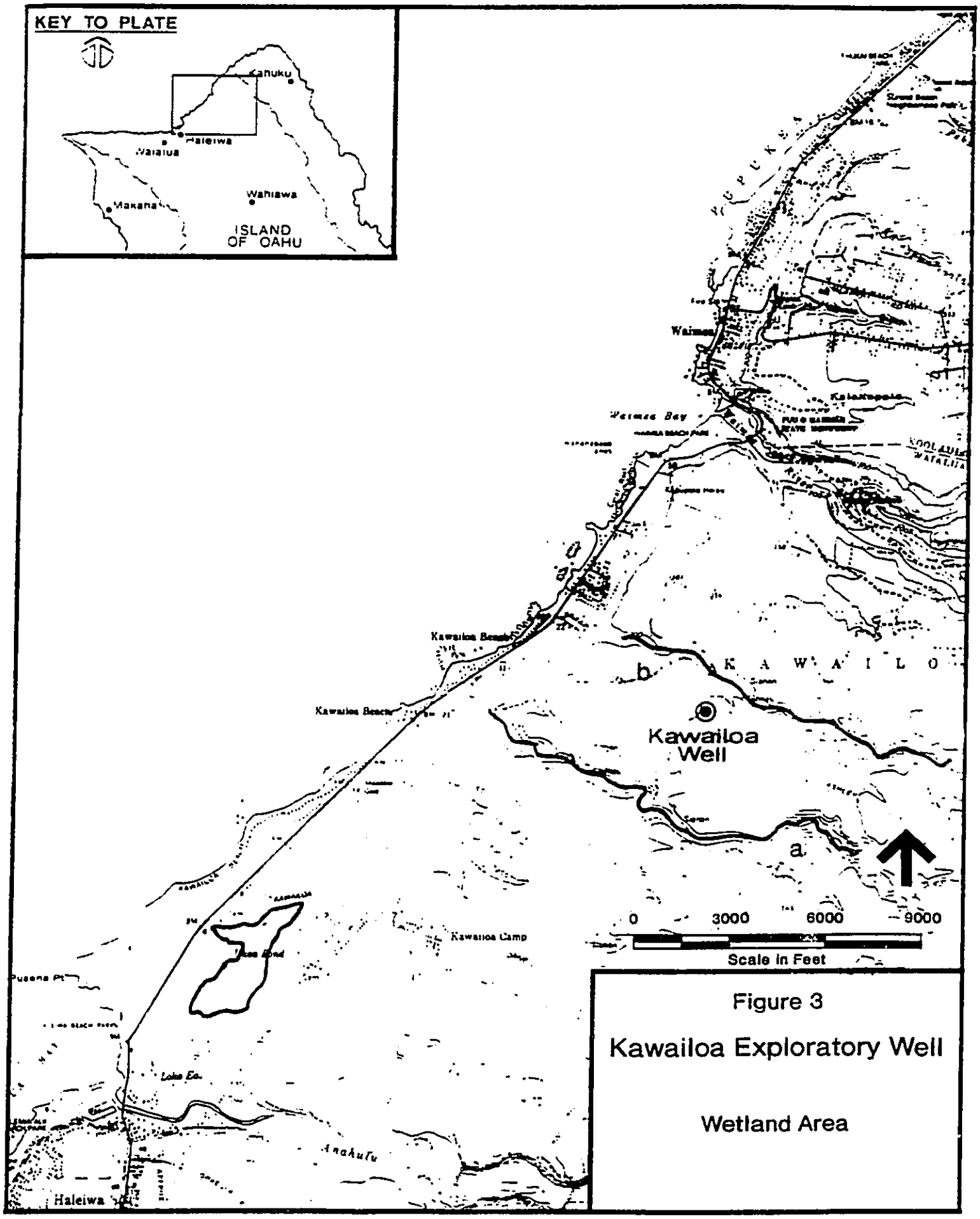


Figure 3

Kawailoa Exploratory Well

Wetland Area

According to the U. S. Department of the Interior Geological Survey, there are six main groundwater bodies along the North Shore. The Kawailoa freshwater body below the well site lies between the Waialua-Haleiwa groundwater body to the south, and the Kawailoa ground water body to the east. It is identified by a 6-foot difference in water level between two distinct areas. High water levels are found near the Anahulu River with declining levels found to the northeast towards Waimea. A portion of groundwater may move northeastward through or under the alluvium-filled Anahulu River Valley, as indicated by the presence of high water levels south of the Anahulu River.

Free movement of groundwater to the ocean is found in the Kawailoa area due to a thin or completely absent boundary of caprock material. The discharge of water occurs as springs from lava near the shoreline and through sedimentary materials into Ukoa pond located in the southwestern Kawailoa area. The springs were once used by Waialua Agricultural Company. [Ref. 4]

The closest existing groundwater source to the Kawailoa well site is Meadow Gold Dairy's Well No. 3409-16 (a shaft), located about one mile to the west. The latest records show no production at this shaft. [Ref. 8]

Other nearby wells include a series of wells (Nos. 3605-01 to 04, 06 to 08, 11 to 13, and 15 to 25) designated Pump 4 by Waialua Sugar Company which are located two and a half miles to the southwest. The latest records indicate withdrawals of about 5.1 million gallons per day (MGD) from these sources. [Ref. 8]

3.1.5 Noise

In most areas of Oahu, including the North Shore area, vehicle traffic is the primary source of noise. The well site is distant enough from Kamehameha Highway, about one mile away, to be extremely quiet. Vehicle

traffic on Ashley Road, an unimproved dirt road adjacent to the project site, is light and not a noise source.

