



EXECUTIVE CHAMBERS
HONOLULU

GEORGE R. ARIYOSHI
GOVERNOR

August 16, 1984

Ms. Letitia N. Uyehara, Director
Office of Environmental Quality Control
550 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

Dear Ms. Uyehara:

Based on the recommendation of the Office of Environmental Quality Control, I am pleased to accept the environmental impact statement for the Kaluanui Wells at Koolauloa, Oahu, as a satisfactory fulfillment of the requirements of Chapter 343, Hawaii Revised Statutes.

This environmental impact statement will be a useful tool in deciding whether this project should be allowed to proceed. My acceptance of the statement is an affirmation of its adequacy under applicable laws and does not constitute an endorsement of the proposal.

When the decision is made regarding this action, I expect the proposing agency to carefully weigh the societal benefits against the environmental impact which will likely occur. This impact is adequately described in the statement and, together with the comments made by reviewers, provides a useful analysis of alternatives to the proposed action.

With warm personal regards, I remain,

Yours very truly,


George R. Ariyoshi

cc: Mr. Kazu Hayashida

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Revised
Environmental Impact Statement
For The

KALUANUI WELLS

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU



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BOARD OF WATER SUPPLY

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REVISED ENVIRONMENTAL IMPACT STATEMENT

FOR THE

KALUANUI WELLS

Koolauloa, Oahu, Hawaii

Tax Map Key: 5-3-9 :por. 2
5-3 10:por. 1
5-3-12:por.41

THIS ENVIRONMENTAL DOCUMENT IS SUBMITTED
PURSUANT TO CHAPTER 343, HRS

PROPOSING AGENCY:

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

ACCEPTING AUTHORITY:

Governor, State of Hawaii

BOARD MEMBERS:

Yoshie H. Fujinaka, Chairman
Walter A Dods Jr., Vice Chairman
Milton J. Agader
Michael J. Chun
Ernest A. Watari
Wayne J. Yamasaki
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Date 7/19/84

KAZU HAYASHIDA
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SUMMARY

The City and County of Honolulu Board of Water Supply (BWS) has developed one exploratory well on the northwest side of Kaluanui Valley. A second BWS exploratory well is proposed. If test pumping of the second exploratory well is successful, then the BWS plans to develop the necessary facilities to put both wells into production. Production facilities will include submersible pumps at both well sites, a control building and ancillary equipment at the second well site, a paved access road along a jeep trail (which forks off the main valley access road), underground water transmission mains, and overhead and underground electrical and telephone lines. If requested by the Division of State Parks, then the control building and ancillary equipment could be located on another site along the jeep trail to the existing well.

Approximately 1.5 million gallons per day (mgd) will be pumped from each of the Kaluanui Wells. The total 3.0 mgd will be used to service Windward Oahu from Punaluu through Waimanalo. Any surplus water will be exported to the Honolulu Water District.

Proposed BWS facilities will be almost entirely located in Sacred Falls State Park. In order to minimize visual impacts, all improvements will be designed to meet requirements set by the Division of State Parks. Archaeological reconnaissance surveys have been made and proposed facilities will be sited to avoid prehistoric artifacts.

The BWS Kaluanui Wells will withdraw water from the Koolauloa Basal Aquifer. Adequate ground water is available so that the BWS wells will not adversely affect the existing yield of other wells in the basal aquifer. However, allocation of remaining undeveloped ground water in the aquifer is an unresolved issue.

Kaluanui Stream is perennial at high elevation but intermittent in Kaluanui Valley. It is one of only two streams on Oahu known to provide habitat for the rare endemic diadromous mollusk Neritina granosa (hihiwai). The BWS Kaluanui Wells will not significantly affect Kaluanui Stream or Sacred Falls because the source of dry weather stream flow is high level dike confined ground water and not basal ground water.

**ENVIRONMENTAL IMPACT STATEMENT
FOR THE
KALUANUI WELLS**

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I. DESCRIPTION OF THE PROPOSED PROJECT

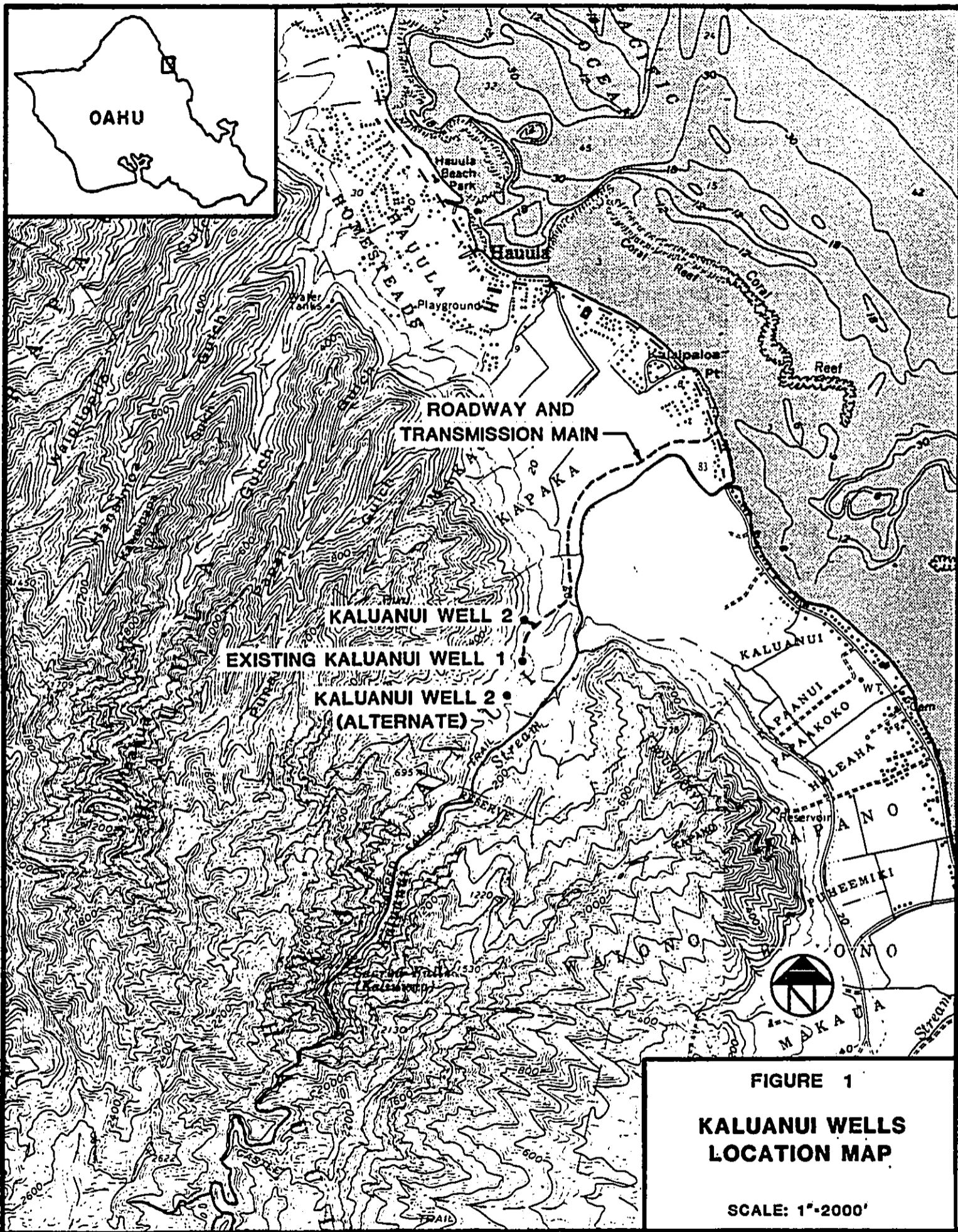
A. LOCATION AND LAND OWNERSHIP

The Board of Water Supply (BWS) has drilled and tested one exploratory well (DOWALD No. 3554-04) on the northwest side of Kaluanui Valley at an elevation of 134 feet. A second BWS exploratory well is proposed at a similar elevation about 600 feet north of the existing well. However, if test pumping of the second exploratory well is not successful, then another exploratory well will be developed at a similar elevation about 600 feet south of the existing well. [Figure 1 and Figure 2] The existing and proposed wells are sited within Sacred Falls State Park on a portion of a State owned parcel identified by Tax Map Key 5-3-09:2. The parcel is within the State Agricultural District and is zoned AG-1 by the County.

In order to develop water from its Kaluanui Wells, the BWS is proposing to construct a water transmission main and electrical and telephone lines between the wells and Kamehameha Highway. The pipeline and utility lines will be almost entirely within Sacred Falls State Park on portions of State owned parcels identified by Tax Map Key 5-3-09:2 and 5-3-10:1. A short section of the proposed pipeline and utility lines will be located on a portion of a parcel owned by Zions Securities Corporation and identified by Tax Map Key 5-3-12:41. Except for their makai end, the proposed pipeline and utility lines will be located within the State Agricultural District on land zoned either AG-1 or P-1 by the County. About 100 feet of utility lines will be located within the State Urban District on land zoned AG-1 by the County. (About 3,000 feet of buried pipeline and overhead utility lines will be located within the County Special Management Area.)

B. DESCRIPTION

The existing BWS exploratory well was drilled and test pumped in 1982 and then capped. Its static head was 21.2 feet msl prior to test



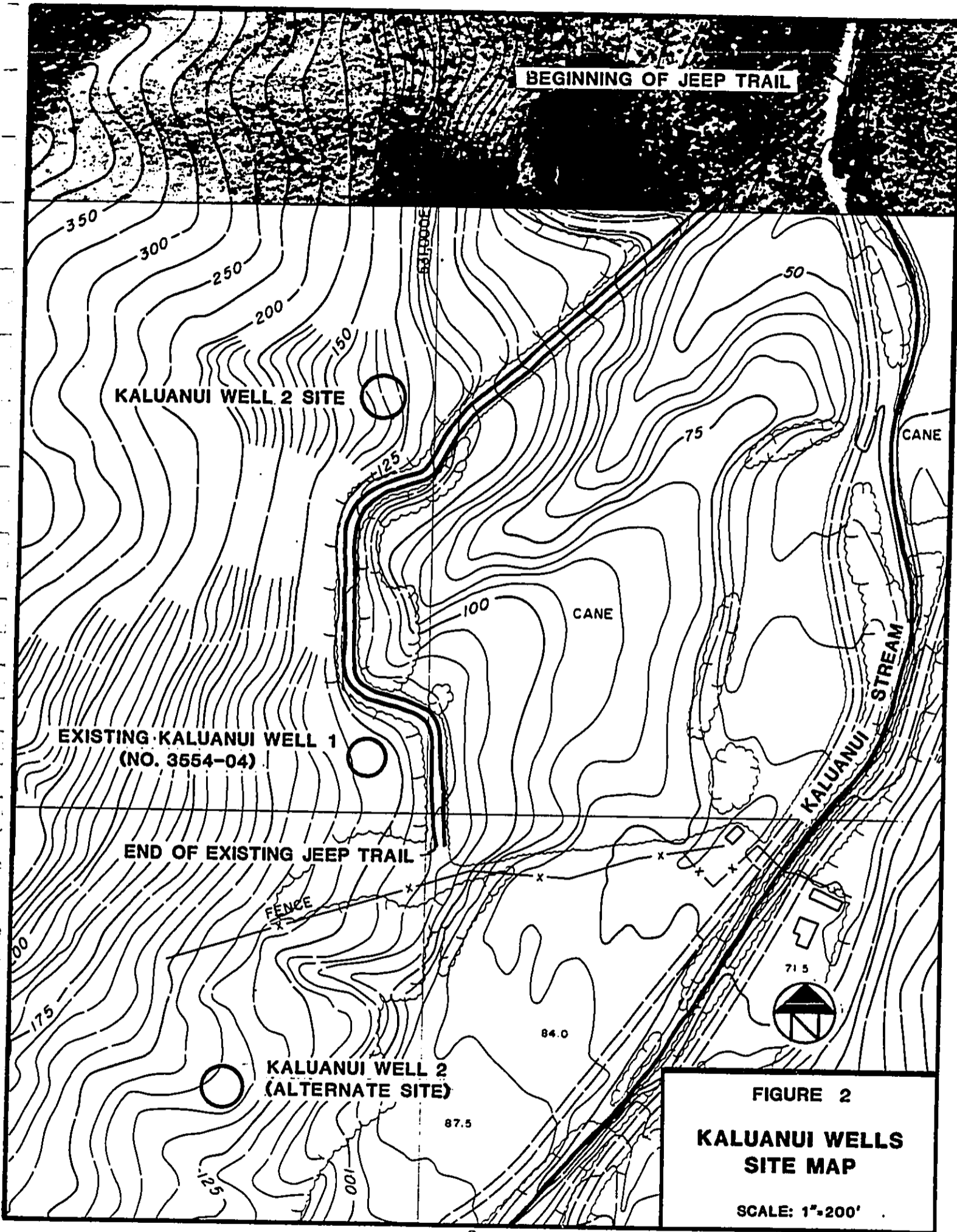


FIGURE 2
KALUANUI WELLS
SITE MAP
 SCALE: 1"=200'

pumping on June 8, 1982. The well capacity is about 1.5 million gallons per day (mgd). The well is 316 feet deep and has 165 feet of casing with an inside diameter of 13.25 inches. The proposed second BWS exploratory well will be similar in design.

If test pumping of a second exploratory well is successful, then the BWS plans to put both Kaluanui Wells into production. No development is proposed in the channel of Kaluanui Stream. At the existing well site, an area of about 900 square feet will be graded and enclosed by a 6-foot high chain link fence. Within this fence, the BWS will install a motor, submersible pump, and low-maintenance landscaping. At the second well site, an area of about 24,000 square feet will be graded and enclosed by a 6 foot high chain link fence. The second well site will contain a one-story control building (approximately 23' x 30' x 10' high), motor, submersible pump, transformer pad, hydropneumatic tank, and low-maintenance landscaping. No toilets will be provided at either well site. Landscaping and structures at both well sites will require approval by the Division of State Parks.

If requested by the Division of State Parks, then the control building, transformer pad, hydropneumatic tank, ancillary facilities and landscaping could be located on another 24,000 square foot site along the jeep trail to the existing well. In this case, improvements at the second well site would be similar to that at the first well site.

An existing dirt road extends from Kamehameha Highway to the Sacred Falls trail at the mauka end of Kaluanui Valley. [Figure 1] Access to the existing well site and proposed second well site is provided by a dirt jeep trail which forks from the main dirt road. [Figure 2] Development of the alternative site for a second well would require extension of the jeep trail. The BWS will place approximately 1,400' x 12' of A.C. pavement on the jeep trail, but does not plan to improve the main valley access road.

The BWS will install an 8" diameter water main beneath the paved jeep trail to carry water from the existing well site to control facilities at the second well site. From the second well site the BWS also will install approximately 5,500 feet of 12" diameter underground transmission main to Kamehameha Highway. Current thinking is to route the 12" main along the jeep trail and Kaluanui Valley access road.

However, the actual pipeline route may be altered to accommodate park development plans proposed by the Division of State Parks.

The BWS will install approximately 1,900 feet of underground telephone and electrical lines beneath the paved jeep trail. Approximately 3,600 feet of overhead telephone and electrical lines will be installed between the jeep trail and Kamehameha Highway. Overhead utilities will be routed near the northern boundary of Sacred Falls State Park in a location to be selected by the Division of State Parks. Proposed utility poles will also be used to service park utility lines.

The cost for drilling and testing the existing exploratory well was about \$0.14 million. Development of a second exploratory well, production facilities for two wells, paved access road, and utility lines will cost an estimated \$1.75 million (at 1982 prices). About \$130,000 of this would be for development within the County Special Management Area. Construction of all facilities to put the BWS Kaluanui Wells into production is tentatively planned for F.Y. 1985-86.

Approximately 1.5 mgd will be pumped from each of the Kaluanui Wells. The total 3.0 mgd will be used to service Windward Oahu from Punaluu through Waimanalo. Any surplus water will be exported to the Honolulu Water District.

C. OBJECTIVES

The de facto Oahu population served by the BWS is projected to increase from 737,300 in 1980 to 912,800 in the year 2000. The BWS plans to develop water from a number of sources including the Kaluanui Wells in order to accommodate projected growth. It is estimated that the average daily island-wide municipal water demand including all public, residential, commercial, industrial, and agricultural uses supplied by the BWS will increase from 130.1 mgd in 1980 to 181.0 mgd in the year 2000. The anticipated 50.9 mgd twenty-year increase in demand will be used primarily to meet the needs of leeward Oahu, since

more growth is planned for the leeward side than for the windward side of the island. These estimates are based on 1978 "II-F" population projections by the State Department of Planning and Economic Development with assumptions on population and employment distribution being provided by the City Department of General Planning.

On the average, about 75.9 mgd of the water supplied by the BWS to leeward Oahu in 1981 was withdrawn from the Pearl Harbor basal water lens. In 1982, which was a rainy year, average BWS water withdrawal from the Pearl Harbor basal lens was 68.7 mgd. To control fresh water pumpage, the Board of Land and Natural Resources (BLNR) has limited BWS withdrawals from the Pearl Harbor aquifer to an average of 76.95 mgd. In order to meet the increasing demand for water, water development projects in windward Oahu have been accelerated. [Ref. 16] Water from windward sources not used for windward needs will be pumped around Makapuu to Hawaii Kai. This will "free" water from leeward sources that now is used in Hawaii Kai for use elsewhere in the Honolulu Water District.

In the event that the BWS is unable to accommodate water demand, then the BWS will be forced to deny hook-ups or to not issue new water meters larger than 5/8" (adequate for a single family home). In effect, this would impose a moratorium on most new development until such time as new water sources are developed.

CHAPTER II. DESCRIPTION OF THE ENVIRONMENTAL SETTING

A. TOPOGRAPHY AND AESTHETICS

A broad coastal plain with slopes of less than 5% extends from the ocean to the mouth of Kaluanui Valley. The gently sloping valley bowl is bordered by steep, highly weathered spurs of the Koolau Range. Between the valley bowl and Sacred Falls, the narrow, winding, steep-faced mauka section of Kaluanui Valley follows the course of Kaluanui Stream.

Proposed overhead power lines will be located on the flat coastal plain. The existing jeep trail to the BWS wells and the well sites are located on the lower slopes of the northwest side of Kaluanui Valley. Because of existing heavy vegetation, the jeep trail and well sites are only visible from a few parts of the valley bowl. Plate 1 shows the jeep trail; Plate 2 shows the site of the existing exploratory well; and Plate 3 shows a view of the BWS well sites from the slopes on the other side of Kaluanui Valley. All pictures were taken in January 1983.

B. CLIMATE

Most rain in Koolauloa results from cooling of warm moist air when the predominant northeast trade winds are deflected upward by the Koolau Range. Kona (southerly) winds and major North Pacific storm systems occasionally bring torrential and more persistent winter rains to the entire island. Average annual rainfall increases from 60" near the coast to 300" near the crest of the Koolau Range inland of Kaluanui Valley. At the well sites, rainfall averages 75" per year. The average monthly temperature in the project area ranges from 69° to 79° fahrenheit. [Ref. 27, pp. 8, 9]



PLATE 1
EXISTING JEEP ACCESS ROAD

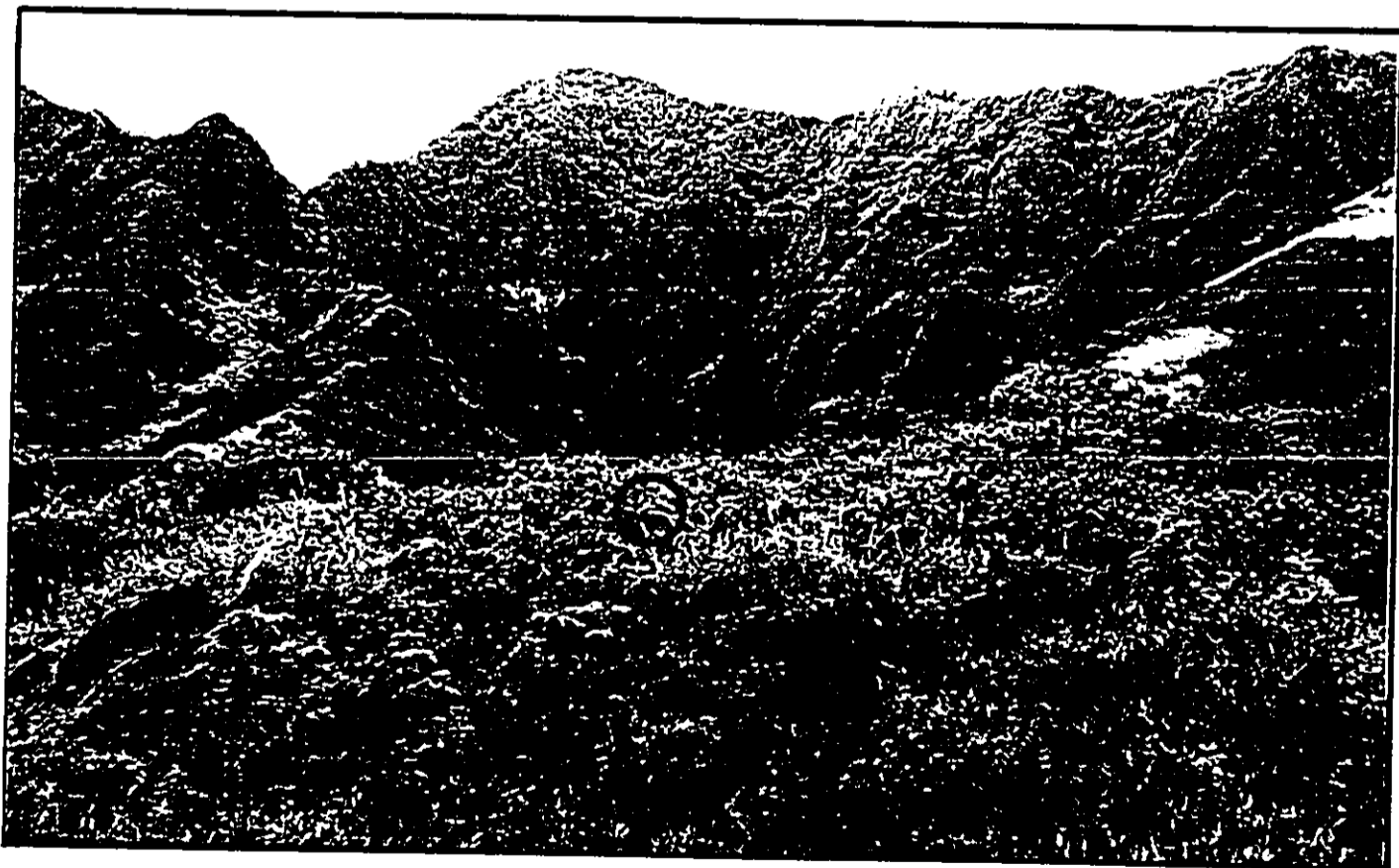
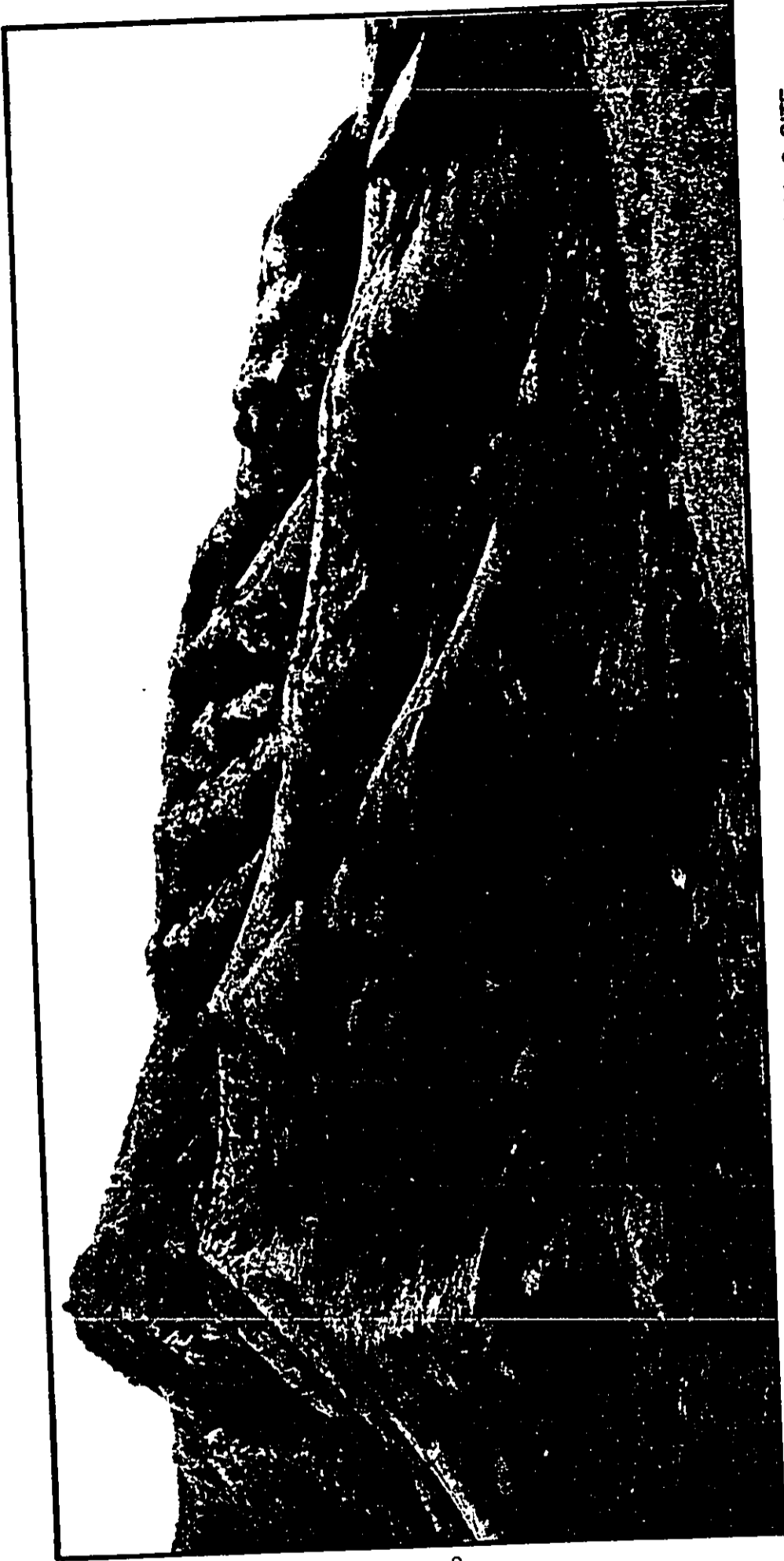