3.2 BIOLOGICAL ENVIRONMENT

3.2.1 Flora

A botanical survey of the well site was conducted in July, 1985 as part of the Waialua to Kahuku EIS. (See Appendix B). According to this survey, the well site is primarily cultivated sugarcane production fields. Along the verges of the production fields and roadways, there are small numbers of other species such as nut sedge, fir-leaved celery, bur clover, sow thistle, garden spurge, pua-lele, slender amaranth, prostrate spurge, goosegrass, rhodes grass, Panama grass and Bermuda grass. None of these species is a Federal (Department of the Interior Fish and Wildlife Service) or State of Hawaii listed or candidate threatened or endangered plant species. [Ref. 9 and Ref. 10]

3.2.2 Fauna

Although a site survey for wildlife was not been undertaken, based on the sugarcane production of the well site, an extensive population of wildlife most likely does not occur on the site. During the field survey, no wildlife was observed at the site. However, the well site could conceivably provide habitat for rats, mice, mongoose, feral pigs, feral cats, and feral dogs. None of these species is a Federal or State of Hawaii listed or candidate threatened or endangered species.

The wetland areas to the north and south of the site could provide habitats for several endangered waterbirds which may include the Hawaiian Stilt, Hawaiian Coot, Hawaiian Gallinule, and Hawaiian Duck.

3.3 SOCIAL ENVIRONMENT

3.3.1 Population

The regional population of the North Shore area in 1985 was 13,227 persons, an increase of about 1.3% from the 1980 figure of 13,061 persons. These data compare to about 811,096 persons on Oahu in 1985, an increase of 6.7 % from the 1980 figure of 762,534 persons. [Ref. 11]

Within Census Tract No. 100 which encompasses just the Kawailoa-Haleiwa area, resident population in 1985 was 1,872 persons, a slight decrease from the 1980 figure of 1,879 persons. [Ref. 11] Thus, the Kawailoa-Halewia area had no significant change in population.

3.3.2 Scenic and Visual Resources

Most of the North Shore of Oahu near Kawailoa can generally be characterized as rural with a few residential and light commercial areas located among open spaces or agricultural production lands on the mountain foothills behind the coast. Although the project site is located at about the 400 FT elevation, it is not visible from the lower elevations along Kamehameha Highway.

3.3.3 Archaeological and Historic Resources

An archaeological survey was conducted in 1985 by William Barrera as part of the Waialua to Kahuku EIS. (See Appendix C). This field investigation revealed no archaeological or historic structures, remains, objects, or artifacts at the site. There is nothing on the well site listed on the National or State of Hawaii Register of Historic Places.

3.4 LAND USE, LAND USE PLANS, POLICIES, AND CONTROLS

3.4.1 Land Use

The well site is currently being used for the agricultural production of sugarcane. A field inspection showed that most of the surrounding nearby areas were also in sugarcane production. The closest developed areas are along Kamehameha Highway, about one mile away.

3.4.2 Land Use Plans, Policies and Controls

The proposed well site is within the State Agricultural Land Use District. *This designation and the Land Study Bureau overall productivity rating of* "B" allows public facilities which are a necessary use for agricultural practices. [Ref. 3 and Ref. 6]

On the City and County of Honolulu Development Plan Land Use Map, the proposed well site is within an area designated "Agriculture". The Kawailoa exploratory well is shown on the City and County of Honolulu Development Plan Public Facilities (DPPF) Map as "PF", site determined within 6 years. The exploratory well does not require an amendment to the DPPF Map. However, an amendment will be required if a production well is to be constructed.

The well site is zoned AG-1, Restricted Agriculture. According to the City and County of Honolulu Land Use Ordinance, a public facility such as the proposed exploratory well is a permitted use in all zoning designations.

The well site is within the Waialua Water Management Area (WMA). This designation is made by the State Commission on Water Resource Management when it can be reasonably determined that the water resources in an area may be threatened by existing or proposed withdrawals or diversions.

CHAPTER 4

POTENTIAL IMPACTS AND MITIGATIVE MEASURES

4.1 PHYSICAL ENVIRONMENT

4.1.1 Geology

The exploratory well will require a bore hole to be drilled into the subsurface basalt rock. Once the exploratory well has been constructed and the five-day pumping test completed, the well will be capped. Once capped, there will be no adverse affects to the resources of the area.

4.1.2 Soils

The well site will be cleared of all of the existing sugarcane prior to the well drilling. According to the U.S. Department of Agriculture Soil Conservation Service, soils on the well site are classified as Wahiawa silty clay, 3 to 8 percent slopes. Runoff on this soil is slow and erosion hazard slight. Clearing of the site may cause some erosion. However, surrounding vegetation (principally sugarcane) should contain any soil runoff. Thus, the exploratory well should not have significant adverse affect to soil conditions on the well site.

4.1.3 Air Quality

The site clearing, well drilling and testing will take approximately six months to complete. These actions will create increased dust from clearing and grading the well site, and pollutant emissions from operation of vehicles and equipment.

4.1.4 Hydrology

4.1.4.1 Surface Water

There are no surface water sources, flood plains, or wetlands on the well site. The closest surface water sources are the Anahulu River, about three miles south of the well site, and the Waimea River, about 1 1/2 miles northeast of the well site. These distances from the well site indicate there is little likelihood of adverse affects to nearby surface water sources.

There are two wetland areas within one-half mile of the well site. (See Figure 3). The distance between the well site and the wetland areas indicate there is little likelihood for adverse affects to the wetlands.

At this time, the BWS does not anticipate monitoring these surface water sources during the pumping test period. If monitoring were to be undertaken, the BWS would contract the U.S. Department of Interior Geological Survey to conduct the monitoring of streams and other water bodies.