PLATE 2
EXISTING WELL SITE
-8-

PLATE 3

VIEW ACROSS VALLEY OF WELL SITES



KALUANUI WELL 2
(ALTERNATE SITE)

EXISTING KALUANUI WELL 1

KALUANUI WELL 2 SITE

C. SOILS AND GEOLOGY

Soils at the well sites and jeep trail are classified by the Soil Conservation Service as Waikane series clays. They have low shrink swell potential and moderate erosion hazard. [Ref. 3]

From a ground elevation of 134 feet, the existing BWS exploratory well (DOWALD No. 3554-04) penetrated 55 feet of clay and weathered fragments before striking rock. As drilling continued, clay was occasionally encountered between layers of rock almost to the bottom of the well. [Ref. 10] In the area where the well was drilled, rocks are mainly basaltic lava flows of the Koolau Volcanic Series. [Ref. 27, p. 95] Basal ground water tapped by the BWS well is stored in the permeable basalt.

There is no visible evidence of dikes makai of the BWS well. Instead, ground water in the basalt is confined by a wedge of poorly permeable sedimentary material which covers the coastal plain and extends several miles makai of the shoreline. [Ref. 30, pp. 13-14] (See Section F, Basal Water Resources for further discussion of ground water geology.)

D. HYDROLOGY AND DRAINAGE

At high elevations in windward Oahu, rainfall which is not lost to evapotranspiration or surface runoff is stored as ground water in the permeable basaltic lava flows of the Koolau Range between relatively impermeable intrusive basaltic dikes. Dikes were formed by the solidification of molten lava in the fissures of volcanoes. Because dikes are frequently oriented at oblique angles to each other, dike compartments are thought to be shaped like irregular prisms. Dike compartments containing the highest ground water head coincide with the higher rainfall portions of the Koolau crest. Although the general pattern of ground water movement is toward the ocean, local flow directions are complicated by the shape of dike compartments and by breaching of the compartments by erosion. Generally, water moves gradually by leakage and overflow from dike compartments with higher

head to compartments with lower head. Water from dike reservoirs can discharge directly into streams which have cut into the water-bearing rocks or indirectly by seeping through permeable alluvium and then into streams. [Ref. 27]

Like most perennial windward Oahu streams, the primary source of Kaluanui Stream discharge is dike-impounded ground water. Kaluanui Stream also receives surface runoff from a 3.5 square mile watershed and can gain flow from rainfall stored in unconsolidated surface alluvial material overlying relatively impermeable alluvium. Although Kaluanui Stream is perennial at high elevation, it is intermittent in the middle and lower portions of Kaluanui Valley because its dry weather flow percolates into the stream bed. [Ref. 27, pp. 95-99; Ref. 25]

As leakage from dike confined ground water in Koolauloa moves toward the ocean, it may eventually reach a dike-free area. However, along 11 miles of coast from Punaluu Valley to Kahuku Point, terrestrial and marine sediments have formed a relatively impermeable wedge of sedimentary material known as caprock. This caprock confines and partially overlies a substantial body of low level ground water which hydrogeologist John Mink has named the Koolauloa Basal Aquifer. [Ref. 30, pp. 5, 14, 15]

E. SURFACE WATER RESOURCES

Kaluanui Stream is the only significant surface water resource in the project area. Kaluanui Stream is entirely located on State land acquired for Sacred Falls State park. None of its water is diverted for agricultural or domestic use. However, the stream bed was deepened and slightly straightened prior to the time it was purchased by the State. Presumably this was done by Kahuku Plantation Company to improve drainage of sugar cane fields in the valley bowl and coastal plain. Irrigation of these fields ended when the sugar plantation closed in 1970.

The U.S. Army Corps of Engineers recently designated some abandoned, poorly-drained sugar cane fields and irrigation ditches on the coastal plain south of Kaluanui Stream as wetlands. The wetland is maintained by surface runoff, springs, and occasionally by floodwaters during intense storms when Kaluanui Stream overflows its banks. [Ref. 40]

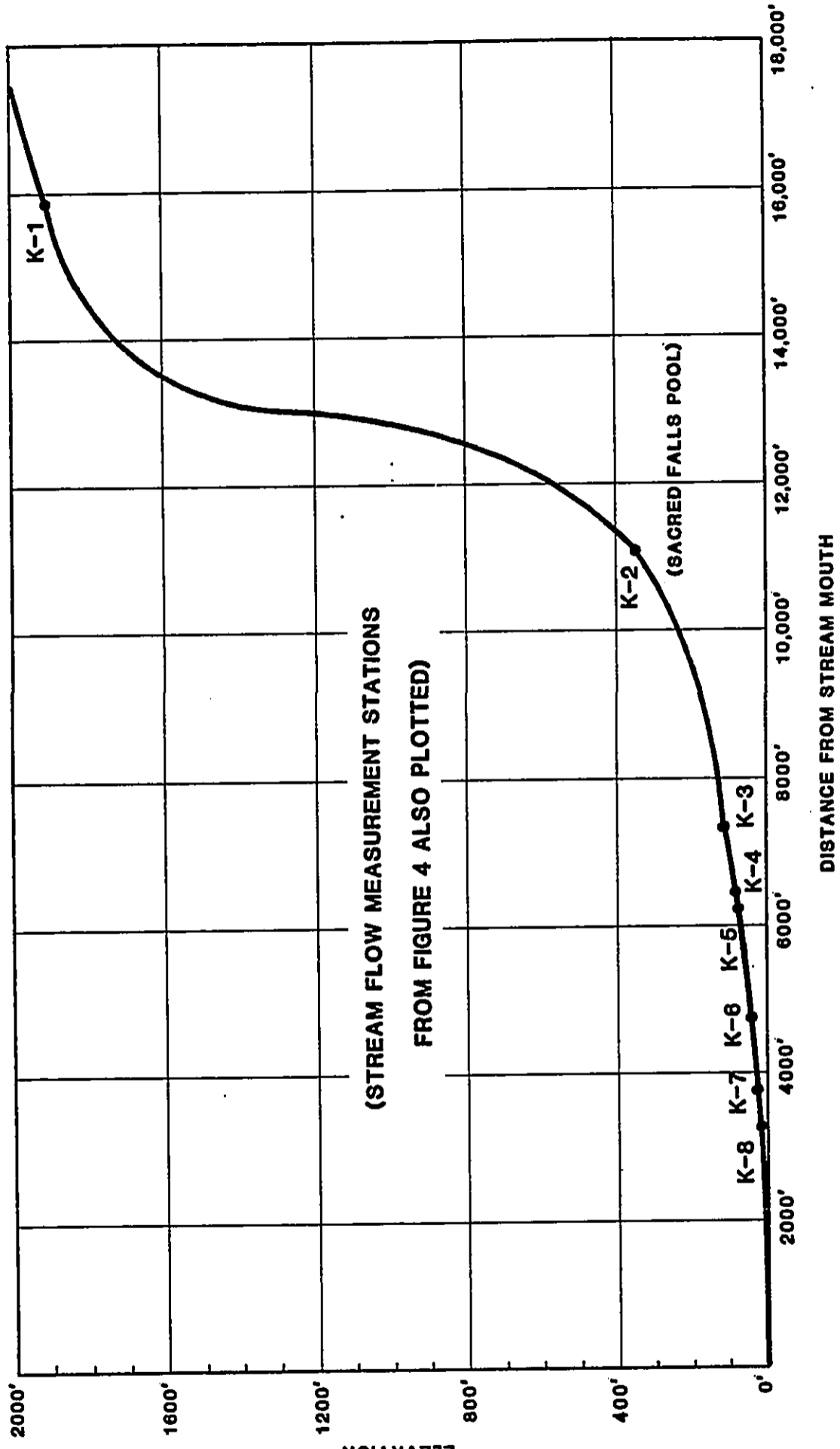
As shown in Figure 3, Kaluanui Stream has gentle slopes below an elevation of about 340 feet (Sacred Falls Pool). However, the stream's mauka reach is very steep and includes seven waterfalls. The stream channel is relatively narrow at high elevations (Plate 4), but broadens as the gradient flattens (Plate 5).

From July 1915 through June 1917, the USGS operated a gaging station on Kaluanui Stream at an altitude of 1,900 feet. (Station K-1 on Figure 4) Stream flow at this elevation is not fed by dike overflow, but by runoff from rainfall and by bank storage. The mean discharge at this station was 2.96 mgd, the Q_{90} discharge (flow exceeded 90% of the time) was 0.54 mgd, and the minimum discharge was 0.25 mgd. [Ref. 22, pp. 143-144; Ref. 27, p. 99] Due to the short period of record, these flow data are inconclusive.

Since May 1967, the USGS has operated a gaging station on Kaluanui Stream at an altitude of 110 feet. (Station K-3 on Figure 4) Through September 1982, the mean discharge at this station was 2.78 mgd and the stream sometimes had no flow. [Ref. 24] As shown in Table 1, the USGS has computed Q_{90} at this station as 0.19 mgd and Q_{95} as only 0.06 mgd. [Ref. 26] Table 2 summarizes mean annual flow and days of no flow for Kaluanui Stream at this gaging station.

In addition to its long-term gages, the USGS has taken miscellaneous measurements during dry periods when ground water supplies all of the stream base flow. As shown in Figure 4, available data indicates that the dry weather flow of Kaluanui Stream is greater at higher elevations, and that the stream is intermittent in Kaluanui Valley.

FIGURE 3
KALUANUI STREAM PROFILE



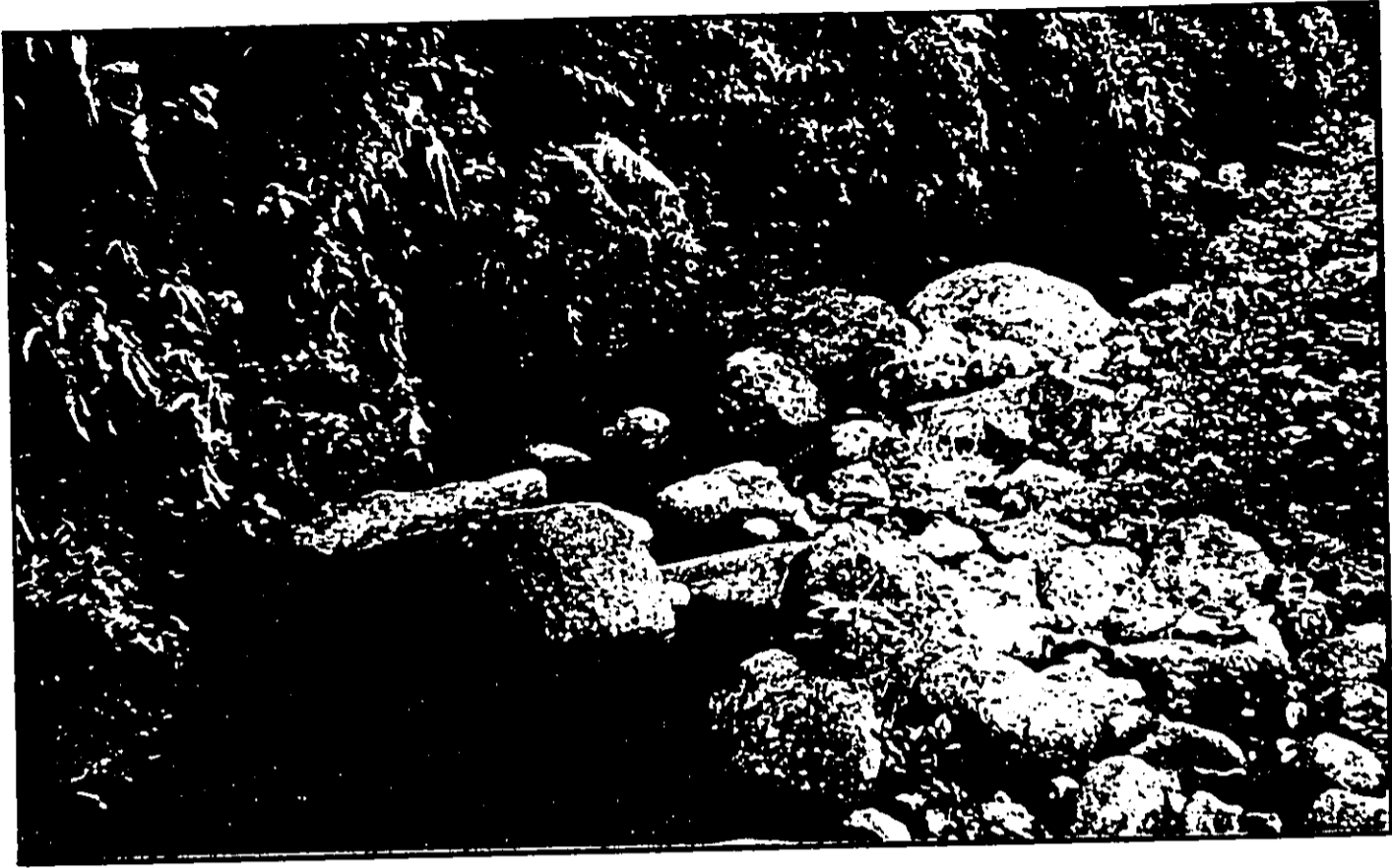


PLATE 4
KALUANUI STREAM AT 2,000 FEET

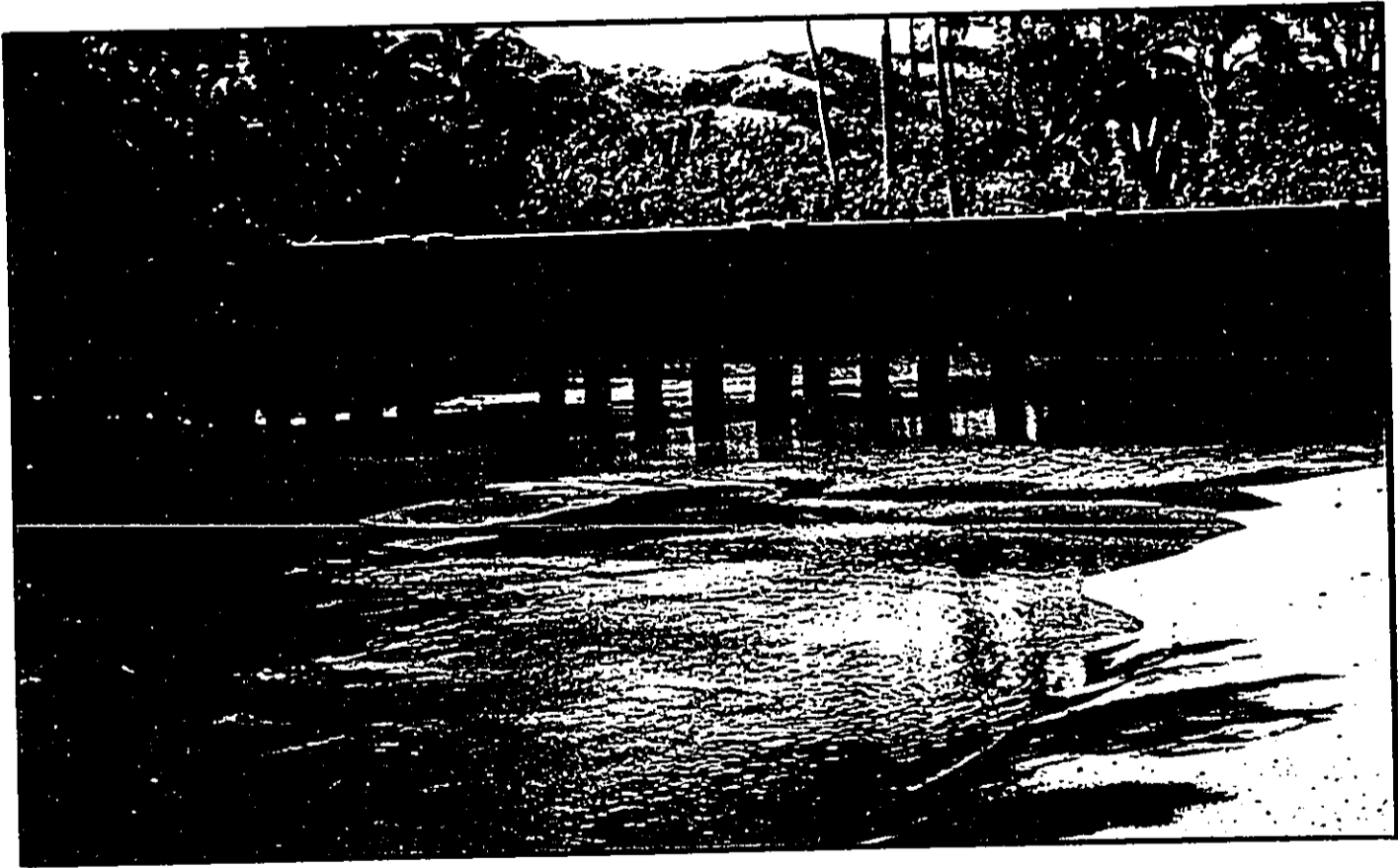


PLATE 5
KALUANUI STREAM MOUTH
-14-

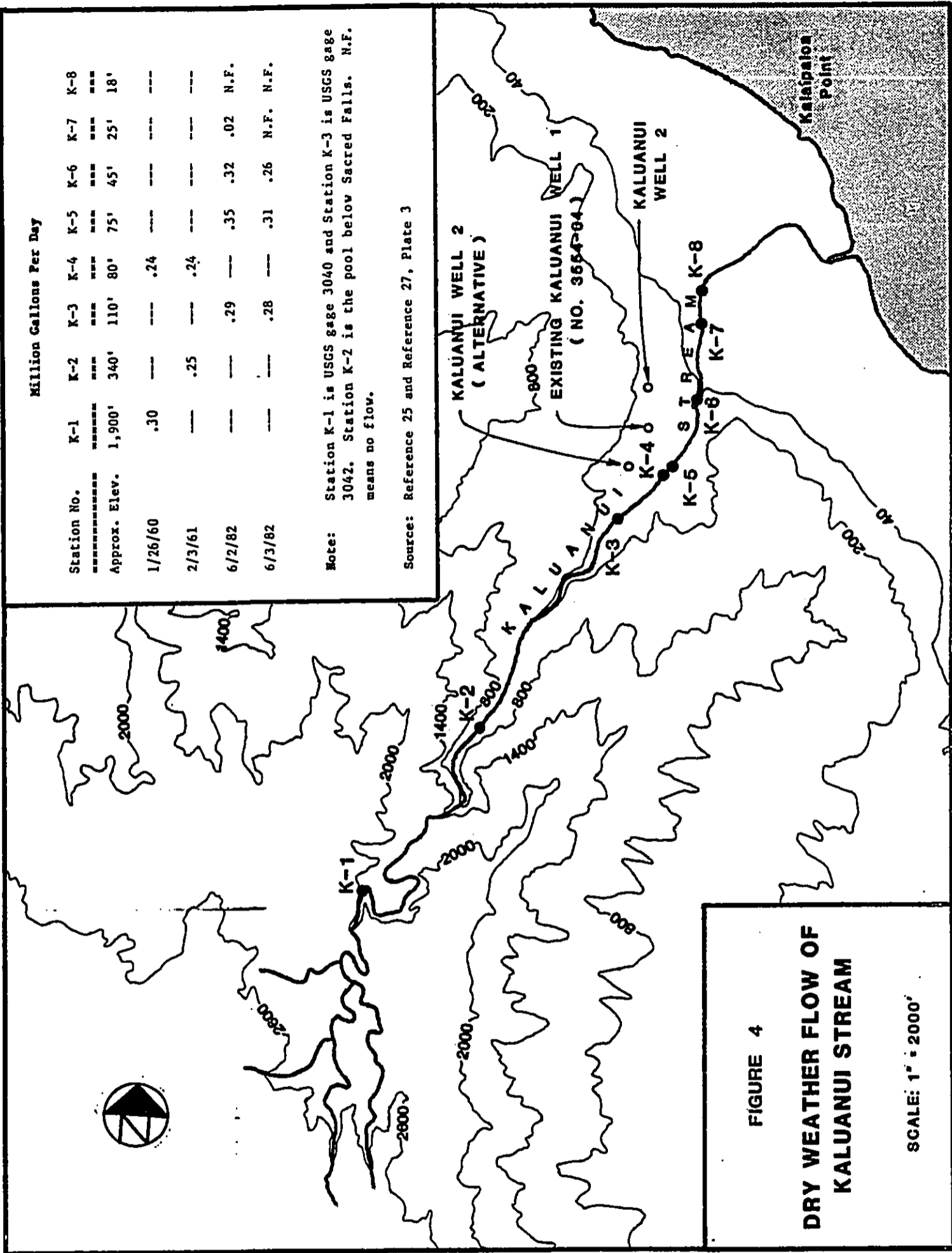


FIGURE 4

**DRY WEATHER FLOW OF
KALUANUI STREAM**

SCALE: 1" = 2000'

Million Gallons Per Day

| Station No. | K-1 | K-2 | K-3 | K-4 | K-5 | K-6 | K-7 | K-8 |
|---------------|--------|------|------|-----|-----|-----|------|------|
| Approx. Elev. | 1,900' | 340' | 110' | 80' | 75' | 45' | 25' | 18' |
| 1/26/60 | .30 | --- | --- | .24 | --- | --- | --- | --- |
| 2/3/61 | --- | .25 | --- | .24 | --- | --- | --- | --- |
| 6/2/82 | --- | --- | .29 | --- | .35 | .32 | .02 | N.F. |
| 6/3/82 | --- | --- | .28 | --- | .31 | .26 | N.F. | N.F. |

Note: Station K-1 is USGS gage 3040 and Station K-3 is USGS gage 3042. Station K-2 is the pool below Sacred Falls. N.F. means no flow.