4.1.4.2 Groundwater

The groundwater resource below the Kawailoa well site is basal which indicates the fresh water is floating on top of saline water of ocean salinity. Once the well has been drilled, a five-hour step-drawdown test will be undertaken to determine the specific capacity (number of gallons withdrawn per foot of drawdown) of the well. The drawdown will be measured at each pumping rate.

The five-day, 120-hour pumping test will create a temporary disturbance to the equilibrium conditions in the basal aquifer. However, upon completion of the test, the well will be capped. Once this is done, the basal aquifer should return to the equilibrium conditions which existed

prior to the test. Thus, there will be no significant adverse affect to the groundwater resources of the area.

The closest private well (Meadow Gold Diary shaft) to the Kawailoa well site is located about one mile to the west. This distance between the Kawailoa well site and the Meadow Gold shaft indicates there would, most likely, be no significant adverse effects to this private source.

At this time, the BWS does not anticipate monitoring the Meadow Gold well during the five-day pumping test.

4.1.5 Noise

The well site is located about one mile south of Kamehameha Highway, a distance far enough so that vehicle traffic is not a major source of noise. Site clearing, well drilling and testing will create noise from equipment and vehicles used during these operations.

Since the nearest residences are approximately one mile below the site, noise generated during these operations should not be intrusive. If the cable tool drilling method is used, noise will result from the drill bit hitting rock (like a pile driver, only quieter) and from the operation of a diesel engine.

Drilling will generally be restricted to hours from 7:30 am to 3:30 pm to mitigate any potential adverse noise impacts.

4.2 BIOLOGICAL ENVIRONMENT

4.2.1 Flora

According to the botanical survey, the well site is primarily cultivated sugarcane production fields. Along the verges of the production fields and roadways, there are a number other species, mostly weeds. None of the

species found on the well site are Federal or State of Hawaii listed or candidate threatened or endangered species. [Ref. 9 and 10] The exploratory well will not have a significant adverse effect, loss, or destruction to the flora of this area of Hawaii.

4.2.2 Fauna

Due to the sugarcane production at the well site, an extensive population of wildlife most likely does not occur on the site. However, the well site could provide habitat for rats, mice, mongoose, feral pigs, cats and dogs. None of these species is a Federal or State of Hawaii listed or candidate threatened or endangered species. [Ref. 9 and 10] The exploratory well will not have a significant adverse affect, loss, or destruction to the fauna of this area of Hawaii.

4.3 SOCIAL ENVIRONMENT

4.3.1 Population

The well drilling will be contracted by the BWS to a contractor who will be responsible for all aspects of the project, including supplying a drilling crew. Most likely, the crew members will come from all areas of Oahu, including some from the North Shore area. However, the crew size of two to four persons is not significant when compared to the population of the North Shore. There will be no adverse effects to the population of the North Shore from the project.

4.3.2 Scenic and Visual Resources

The well site is about one mile from Kamehameha Highway and is generally not visible. Although the well rig may be visible from the Highway, it will not be a significant structure and will not block any views of nearby areas. There should be no significant adverse effects to the visual quality of the North Shore area of Oahu.

4.3.3 Archaeological and Historic Resources

The archaeological field investigation revealed no archaeological or historic structures, remains, objects, or artifacts at the well site. There are no structures on the well site listed on the National or State of Hawaii Register of Historic Places. The lack of cultural resources indicates there will be no significant adverse effects from the exploratory well.

Should any unforeseen archaeological or historical artifact be encountered during construction, all work will be stopped and the State Historic Preservation Office will be notified.

4.4 LAND USE, LAND USE PLANS, POLICIES, AND CONTROLS

4.4.1 Land Use

The well site is currently being used for the agricultural production of sugarcane. The exploratory well will require removal of the existing production area for the drilling and support equipment. Once the drilling has been completed and the well capped, the well site can be returned to the production of sugarcane. There will be no adverse effect to the land use of the well site.

4.4.2 Land Use Plans, Policies, and Controls

The well site is within the State of Hawaii Land Use District designated as Agricultural. Public facilities are a permitted use when they are necessary for agricultural practices.

The well is designated on the City and County Development Plan Facilities (DPFF) Map as "PF", site determined within 6 years. The exploratory well will not require an amendment to the DPFF Map.

The site is zoned AG-1, Restricted Agriculture, which permits public facilities such as an exploratory well. Thus, the exploratory well is consistent with City and County of Honolulu land use plans and policies.

CHAPTER 5

POSSIBLE ALTERNATIVES

5.1 NO ACTION

The proposed project is part of an overall groundwater development program intended to meet anticipated consumer demands for potable water within the BWS Waialua-Kahuku Water Use District. The objective of the exploratory well is to determine the potential of the Kawailoa well as a future source of potable water. Under a no action alternative, neither of these objectives would be achieved. The no action alternative is not considered a feasible option to the proposed project.

5.2 DELAYED ACTION

Although the proposed project is not currently scheduled, delay of the project once budgeted would only serve to increase the cost when construction ultimately begins. Delaying the project would not rule out its necessity in the near future. The delayed action alternative is not considered a feasible option to the proposed project.

5.3 ALTERNATE SITES

The BWS is responsible for management, control, and operation of the municipal water system for certain areas of Oahu. As part of this responsibility, the BWS must identify well sites for exploratory drilling and eventual production of water. A number of factors are considered by the BWS in the selection of potential alternative exploratory well sites, including subsurface geologic and groundwater characteristics, depth of drilling to the water resource, nearby surface and groundwater sources, elevation of the site in relation to the distribution system, ease of access, surrounding terrain, natural and cultural resources, and environmental impacts.

The Kawailoa well site was selected after consideration of all of these factors. Thus, there are no alternative sites which meet the determining factors established by the BWS at this site.