Source: Reference 25 and Reference 27, Plate 3

TABLE 1
FLOW DURATION TABLE FOR KALUANUI STREAM AT ELEVATION 110 FEET MSL
 [October 1967 to October 1979]

| | | |
|-----------------|---|----------|
| Q ₉₅ | = | 0.06 mgd |
| Q ₉₀ | = | 0.19 mgd |
| Q ₇₅ | = | 0.39 mgd |
| Q ₇₀ | = | 0.45 mgd |
| Q ₅₀ | = | 0.84 mgd |
| Q ₂₅ | = | 2.13 mgd |
| Q ₁₀ | = | 5.17 mgd |

Note: Q₉₀ means the flow exceeded 90% of the time.

Source: Reference 26

TABLE 2
MEAN ANNUAL FLOW AND DAYS OF NO FLOW FOR KALUANUI STREAM
AT ELEVATION 110 FEET MSL
 [October 1967 to October 1982]

| Year Ending September 30 | Mean Annual Flow in MGD | Total Days of No Flow | Maximum Consecutive Days of No Flow |
|-----------------------------|----------------------------|--------------------------|--|
| 1968 | 3.04 | 0 | 0 |
| 1969 | 3.37 | 0 | 0 |
| 1970 | 2.29 | 0 | 0 |
| 1971 | 2.98 | 11 | 6 |
| 1972 | 2.30 | 0 | 0 |
| 1973 | 1.52 | 0 | 0 |
| 1974 | 2.80 | 0 | 0 |
| 1975 | 1.88 | 14 | 14 |
| 1976 | 2.10 | 0 | 0 |
| 1977 | 2.02 | 21 | 13 |
| 1978 | 2.18 | 7 | 6 |
| 1979 | 2.99 | 0 | 0 |
| 1980 | 3.77 | 0 | 0 |
| 1981 | 2.04 | 1 | 1 |
| 1982 | 6.42 | 0 | 0 |

Source: Reference 23 and Reference 24

F. BASAL WATER RESOURCES

The Koolauloa Basal Aquifer extends from Punaluu Valley to Kahuku Point. (Figure 5) The aquifer is composed of permeable basaltic lava flows from the Koolau Volcano. The aquifer is recharged by the seaward movement of dike confined high level ground water and by the infiltration of rainfall into parts of the basal aquifer not covered by caprock. In Koolauloa, caprock starts from a ground elevation of about 30 feet and extends several miles makai of the shoreline. As evidenced by the high static (non-pumping) heads of coastal wells from Punaluu to Laie, caprock either prevents or substantially retards discharge of basal ground water into the ocean. Hydrogeologist John Mink believes that the southern boundary of the aquifer is poorly permeable alluvial fill material in lower Punaluu Valley. [Ref. 30, pp. 14, 15, 19]

Because the static heads of coastal wells gradually decline in a northwesterly direction from about 22 feet at Punaluu to about 10 feet at Kahuku, one hypothesis is that instead of moving perpendicular to the coast and discharging into the ocean at the seaward toe of the caprock, most ground water in the Koolauloa Basal Aquifer moves northward and discharges into marshes and springs between Kahuku Town and Kahuku Point. [Ref. 30, pp. 20-22, 43-46] If this hypothesis is correct, then ground water in the Koolauloa Basal Aquifer flows in all directions from areas of high potential to areas of low potential. Assuming hydraulic integrity, long term excessive pumping of wells in any part of the aquifer could adversely affect the static head and yield of wells in other parts of the aquifer. Another implication of this hypothesis is that undeveloped basal ground water from Hauula and Laie can be developed by wells in Kahuku.

Other than differentials in the static heads of coastal wells, which could be accounted for by reduced rainfall towards Kahuku, there is no evidence that the Koolauloa Basal Aquifer is completely hydrologically continuous between Punaluu and Kahuku. Another hypothesis is that most fresh ground water in the basal aquifer leaks into the ocean through coastal caprock rather than flowing to Kahuku through and beneath poorly permeable sedimentary fill material in Kaluanui, Kaipapau, Malaekahana, and numerous smaller stream valleys. Even if caprock is only poorly permeable, substantial quantities of ground water still could seep into the 30 square miles of caprock between

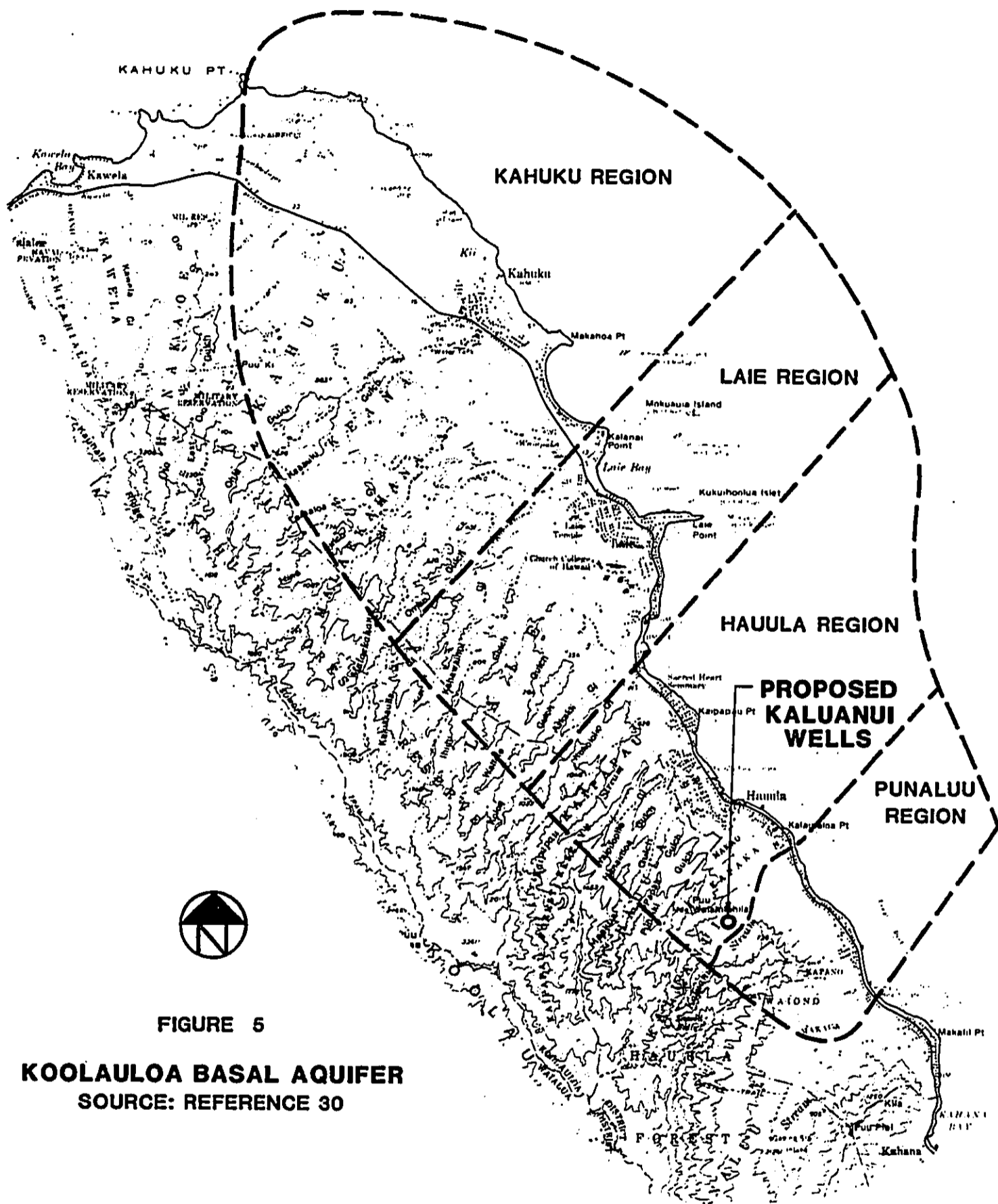


FIGURE 5

KOOLAULOA BASAL AQUIFER
 SOURCE: REFERENCE 30

Punaluu and Kahuku. [Ref. 35, pp. 86-88] As evidence that basal water may seep into the caprock, an exploratory alluvial well and a producing hybrid alluvial-bedrock well in Punaluu both show developable yields in excess of 0.5 mgd. Despite any hydraulic continuity through the Koolauloa aquifer, northward flow of fresh basal water does not necessarily occur across hydrologic barriers which extend below the fresh water. If this hypothesis is correct, then fresh basal ground water between Kaluanui and Kaipapau Streams (being tapped by the BWS Kaluanui Wells) would behave more as if it were compartmentalized by valley fills as in Honolulu than as if it were part of a continuous aquifer. Another implication of this hypothesis is that despite undeveloped basal ground water in Hauula and Laie, pumping of wells in Kahuku and Punaluu may be up near the limits of the sustainable yield of the aquifer.

There is insufficient data at this time to resolve the extent to which valley fill caprock limits movement of fresh basal ground water across Kaluanui, Kaipapau, and other stream valleys. However, there is some evidence for a continuous Koolauloa aquifer. In 1961, a 4-day pump test of Kahuku Plantation Well 398 (DOWALD No. 3554-02) near the mouth of Kaluanui Valley at a rate of 4.3 mgd produced a slight drawdown in the static head of the nearby Plantation Well 401 (DOWALD No. 3654-04) and observation Well 396 (DOWALD No. 3654-02) which is 2,500 feet to the north. [Ref. 27, pp. 97, 99] (See Figure 6) Similarly, after a brief shutdown, the BWS Punaluu wells were pumped at rates of 483 to 888 gpm for about 4 hours in June 1983 and produced a slight drawdown in Well 401 (DOWALD No. 3654-04) but not in the exploratory Kaluanui Well. [Ref. 38] Pumpage of 3.0 mgd from the BWS Kaluanui Wells is likely to produce slight drawdowns in other wells in a manner similar to that produced by pumping of Well 3554-02 and by pumping of the BWS Punaluu wells. Existing wells near the project area are plotted in Figure 6 and their uses summarized in Table 3.