CHAPTER 6

DETERMINATION

In accordance with the provisions of Chapter 343, Hawaii Revised Statutes, and the significance criteria set forth in Section 11-200-12 of Title 11 Chapter 200, this assessment has determined that the project will have no significant adverse impact on the environment, and that a negative declaration may be filed.

REFERENCES

1. Hawaii Revised Statutes, comprising the Statutes of the State of Hawaii, Volume 5, Titles 16-19, Chapters 281-344, 1985.

2. Title 11, Chapter 200, State of Hawaii Department of Health Environmental Impact Statement Rules, 1985.

3. Waialua-Kahuku Regional Water System Improvements, Final Environmental Impact Statement, Board of Water Supply, City and County of Honolulu, prepared by Wilson Okamoto & Associates, September 1988.

4. J.C. Rosenau, E.R. Lubke, and R.H. Nakahara, Water Resources of North-Central Oahu, Hawaii, U.S. Department of the Interior, Geological Survey Water-Supply Paper 1899-D, Prepared in Cooperation with the State of Hawaii, Department of Land and Natural Resources, Division of Water and Land Development, 1971.

5. Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii, August 1972. U.S. Department of Agriculture, Soil Conservation Service, in cooperation with the University of Hawaii, Agricultural Experiment Station.

6. Detailed Land Classification-Island of Oahu, Land Study Bureau, University of Hawaii, December 1972.

7. Thomas W. Giambelluca, Michael A. Nullet, and Thomas A. Shroeder, Rainfall Atlas of Hawai'i, Report R76, June 1986. Water Resources Research Center. Prepared for State of Hawaii Department of Land and Natural Resources, Division of Water and Land Development.

8. Oahu Water Use and Development Plan, Technical Reference Document, Prepared for the City and County of Honolulu Department of General Planning, September 1989.

9. Title 13, Chapter 124, Hawaii Administrative Rules, Department of Land and Natural Resources, Indigenous Wildlife, Endangered and Threatened Wildlife and Plants, and Introduced Wild Birds.

10. U.S. Fish and Wildlife Service, Endangered and Threatened Wildlife and Plants, January 1, 1989.

11. U.S. Bureau of the Census, 1980 Census of Population and Housing, Census Tracts, Honolulu, Hawaii, Standard Metropolitan Area.

AGENCIES CONSULTED

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Soil Conservation Service
P.O. Box 50004
Honolulu, Hawaii 96850

4.* Mr. Daniel W. McGovern
Regional Administrator
U.S. Environmental Protection Agency Region IX
215 Fremont Street
San Francisco, CA 94105

STATE AGENCIES

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

2.* Mr. William Paty
Chairperson
State of Hawaii
Department of Land and Natural Resources
P.O. Box 621
Honolulu, Hawaii 96809

CORRECTION

THE PRECEDING DOCUMENT(S) HAS
BEEN REPHOTOGRAPHED TO ASSURE
LEGIBILITY
SEE FRAME(S)
IMMEDIATELY FOLLOWING

AGENCIES CONSULTED

FEDERAL AGENCIES

1. Mr. Ernest Kosaka
   Environmental Coordinator
   Department of the Interior
   Fish and Wildlife Service
   P.O. Box 50167
   Honolulu, Hawaii 96850

2. Mr. William Myer
   District Chief
   Department of the Interior
   Geological Survey
   677 Ala Moana Blvd., Suite 415
   Honolulu, Hawaii 96815

3. Mr. Warren M. Lee
   State Conservationist
   Department of Agriculture
   Soil Conservation Service
   P.O. Box 50004
   Honolulu, Hawaii 96850

4.* Mr. Daniel W. McGovern
   Regional Administrator
   U.S. Environmental Protection Agency Region IX
   215 Fremont Street
   San Francisco, CA 94105

STATE AGENCIES

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   Honolulu, Hawaii 96801

2.* Mr. William Paty
   Chairperson
   State of Hawaii
   Department of Land and Natural Resources
   P.O. Box 621
   Honolulu, Hawaii 96809

3.* Mr. Yukio Kitagawa
Director
State of Hawaii
Department of Agriculture
1428 S. King St.
Honolulu, Hawaii 96814

4. Mr. John Harrison
Environmental Coordinator
University of Hawaii at Manoa
Environmental Center, Crawford 317
2550 Campus Rd.
Honolulu, Hawaii 96822

5. Mr. L. Stephen Lau, Ph.D.
University of Hawaii
Water Resources Research Center
2540 Dole St., Holmes Hall 283
Honolulu, Hawaii 96822

CITY AND COUNTY OF HONOLULU

1.* Mr. John Whalen
Director
City and County of Honolulu
Department of Land Utilization
650 South King Street
Honolulu, Hawaii 96813

2.* Mr. Donald Clegg
Director
City and County of Honolulu
Department of General Planning
650 South King Street
Honolulu, Hawaii 96813

3.* Mr. Sam Callejo
Director
City and County of Honolulu
Department of Public Works
650 South King Street
Honolulu, Hawaii 96813

OTHER INTEREST GROUPS

1. North Shore Neighborhood Board No. 27
P.O. Box 607
Haleiwa, Hawaii 96712

2. Kalihi Valley Neighborhood Board No. 16
P.O. Box 19063
Honolulu, HI 96817

3.* Bernice P. Bishop Trust Estate
Trustees of the Bernice P. Bishop Estate
P.O. Box 3466
Honolulu, Hawaii 96801

4.* Castle & Cooke, Inc.
P.O. Box 2990
Honolulu, Hawaii 96802

5. Life of the Land
250 South Hotel Street, Room 211
Honolulu, Hawaii 96813

6. Mr. Gary Anderson, Conservation Chair
Sierra Club
Honolulu Executive Committee
P.O. Box 11070
Honolulu, Hawaii 96828

* Responded. Letters included in Appendix A.