Based on hydrological budgeting and operational experience of wells in the region, the BWS estimates that the sustainable yield of the Koolauloa Basal Aquifer is approximately 31-36 mgd. Estimates of water use and sustainable yield shown in Figure 7 have been divided into four regions along geographical (not hydrological) boundaries suggested by John Mink. Mink's Hauula region, within which the proposed Kaluanui Wells are located, extends from Kaluanui Stream to Aakakii Gulch (about 0.5 miles north of Kaipapau Stream). The Hauula

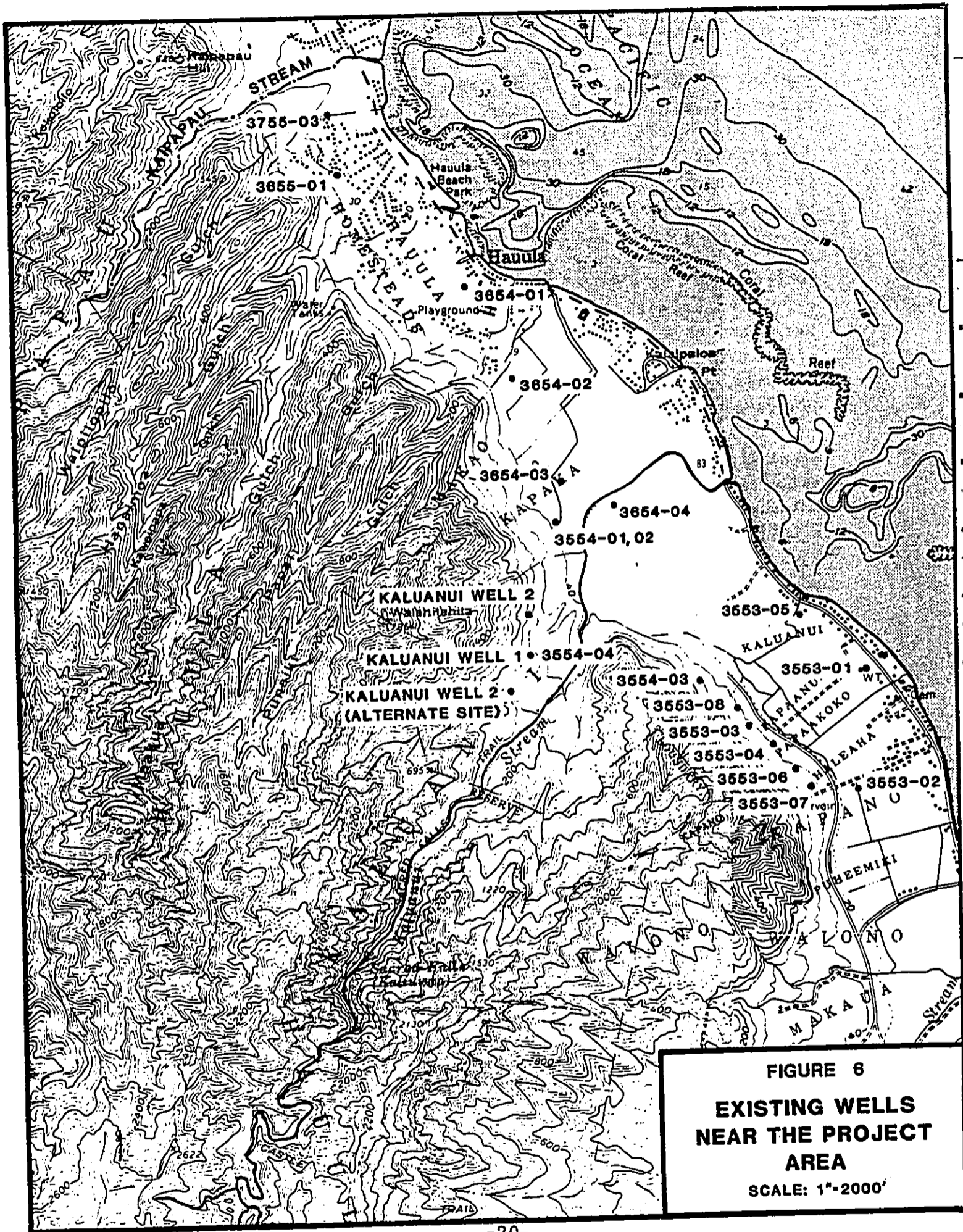


TABLE 3
EXISTING WELLS NEAR THE PROJECT AREA

| DOWALD No. | Old No. | Year Drilled | Present owner | Existing Use | Proposed Use |
|------------|---------|--------------|-----------------------|----------------------------|------------------------------|
| 3553-01 | 402 | ? | Hanohano Enterprises | Irrigation and Aquaculture | No Change |
| 3553-02 | 402-1 | 1958 | BWS | Municipal Water Supply | No Change |
| 3553-03 | 402-2A | 1965 | BWS | Municipal Water Supply | No Change |
| 3553-04 | 402-2B | 1966 | BWS | Municipal Water Supply | No Change |
| 3553-05 | T-143 | 1967 | BWS | Municipal Water Supply | No Change |
| 3553-06 | 402-2C | 1967 | BWS | Monitoring Water Levels | No Change |
| 3553-07 | 402-2D | 1967 | BWS | Municipal Water Supply | No Change |
| 3553-08 | 402-2F | 1967 | BWS | Municipal Water Supply | No Change |
| 3554-01 | 398A | 1932 | Zions Securities Corp | Unused | No Change |
| 3554-02 | 398B | 1932 | Zions Securities Corp | Unused | No Change |
| 3554-03 | 402-2E | 1967 | BWS | Municipal Water Supply | No Change |
| 3554-04 | ----- | 1982 | BWS | Unused | Municipal Water Supply |
| 3654-01 | 395 | 1914 | State | Sealed | No Change |
| 3654-02 | 396 | G.1911 | L. Holt | Unused | Aquaculture by N. Holt |
| 3654-03 | 397 | G.1938 | Kapaka Farm | Irrigation and Aquaculture | No Change |
| 3654-04 | 401 | ? | State | Unused | Aquaculture by Sakoda Realty |
| 3655-01 | 394 | G.1906 | BWS | Municipal Water Supply | No Change |
| 3755:03 | 393 | G.1938 | T. Aana | Unused | No Change |

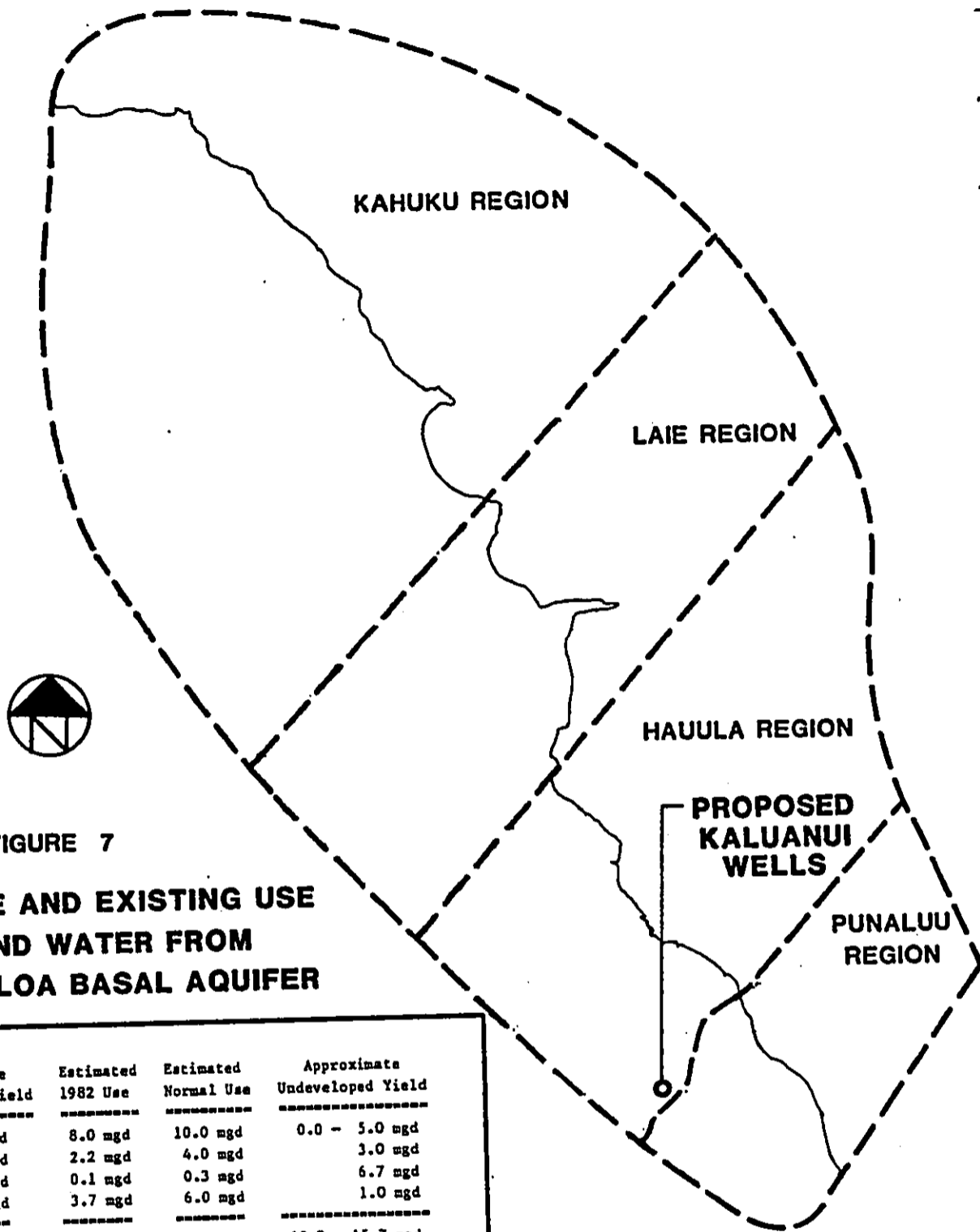


FIGURE 7

SUSTAINABLE AND EXISTING USE OF GROUND WATER FROM THE KOOLAULOA BASAL AQUIFER

| Region | Approximate Sustainable Yield | Estimated 1982 Use | Estimated Normal Use | Approximate Undeveloped Yield |
|--------------|-------------------------------|--------------------|----------------------|-------------------------------|
| Kahuku | 10 - 15 mgd | 8.0 mgd | 10.0 mgd | 0.0 - 5.0 mgd |
| Laie | 7 mgd | 2.2 mgd | 4.0 mgd | 3.0 mgd |
| Hauula | 7 mgd | 0.1 mgd | 0.3 mgd | 6.7 mgd |
| Punaluu | 7 mgd | 3.7 mgd | 6.0 mgd | 1.0 mgd |
| Total | 31 - 36 mgd | 14.0 mgd | 20.3 mgd | 10.7 - 15.7 mgd |

Note: 1982 was a "wet" year so pumpage was much lower than normal. Estimates of well pumpage in Kahuku and Laie are approximations because most of the private pumps are unmetered.

Source: BWS Geology Section

region's share of developable ground water in the basal aquifer is approximately 7 mgd. [Ref. 30, p. 77] By comparison, as shown in Figure 7, the BWS has estimated that only about 0.3 mgd of ground water is now being pumped from the Hauula region and about 20.3 mgd from the entire basal aquifer. Most of the existing water development in the Laie and Kahuku regions is used for agriculture and aquaculture, while most of the existing water development in the Hauula and Punaluu regions is used for municipal water supply to windward Oahu. [Ref. 38]

✓ G. NATURAL HAZARDS

There are no known natural hazards at the well sites or existing jeep trail. County Flood Insurance Rate Maps identify Kaluanui Valley as "Zone D": an area of undetermined, but possible, flood hazard. Much of the coastal plain bordering Kaluanui Stream is classified within "Zones B and A-2": which are areas subject to periodic shallow flooding. Makai portions of the coastal plain also are subject to occasional tsunami inundation. [Ref. 21]

H. AIR QUALITY AND NOISE

There are no significant sources of air pollution or noise in the project area. Ambient sound levels in rural areas such as Kaluanui Valley are typically 40 to 45 dBA.

I. VEGETATION AND WILDLIFE

The BWS well sites and jeep access trail are in an area where native vegetation has largely been displaced by introduced herbaceous grasses and shrubs. The predominant vegetation at the well sites consists of haole koa, java plum, brassaia, christmas berry, guava, sensitive plant, and various grasses. While native species of plants are present, none are rare or endangered. [Appendix A]

The coastal plain makai of Kaluanui Valley is mostly abandoned sugar cane fields. Existing vegetation primarily consists of sugar cane, haole koa, and California grass.