APPENDIX A

RESPONSE TO CONSULTATION

JS

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
215 Fremont Street
San Francisco, CA 94105

DEC 21 1989

In reply
refer to W-6-2

John L. Sakaguchi
Wilson Okamoto & Associates, Inc.
P. O. Box 3530
Honolulu, Hawaii 96811

Dear Mr. Sakaguchi:

I am writing in response to your request for comments and issues that should be addressed in each of the Environmental Assessments for the proposed exploratory well projects located near Mokuleia, Kawailoa and Kalihi Valley. Your letter was routed to our Section for reply.

The Underground Injection Control Section of the Region IX Environmental Protection Agency is primarily concerned with protecting underground sources of drinking water from contamination as a result of fluids being placed into injection wells. Since fluids will not be injected into your wells, these exploratory well projects are not directly under our program's jurisdiction. However, the Underground Injection Control Section is concerned with potential problems which may arise if, after evaluation, the decision is made not to put these wells into production. Unplugged or improperly abandoned water wells can easily become receptacles for the disposal of wastes. Whether intentional or unintentional, misuse may occur, involving disposal of various wastes which may ultimately contaminate underground sources of drinking water. Intentional misuse may involve disposal of hazardous wastes, sewage or simply household garbage. Unintentional injection through improperly plugged and abandoned wells may consist of surface run-off drainage into a well or the establishment of hydraulic connection between aquifers of different water quality.

Since these types of situations pose a great potential threat to underground sources of drinking water, we believe that plans for proper plugging and abandonment should be addressed in the EAs. The problems which arise when these wells are not properly

plugged and abandoned become issues that must be addressed by the appropriate authorities in Hawaii or by the EPA.

Should you have any questions, please call Donna Ann Ng of my staff at (415) 744-1640 or me at (415) ~~645~~ 554-9275.

Sincerely,

Lester Kaufman

Lester Kaufman, Chief
Underground Injection Control Section

cc: Tom Arizumi, HDOH

cc: L WHANG, BWS

JOHN WAIHEE
GOVERNOR OF HAWAII

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

JOHN C. LEWIN, M.D.
DIRECTOR OF HEALTH

In reply, please refer to:
EPHSD

November 9, 1989

Wilson Okamoto & Associates, Inc.
1150 South King Street, Suite 800
Honolulu, Hawaii 96814

ATTENTION: John L. Sakaguchi

SUBJECT: ENVIRONMENTAL ASSESSMENT FOR EXPLORATORY WELLS
MOKULEIA, KAWAILOA, AND KALIHI VALLEY

Dear Mr. Sakaguchi:

Thank you for the opportunity to review the subject document. We have the following comments:

1. If the wells are to serve 25 or more individuals at least 60 days per year or has a minimum of 15 service connections, then the use of these wells as sources of drinking water will require compliance with the State's Potable Water Systems Regulations, Chapter 20, Title 11, Administrative Rules.

2. Department's Administrative Rules, Title 11, Chapter 20, "Potable Water Systems", Section 11-20-29 requires that any new source of potable water serving a public water system be approved by the Director of Health prior to its use. Such an approval is based primarily upon the submission of a satisfactory engineering report which addresses the requirements stated in Section 11-20-29.

3. The Mokuleia Well lies approximately one mile east of Mokuleia Homesteads Wells 1 and 2, which are drilled but presently capped. Operation of the proposed well shall not be allowed to degrade the water quality of the Mokuleia Homestead wells, should they come into production.

4. The Kalihi Valley Well will be sited about 2000 feet from the BWS Kalihi Well. Effects of the proposed well, if any, on the Kalihi Well will no doubt be scrutinized by BWS engineers.

Should you have any questions, please contact the Safe Drinking Water Branch at 543-8258.

Sincerely yours,

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

AZ:la

cc: L WANG, EWS

JOHN WAIHEE
GOVERNOR OF HAWAII

WILLIAM W. PATY, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTIES

LIBERT K. LANDGRAF
MANABU TAGOMORI
RUSSELL N. FUKUMOTO

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

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

REF:OCEA:SOR

DEC 6 1989

FILE NO.: 90-242
DOC. NO.: 6895E

Mr. John L. Sakaguchi
Wilson Okamoto and Associates, Inc.
1150 South King Street, Suite 800
Honolulu, Hawaii 96814

Dear Mr. Sakaguchi:

SUBJECT: Environmental Assessment for Exploratory Wells, Mokuleia, Kawailoa, and Kalihi Valley

We have completed our review of the subject document and have the following comments to offer.

Our Division of Aquatic Resources identifies that it appears that two of the sites, in Kalihi Valley and Mokuleia, may be located near enough to streams to require some consideration for monitoring during the 5-day periods set for test operation, when runoff may be diverted into the streams. According to the documentation, the USGS will be contracted to monitor the streams during such periods and the EPA will conduct a variety of water quality tests. It is not anticipated that test operation under these conditions would represent any threat to aquatic habitats, so long as measures were taken to prevent erosion or introduction of toxins with the surface runoff.

Further, the Division of Water and Land Development concludes that well drilling and water use permits will be required.

The Historic Preservation Program finds that the Mokuleia Well site is in a sugarcane field and has never been archaeologically surveyed, as it was assumed that no historic sites would remain. There are very few recorded archaeological sites in Mokuleia, as there has been no systematic professional archaeological survey in the area. While it is probable that agricultural activities have destroyed any archaeological sites on the proposed well site, an archaeological survey of the site would provide the necessary information for an effect determination.

An archaeological field check was completed on the Kawailoa well site, and no archaeological sites were found. The archaeological report, which is included in the 1989 EIS, should also be attached to the proposed EA. A determination of "no effect" is appropriate.

The Kalihi Valley well site may be in an area containing archaeological sites. An archaeological survey in connection with the BWS Kalihi stream crossing project is now underway, and we will soon have more information on the area. Wilson Okamoto could also contact Allan Schilz of ERC, the archaeological contractor, for more information.

Finally, we have identified that the Kalihi well site is within the State Land Use Conservation District. As such, appropriate land use permit approvals are required.

Thank you for the opportunity to comment on this matter. Should you have any questions, please feel free to contact Ed Henry at the Office of Conservation and Environmental Affairs (548-7837).

Very truly yours,

WILLIAM W. PATY

cc: Larry Whang

JOHN WAIHEE
GOVERNOR

YUKIO KITAGAWA
CHAIRPERSON, BOARD OF AGRICULTURE

SUZANNE D. PETERSON
DEPUTY TO THE CHAIRPERSON

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

FAX: 548-6100

Mailing Address:
P. O. Box 22159
Honolulu, Hawaii 96822-0159

November 14, 1989

Wilson Okamoto and Associates, Inc.
1150 South King Street, Suite 800
Honolulu, Hawaii 96814

Attention: Mr. John L. Sakaguchi

Dear Mr. Sakaguchi:

Subject: Environmental Assessments for Exploratory Wells
Mokuleia, Kawailoa, and Kalihi Valley - Oahu
TMK: 6-8-07: por. 2 (Mokuleia)
6-1-06: por. 1 (Kawailoa)
1-4-18: por. 6 (Kalihi Valley)
Area: about one acre each

The Department of Agriculture has reviewed the subject proposals and offers the following comments.

Both the Mokuleia and Kawailoa project sites are classified "Prime" according to the Agricultural Lands of Importance to the State of Hawaii (ALISH) system. The Kalihi Valley site is not classified.

The Soil Conservation Service Soil Survey identifies the soils of the Mokuleia and Kawailoa sites as Ewa silty clay loam (EaC) with 6 to 12 percent slopes and Wahiawa silty clay (WaB) with 3 to 8 percent slopes, respectively. Both soils are used for sugarcane cultivation and have soil capability classifications of IIIe and IIe, respectively (soils with severe and moderate erosion potential if cultivated and not protected).

The Mokuleia and Kawailoa sites have Land Study Bureau Overall Productivity Ratings and Land Types of "A219i" and "A121", respectively. By this method of classification, both sites have fair to excellent productivity potential for most agricultural uses.

Should you have any questions on the above, please contact Mr. Earl Yamamoto of the Planning and Development Office at 548-7134.

Sincerely,

Yukio Kitagawa

YUKIO KITAGAWA
Chairperson, Board of Agriculture

cc: L WHANG; BWS

DEPARTMENT OF LAND UTILIZATION
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813 • (808) 523-4432

FRANK F. FASI
MAYOR

JOHN P. WHALEN
DIRECTOR

BENJAMIN B. LEE
DEPUTY DIRECTOR

LU10/89-6754(RF)

November 9, 1989

Mr. John L. Sakaguchi
Wilson Okamoto & Associates
1150 South King Street
Honolulu, Hawaii 96814

Dear Mr. Sakamoto:

Environmental Assessment for Exploratory Wells
Mokuleia, Kawailoa, and Kalihi Valley

We have reviewed the subject Environmental Assessment and have no comment at this time.

Very truly yours,

for Loretta Chee
JOHN P. WHALEN
Director of Land Utilization

JPW:sl
0338N/2

cc: L WHANG ; BWS

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

FRANK F. FASI
MAYOR

DONALD A. CLEGG
CHIEF PLANNING OFFICER

GENE CONNELL
DEPUTY CHIEF PLANNING OFFICER

CT/KK/DGP 10/89-3850

November 7, 1989

Wilson, Okamoto & Associates
1150 South King Street, Suite 800
Honolulu, Hawaii 96814

Attention: John L. Sakaguchi

Gentlemen:

Proposed Environmental Assessments for
Board of Water Supply Exploratory Wells at
Mokuleia, Kawailoa, and Kalihi Valley

We have reviewed the material transmitted to us and offer the following comments.

1. The regulatory controls on the land and current uses are indicated in the table on page 2. This table should also indicate the Development Plan Public Facilities (DPPF) Map designations for the projects. Two of the sites (Mokuleia and Kawailoa) are shown on the North Shore DPPF Map as "Site Determined, Within 6 Years." The third site (Kalihi Valley) does not appear on the Primary Urban Center DPPF Map. The exploratory well project does not require a DPPF Map amendment, however, construction of a permanent well will require an amendment.

2. Soil Conservation Service soils information should be checked for possible limitations on construction of future pump houses at each site, should sustainable yields justify well development.

We have no specific information about the sites other than what you have listed on page 2 and what we have indicated about the public facilities map designations. We suggest that you contact BWS hydrology, geology or environmental staff for additional site information.

If you have any questions, contact Keith Kurahashi at 527-6051.

Sincerely,

DONALD A. CLEGG
Chief Planning Officer

DAC:lh

cc: L WHANG, BWS

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

FRANK F. FASI
MAYOR

SAM CALLEJO
DIRECTOR AND CHIEF ENGINEER

In reply refer to:
ENV 89-210(449)

November 8, 1989

Mr. John L. Sakaguchi, Planner
Wilson Okamoto and Associates
1150 South King Street
Honolulu, Hawaii 96814

Dear Mr. Sakaguchi:

Subject: Environmental Assessment (EA) for Exploratory Wells
TMK: 1-4-18: 06; 6-1-06: 01; and 6-8-07: 02

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

1. There are no municipal sewers in the vicinity of the proposed exploratory wells.

2. We do not have any drainage comments at this time.

Very truly yours,

for SAM CALLEJO
Director and Chief Engineer

cc: L WHANG: BWS

BISHOP ESTATE

GENERAL CORRESPONDENCE

December 4, 1989

Mr. Herbert Minakami
Honolulu Board of Water Supply
Honolulu, HI 96813

Dear Herbert:

Right of Entry (ROE) for Exploratory Wells, Kawailoa

This is in reference to your staff's request for the above ROE and our subsequent telephone discussion.