The vegetation in the immediate project area does not provide habitat for any rare or endangered species of wildlife. No part of the Kaluanui Stream watershed has been identified as either a marsh or waterbird habitat. [Ref. 2, 8, 18] Three endangered waterbird species, the Hawaiian Gallinule (Gallinula chloropus sandvicensis), Hawaiian stilt (Himantopus mexicanus knudseni), and Hawaiian coot (Fulica americana alai), have occasionally been sighted in the wetland on the coastal plain south of Kaluanui Stream. [Ref. 39] Introduced species of birds present include doves, cardinals, owls, pheasants, thrushes, and white eyes. Introduced species of mammals in the project area probably include, mongooses, rats, feral cats, and feral pigs. [Ref. 28, p. 41]

J. STREAM FAUNA

Hawaii's endemic stream animals include five species of fish, two species of shrimp, and one species of mollusk. (One other native species of fish occurs naturally elsewhere in the Pacific Basin.) In addition to the native aquafauna, at least fifteen species of introduced fish and two species of introduced crustaceans are commonly found in Hawaiian streams. While the endemic species live and spawn in fresh water, hatchlings from their eggs must spend a period of development in the ocean and then migrate upstream. There is no evidence that Hawaii's endemic stream animals are capable of "homing"

on their natal stream after undergoing development in the ocean. Man-made alterations of stream channels can eliminate stream habitat and create barriers to upstream migration of native species. Reduction of base stream flow by water development projects also can create conditions which favor introduced species. [Ref. 6, pp. 27-30]

In terms of native aquafauna, Kaluanui Stream is one of the few remaining high quality streams on Oahu. At an elevation of about 2,000 feet, VTN Pacific staff hiking the Castle Trail in August 1981 observed that Kaluanui Stream contained an abundant population of the diadromous endemic shrimp, opae (Atya bisulcata). To get there, juvenile shrimp must have migrated upstream past seven waterfalls, the lowest of which is Sacred Falls. Below Sacred Falls, an aquatic macrofauna study for this EIS found four of the five endemic species of fish, both of the endemic species of shrimp, and the one endemic species of mollusk. [Appendix B] While the rarest endemic species of goby (Lentipes concolor) is functionally extinct on Oahu, one specimen was collected in 1979 makai of the Sacred Falls pool. [Ref. 19, pp. 16, 46] As of 1983, Kaluanui Stream is one of only two windward Oahu streams which still contain the endemic mollusk, hihiwai (Neritina granosa). The other windward Oahu stream containing hihiwai (Koloa) is relatively close to Kaluanui. [Ref. 33] Because the mollusk spends part of its life cycle in the ocean, the origin of juvenile hihiwai migrating into these streams has not been determined. Conceivably, populations of hihiwai on Oahu may be dependent on hatchlings from relatively abundant populations of hihiwai on Kauai, Molokai, and Maui.

K. HISTORICAL AND ARCHAEOLOGICAL FEATURES

Through 1970, sugar cane was grown on the floor of the Kaluanui Valley bowl and on the coastal plain makai of the valley. Bulldozing and plowing have altered the topography and destroyed any surface archaeological features in areas where sugar cane was cultivated. Most rocks and boulders originally present on the coastal plain have been moved to the edge of Kaluanui Stream.

There are not sufficient archaeological remains within or makai of Kaluanui Valley to evaluate prehistoric patterns of settlement or subsistence. Remnants of a dryland agricultural complex are present on the lower slopes of the valley bowl, but artifacts from most of the indigenous agricultural system and habitation sites have probably been destroyed by bulldozing and plowing. [Ref. 29]

Archaeological reconnaissance surveys were made for this EIS of the existing jeep trail, the route for an extension of the jeep trail to reach the alternative site for a second BWS well, and all proposed well sites. No prehistoric artifacts were found along the jeep trail or at the preferred site for a second well. Rock piles of unknown function were found near the site of the existing exploratory well and the alternate site for a second well. [Appendix C]

L. LAND USE

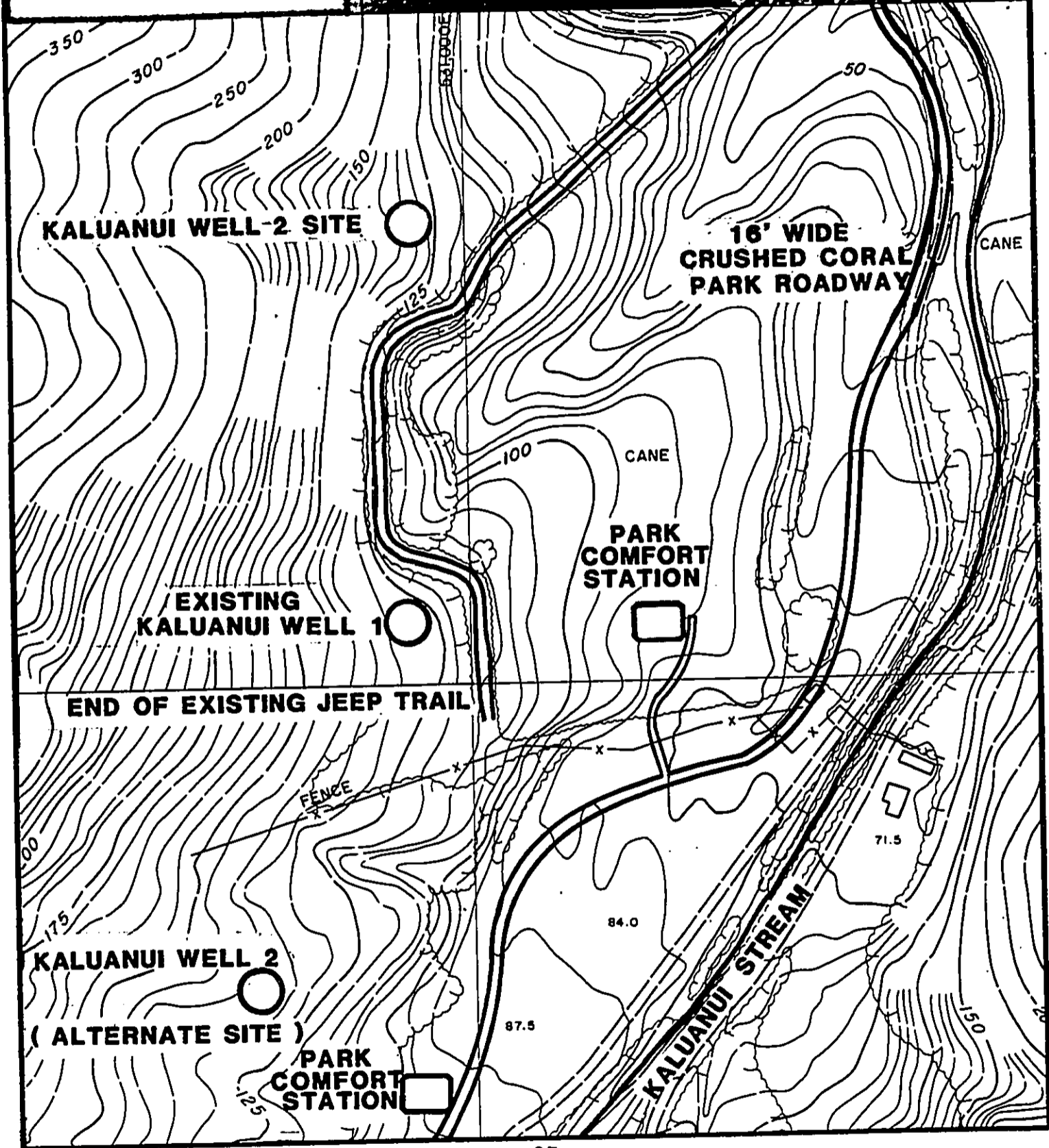
Currently the project area is mostly unimproved brush covered lands. Persons hiking to Sacred Falls use the dirt road which provides access to the BWS well sites.

No County projects are proposed in the project area except for BWS facilities described in this EIS.

The Department of Land and Natural Resources (DLNR) Division of State Parks has prepared plans for developing Sacred Falls State Park in Kaluanui Valley and on the coastal plain makai of the valley. Proposed facilities would accommodate hiking, picnicking, and camping with Kaluanui Stream and Sacred Falls as the principal attractions. An elaborate conceptual plan for park improvements will probably not be implemented in the foreseeable future due to a shortage of funds. [Ref. 28, Ref. 34] Recent construction plans are shown in Figure 8.

FIGURE 8
PROPOSED
SACRED FALLS
STATE PARK

SCALE: 1" = 200'



M. UTILITIES AND INFRASTRUCTURE

Access to the BWS well sites from Kamehameha Highway is by dirt road and jeep trail in Sacred Falls State Park. Private vehicles are currently barred from driving within the Park, but the BWS and DLNR have keys to the access gate.

There are no existing utilities at the well sites. Electrical power and telephone service are available from overhead lines on Kamehameha Highway. There are a few portable toilets at the makai parking lot of Sacred Falls State Park. Otherwise, the project area is served by neither public nor private sewage treatment facilities.

CHAPTER III. ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

A. PROJECT SITE

The proposed action will increase the number of structures in Sacred Falls State Park. Fences at both well sites, the control building, the paved access road, and overhead utility lines may be visible from several locations within the park. In order to minimize adverse visual impacts, landscaping and structures will be subject to design review by the Division of State Parks. The architectural style of the control building will be as unobtrusive as possible, and the Division of State Parks will need to approve its siting. Overhead electrical and telephone lines for the Kaluanui Wells will utilize the same poles as the overhead utility lines for the park.

Provided that production facilities at the Kaluanui Wells are adequately landscaped, they will not significantly affect the recreational value or aesthetics of Sacred Falls State Park. Submersible pumps will be used to prevent noise from annoying park users. The existing jeep trail to the Kaluanui Wells is proposed for use as an access road for park maintenance vehicles in the now outdated development plan for Sacred Falls State Park but is not incorporated in recent park construction plans. These construction plans propose that the brush covered slopes of Kaluanui Valley (including the well sites) remain undeveloped while the flatter sections of the valley bowl be improved for camping, picnicking, and hiking.

Construction-related impacts such as dust and erosion will be minimized by standard mitigation measures. Erosion will be controlled by limiting the cut areas and by landscaping. Dust will be controlled by sprinkling as required. Construction noise will occur only during daylight hours Monday to Friday. Contractors will maintain their equipment to minimize noise and exhaust emissions in compliance with DOH regulations. Construction equipment will mostly remain on site and will not significantly affect traffic on Kamehameha Highway.

Development of production facilities for the most part will only require removal of common introduced plants. No rare or endangered species will be affected. Likewise, development of proposed facilities will not adversely affect any rare or endangered species of

birds, mammals, snails, or stream fauna.

Known archaeological resources near the well sites will be avoided. If any cultural materials are encountered, then construction will stop and the BWS will notify the DLNR Historic Sites Office. The BWS will notify DLNR archaeologists prior to conducting any trenching so that they may examine trenches for any cultural remains.

B. KALUANUI STREAM

Kaluanui Stream is perennial at high elevations but is naturally intermittent at low elevations. This is because the sources of stream flow are runoff from rainfall and high level dike confined ground water but not basal ground water.

The static head of the existing BWS exploratory well in Kaluanui Valley was 21.2 feet msl prior to test pumping on June 8, 1982. [Ref. 11] If the basal ground water being developed by this well were able to enter Kaluanui Stream, then the stream would have perennial flow at its makai end. However, on June 2 and 3, 1982, there was no detectable flow in the makai 3,300 feet of Kaluanui Stream channel below an elevation of 20 feet. [Ref. 25] The implication is that relatively impermeable alluvium underlying the valley prevents basal ground water from entering Kaluanui Stream.

On June 2 and 3, 1982, Kaluanui Stream had a flow of about 0.28 mgd at an elevation of 110 feet, but virtually no flow below an elevation of about 25 feet. Hence, the dry weather flow of Kaluanui Stream naturally percolates into the permeable stream bed alluvium at an elevation higher than the static head of basal ground water in Kaluanui Valley. [Ref. 11, Ref. 25]

Withdrawal of basal ground water by the BWS Kaluanui Wells will not directly affect the flow of Kaluanui Stream or Sacred Falls. However, there is a remote possibility that long-term pumping of the Kaluanui Wells might cause a small reduction in high level springs which feed Kaluanui Stream. In order for the Kaluanui Wells to affect stream

flow, the basal lens in Kaluanui Valley would have to be hydraulically connected to high level dike compartments which feed Kaluanui Stream. Other things being equal, in cases where water flows through dikes, leakage between two dike compartments will be proportional to their difference in water pressure (i.e. head). The same would be true of underflow from a dike compartment to a basal lens. Hence, by reducing the head of a basal lens, it theoretically is possible for a basal well to increase leakage out of "upstream" dike compartments and thus reduce dike reservoir discharge into a stream above the static head of the well.