Since you have informed us that it is the Board's current policy to have landowners be responsible for exploring and drilling water wells for their own developments, we must defer your ROE request until our internal water management plan is completed. This plan could conclude that the water requirements for our projected developments might need all the surplus gallonage supplied by your proposed well site.

As we previously informed you, once our water needs are identified, your office will be briefed on our water development plans.

Thank you for your continued assistance.

Very truly yours,

Paul J. Cathcart
Manager, Oahu Division

PJC:dkk

cc: John L. Sakaguchi - Wilson Okamoto and Associates, Inc.
George Fraser - Waialua Sugar Company

CASTLE & COOKE, INC. P. O. BOX 2990 • HONOLULU, HAWAII 96802-2990
TELEPHONE (808) 548-6611

December 5, 1989

Wilson Okamoto & Associates, Inc.
1150 South King Street, Suite 800
Honolulu, Hawaii 96814

Attention: John L. Sakaguchi

Subject: Environmental Assessment for Exploratory Wells
Mokuleia, Kawailoa, and Kalihi Valley

We must apologize for the delay in responding to your letter of October 18, 1989.

We expect to have the comments from Waialua Sugar Company shortly and we will forward it to you.

Very truly yours,

George Yim, President
CASTLE & COOKE LAND COMPANY

cc: LWHANG

650 IWILEI ROAD, HONOLULU, HAWAII 96817

CASTLE & COOKE, INC. P. O. BOX 2990 • HONOLULU, HAWAII 96802-2990
TELEPHONE (808) 548-6611

December 13, 1989

Wilson Okamoto & Associates
P. O. Box 3530
Honolulu, Hawaii 96811

We forwarded a copy of the letter to the Bishop Estate regarding well location on Ashley Road on Trust property.

In addition to that letter we also enclosed copies of the location maps which show alternate areas circled in red and for the well on lands owned by Castle and utilized by Waialua Sugar Company.

Please call me if you have any comments.

Very truly yours,

George Yim, President
CASTLE & COOKE LAND COMPANY

cc: L WHANG; EWS

650 IWILEI ROAD, HONOLULU, HAWAII 96817

APPENDIX B

BOTANICAL SURVEY

WAIALUA-KAHUKU REGIONAL EIS

BOTANICAL SURVEY

PREPARED FOR WILSON OKAMOTO AND ASSOCIATES, INC.

KENNETH M. NAGATA

2 JULY 1985

KAWAILOA

The Kawailoa site is situated at approximately 400' elevation in the land of Kawailoa, Waialua District, Koolau Mountains. It lies within Ripperton and Hosaka's vegetation zone C, low phase. Although the natural cover of this zone is one of mixed open forest and shrubs, the entire region has been planted in sugar cane.

The site is situated in the sugar cane fields along a cane haul road. The cane within these fields are more than 10' in height and form a complete cover. Thus, the fields are devoid of other species except along the verges and along the roadways. Only small numbers of a few species were observed in the site. These are nut sedge, fir-leaved celery, bur clover, sow thistle, garden spurge, a pua-lele (Emilia sonchifolia var. javanica), Euphorbia glomerifera, slender amaranth (Amaranthus viridis), prostrate spurge (Euphorbia prostrata), goosegrass, rhodes grass, Panama grass and bermuda grass.

LITERATURE REFERENCES

Ripperton, J.C. and E.Y. Hosaka. 1942. Vegetation Zones of Hawaii. Hawaii Agricultural Experiment Station Bulletin 89. Honolulu. 60 pp.

St. John, H. 1973. List and Summary of the Flowering Plants in the Hawaiian Islands. Pacific Tropical Botanical Garden. Memoir No. 1. Lawai. 519 pp.

APPENDIX C

ARCHAEOLOGICAL SURVEY

KAWAILOA, OAHU: ARCHAEOLOGICAL SURVEY AT PROPOSED WELL LOCATION

Prepared for:

WILSON OKAMOTO AND ASSOCIATES
1150 South King Street
Honolulu, Hawaii 96814

Prepared by:

William Barrera, Jr.

CHINIAGO INC.
1040 B Smith Street
Honolulu, Hawaii 96817

JULY 1985

Introduction

During June 1985, arcnaeological reconnaissance surveys were performed at tne locations of a series of existing and proposed Board of Water Supply wellsites on tne windward coast of tne island of Oanu. Tne purpose of the work was to locate and identify arcnaeological or nistorical remains whicn mignt be adversely affected oy construction activities associated witn tne development of tnese wells. Tnis report covers tne proposed well at Kawailoa, wnicn is to oe located adjacent to Asnley Road at an elevation of approximately 400 feet (Figures 1 and 2].

Figure 1. Kawailoa Wellsite Looking Soutn.

Literature Searcn

Handy discusses agricultural sites in tne adjacent valleys, but mentions nothing in tne vicinity of tne wellsite:

> "Kawailoa. This anupua'a included tne extensive terrace areas nortn of tne Waialua River, along tne level land nortn and soutn of Ananuiu River, in tne lower part of Ananulu Gulcn, and in tne swampy land east of Puena point. [This swampy land apparently gave tne district its name.] In Anahulu Gulcn small flats with old mango trees, indicating kuleana, were observed several miles inland, and I am told that small areas were cultivated far up tne gulch. Wild taros were seen in the side gulch at least 5

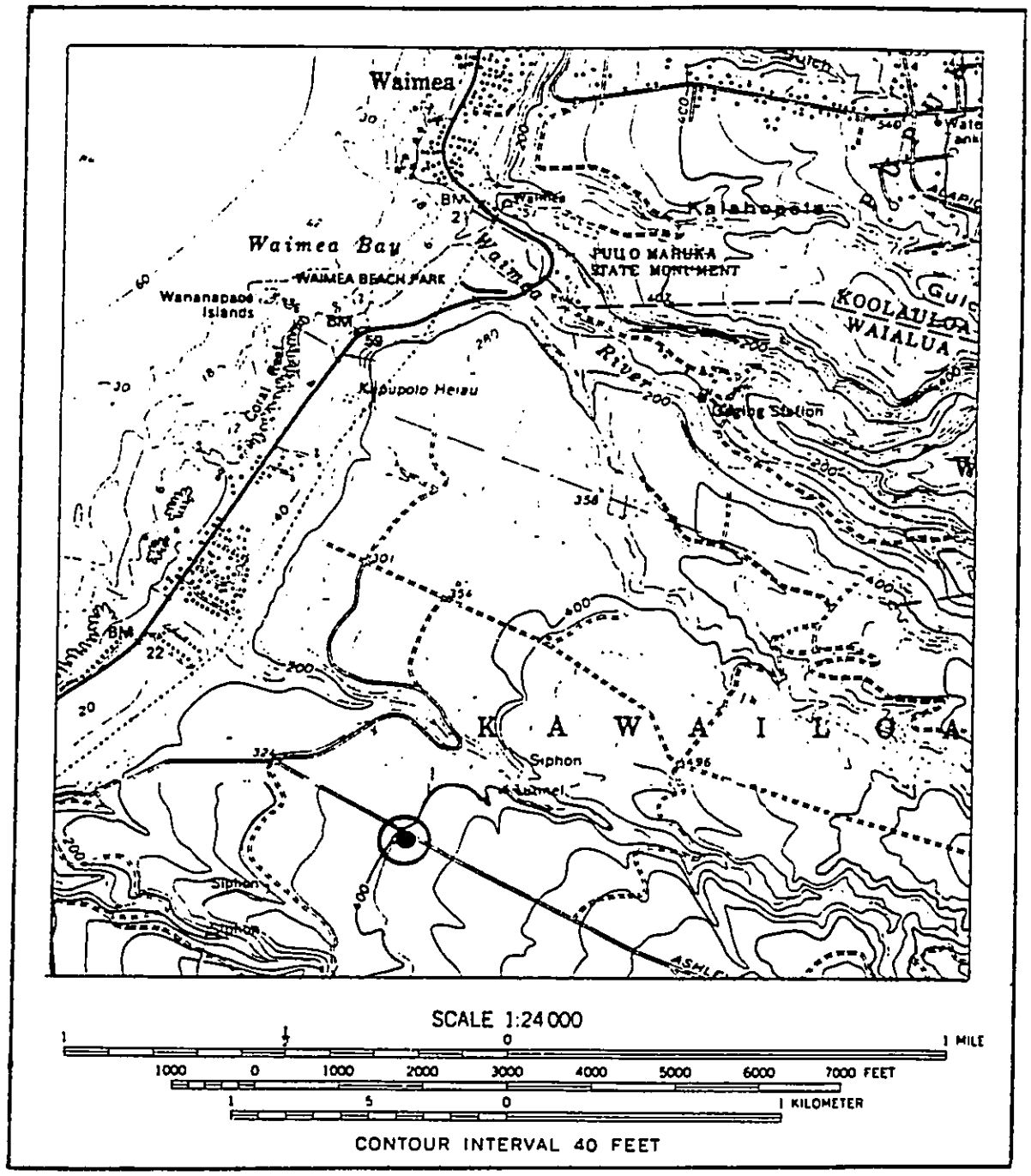

Figure 2. Location of Kawailoa Wellsite.

> miles inland. The dry gulches between Ananulu and Waimea Streams probably never watered taro" [Handy 1940:86].

Neither Sterling and Summers [1968] nor McAllister [1933] mention any sites in the vicinity, and a 1901 Waialua Agricultural Company Map [State of Hawaii Survey Office 1901] shows nothing near the site. Maps from the State Historic Preservation Office also indicate no sites in the vicinity.

Field Inspection

The field inspection revealed that the proposed wellsite is in a field of sugarcane. No archaeological or historical remains were observed.

Recommendations

As no archaeological or historical remains were found at the proposed wellsite, no further archaeological work is necessary there. The construction of the pipeline should be monitored by an archaeologist to ensure that no sub-surface remains are destroyed without first being studied.

Sources Consulted

Handy, E. S. Craighill

1940 The Hawaiian Planter. Volume I. Bernice P. Bishop Museum Bulletin 161. Honolulu.

McAllister, J. Gilbert

1933 Archeology of Oahu. Bernice P. Bishop Museum Bulletin 104. Honolulu.

[This report presents the results of a selective archaeological survey of the island of Oahu.]

State of Hawaii, Department of Land and Natural Resources

Site records, site maps and archaeological survey and excavation reports on file at the Historic Sites Section.

State of Hawaii Survey Office

1901 Map Showing Lands of the Waialua Agricultural Co. Ltd., Kawailoa Section, Waialua, Oahu. Map by W. A. Wall.

Sterling, Elspeth P. and Catherine C. Summers

1968 Sites of Oahu. Departments of Anthropology and Education, Bernice P. Bishop Museum. Honolulu.

[This is a compilation of information from numerous sources concerning the archaeological sites, history, traditions, legends, place names and land descriptions from the island of Oahu.]