If this kind of effect occurred, which is unlikely, then it would affect the flow of Kaluanui Stream. To put matters into perspective, if the basal lens in Kaluanui Valley were hydraulically connected to a dike compartment with a 1,000-foot head, then a 2-foot reduction in the head of the basal lens at most would only cause a 0.2% increase in leakage out of such a dike compartment. Any resulting reduction in dry-weather stream flow probably would not be measureable and definitely would not have the potential to affect stream fauna, wetlands, or waterbird habitat.

C. BASAL GROUND WATER

Regardless of whether or not the Koolauloa Basal Aquifer is hydrologically continuous between Punaluu and Kahuku or is compartmentalized between sedimentary fill material in valleys, adequate ground water is available to allow additional water development in Kaluanui Valley without adverse effect on the yield of existing wells in the aquifer. Moreover, the BWS Kaluanui Wells will not preclude development of new BWS wells or use of presently unused wells to tap undeveloped ground water elsewhere in Koolauloa.

Based on the results of a 1961 pump test for Well 3554-02 near Kaluanui and a 1982 pump test for all BWS Punaluu wells, it seems likely that withdrawal of 3 mgd by the proposed BWS Kaluanui Wells will produce a slight (but not harmful) drawdown in the static head of wells within a distance of a few thousand feet. As shown in Figure 6

and Table 3, the only private well in use within a mile of the proposed BWS wells is Well 3654-03 owned by Kapaka Farm.

Allocation of the remaining undeveloped ground water in the Koolauloa Basal Aquifer is an unresolved issue. Unless existing water law is changed by the State Legislature or County Council, it seems likely that competing demands for limited water resources will be resolved on a first-come first-served basis. BWS Rules and Regulations authorize the BWS to prohibit new wells and restrict pumpage from existing wells when necessary to prevent overdraft of or salt water intrusion into an aquifer. The State BLNR is granted similar powers pursuant to Chapter 177, HRS.

If all proposed public and private water development projects in Koolauloa were implemented, then they would exceed the sustainable yield of the basal aquifer. Hence, BWS or BLNR regulation of wells will inevitably be necessary to protect the aquifer. As shown in Figure 7, there are approximately 11 to 16 mgd of undeveloped ground water remaining in the aquifer. By comparison, in the Kahuku area, lessees of Campbell Estate have proposed to increase draft by 0.4 mgd and the State Department of Agriculture is contemplating use of 1 mgd for development of an agricultural park. [Ref. 37, pp. II-9, IV-5] In the Laie region, the existing BWS Laie and Wailele exploratory wells could develop up to 3 mgd when put into production. In the Hauula region, the proposed BWS Kaipapau, Maakua and Kaluanui wells could develop between 4 to 7 mgd and N. Holt has proposed to put the presently unused Well 3654-02 into production for aquaculture. (Figure 6) In the Punaluu region, the existing BWS Punaluu V-A exploratory well could develop up to 1.3 mgd if put into production. Also, Sakoda Realty has proposed to develop 1 mgd from the presently unused Well 3654-04 for aquaculture.

D. GROWTH AND LAND USE

Production of potable water for domestic use by the Kaluanui Wells will accommodate, but not induce, development on Oahu. Net population growth on Oahu is primarily due to resident birth rates and the number

of jobs on Oahu. Availability of water is a prerequisite for new development, but will not directly cause people to have more children or create more employment opportunities.

While first priority for use of water from new windward sources like the Kaluanui Wells will be to meet the needs of Windward Oahu, any excess water can be exported to Honolulu. This in turn will allow water from the Pearl Harbor aquifer not needed in Honolulu to be used in the Pearl Harbor District.

E. UNAVOIDABLE ADVERSE IMPACTS

The only unavoidable adverse impact is that some of the proposed water production facilities will be visible from several locations within Sacred Falls State Park. Landscaping will be used to mitigate visual impacts.

F. COMMITMENT OF RESOURCES, FUTURE OPTIONS, AND LONG TERM PRODUCTIVITY

Once production facilities are installed for the Kaluanui Wells, the BWS will be committed to using them. Ground water in the Koolauloa basal aquifer is a renewable resource. Water withdrawal will not exceed sustainable yield. The only non-renewable resources that will be committed to the project are materials and labor.

G. GOVERNMENT POLICIES OFFSETTING ADVERSE IMPACTS

Unless sufficient water is available to meet demand, the BWS will be forced to deny hook-ups or to not issue new water meters larger than 5/8". In effect this would impose a moratorium on most new development and delay creation of housing called for in the Oahu General Plan and the Hawaii State Plan.

IV. RELATIONSHIP OF THE PROJECT TO LAND USE PLANS, POLICIES, AND CONTROLS

Proposed production facilities for the Kaluanui Wells will be in conformance with adopted land use plans and policies, and also with conditions and standards imposed by applicable land use controls. The following paragraphs describe applicable plans, policies, and controls as they relate to the project.

A. STATE PLAN AND STATE LAND USE CONTROLS

The Hawaii State Plan, enacted by Act 100, SLH 1978, indicates legislative intent to:

Ensure that adequate support services and facilities are provided to accommodate the desired distribution of future growth throughout the State. (Section 226-5(b)(3), HRS)

Encourage the protection of rare or endangered plant and animal species and habitats native to Hawaii. (Section 226-11(b)(6), HRS)

Promote the preservation and restoration of significant natural and historic resources. (Section 226-12(b)(1), HRS)

Support water supply services to areas experiencing critical water shortages. (Section 226-16(b)(5), HRS)

Facilitate the use of available urban lands to accommodate the housing needs in various communities. (Section 226-19(b)(6), HRS)

Direct future urban development away from critical environmental areas or impose mitigating measures so that negative impacts on the environment would be minimal. (Section 226-104(c)(4), HRS)

Identify critical environmental areas in Hawaii to include but not be limited to the following: watershed and recharge areas; wildlife habitats (on land and in the ocean); areas with endangered species of plants and wildlife; natural streams and water bodies; scenic and recreational shoreline resources; open space and natural areas; historic and cultural sites; areas particularly sensitive to reduction in water and air quality; and scenic resources. (Section 226-104(c)(5), HRS)

With respect to these State Plan policies, the Kaluanui Wells will provide a portion of the water needed to accommodate population growth indicated in the 1982 Oahu General Plan. The project will affect neither the quantity nor quality of flow in Kaluanui Stream. Appropriate mitigation measures will be used to ensure that the project will not adversely affect natural or historic resources, wildlife habitat, or scenic or recreational resources. A full discussion of impacts is contained in Chapter III.

State land use controls to implement the State Plan are designated in Section 226-52, HRS. These are district boundary classification by the State Land Use Commission (LUC) and Conservation District Use Permits (CDUP) by the Board of Land and Natural Resources (BLNR). Pursuant to Chapter 205, HRS, the LUC has classified all land within the State into four land use districts: Urban, Rural, Agricultural, and Conservation. The BLNR regulates use of all lands which within the Conservation District, while the counties regulate land use in the other districts.

Approximately 100 feet of proposed water transmission main and overhead utility lines will be within the Urban District. Otherwise, proposed production facilities for the Kaluanui Wells will be entirely within the Agricultural District. (Consequently, a CDUP is not required.) The Kaluanui Wells and ancillary facilities are permissible uses within both the Urban and Agricultural Districts pursuant to Part III of the LUC State Land Use District Regulations.

B. STATE COASTAL ZONE MANAGEMENT PROGRAM

The State Coastal Zone Management (CZM) Program (Chapter 205A, HRS) explicitly requires public agencies to protect the habitat of waterbirds and diadromous stream fauna. Part II of Chapter 205A has established a County administered Special Management Area permit system to implement the Hawaii CZM Program. About 3,000 feet of proposed underground water transmission main and overhead utility lines will be within the County CZM Special Management Area. [Figure 9] Proposed water production facilities will comply with the State CZM Program because they will not significantly affect Kaluanui Stream, stream fauna, or wetland waterbird habitat.

C. COUNTY GENERAL PLAN AND ZONING

The Kaluanui Wells will develop water to accommodate growth and development proposed in the 1982 Oahu General Plan. However, the project will not in itself guide where population growth takes place on Oahu. Implementation of County land use plans is primarily achieved with zoning rather than with water supply because the BWS has no legal mandate to use water supply as a tool to direct growth. In the absence of any law or ordinance authorizing the BWS to refuse service when water is available, the BWS is committed to meeting all future demand.

Proposed BWS facilities will be on lands zoned either P-1 or AG-1. The Kaluanui Wells and ancillary facilities are permitted uses pursuant to the County Comprehensive Zoning Code.

V. ALTERNATIVES TO THE PROPOSED PROJECT

There are a wide range of alternatives to the proposed project which to varying degrees could fulfill the objective of meeting future water demand. In brief, these alternatives are as follows:

- A. NO PROJECT**
- B. ALTERNATIVE SITES**
- C. ISLAND-WIDE APPROACHES**
 - 1. Conservation, Bulkheading of Tunnels, Controlling Leaks
 - 2. Desalinization of Brackish Water
 - 3. Exchanging Water with Agriculture
 - 4. Using Non-Potable Water for Landscaping
 - 5. Trapping Storm Runoff
 - 6. Taking Stream Water
 - 7. Taking Agricultural Water
 - 8. Increasing Water Prices

A. NO PROJECT

Over the next several years, total Oahu water demand is projected to increase to the point where the BWS will have to seriously explore all feasible options. For this reason, the BWS has rejected the "no project" alternative in favor of a project which will provide additional water and incorporate adequate mitigation measures.

B. ALTERNATIVE SITES

There are undoubtedly many other sites on Oahu where water can be developed. Over the next few years, both the BWS and the DLNR

(DOWALD) will be conducting extensive field investigations for new sources. However, other well sites will not serve as alternatives to the Kaluanui Wells since these other sites will also be needed to meet the island's growing water demands.

In general, leeward Oahu well sites would tend to produce less water than windward Oahu sites. But, unlike most leeward Oahu well sites, many of the possible alternative windward sites have the potential to reduce the amount of water flowing in perennial streams.

C. ISLAND-WIDE APPROACHES

By the year 2000, easily accessible high quality ground water may not be sufficient to meet total Oahu water demand. Because of the way that Oahu's water supply system is integrated, steps can be taken on an island-wide basis to meet the growing urban demand for water. Without question, some island-wide approaches will ultimately become a necessity. Possible approaches vary widely in cost, impacts, and social acceptability. Some could serve as a feasible alternative to the Kaluanui Wells by freeing water from the Pearl Harbor aquifer to be pumped to other parts of leeward Oahu.

1. Conservation, Bulkheading of Tunnels, Controlling Leaks. A very efficient approach to meeting future water demand is to conserve water and avoid unnecessary losses. Major possibilities include installing water saving devices, constructing or relocating bulkheads on water collection tunnels, and repairing leaky water mains.

Ordinance No. 79-27 amended the Oahu plumbing code to require installation of water saving devices in new toilets and recirculating systems for new cooling equipment after November 9, 1979. Water savings could be expanded by installing similar devices in toilets and cooling equipment in existence prior to November 1979. While the BWS currently is not authorized by statute or ordinance to subsidize "retrofitting" old fixtures with

water saving devices, there could be merit in such a program. However, at present, there is no reliable data on the water savings that could be expected, or the actual cost of a retrofitting program.

Part of Oahu's water supply comes from high level tunnels driven into the Koolau and Waianae mountains. Water trapped in the permeable basalt by impermeable lava dikes is developed by these tunnels. By bulkheading at the dikes (installing an impermeable seal in the tunnel), a tunnel would be able to store water for use during periods of high demand. Without a bulkhead, buildup of storage is not possible and the tunnel would produce only base flow year round. However, out of four tunnels with bulkheads, the procedure has been effective only at Waihee. Other attempts were unsuccessful in restoring the hydraulic integrity of the dikes which formerly controlled storage. [Ref. 27, p. 105]

In fiscal year 1982-83, approximately 10.9% of the water input into the overall BWS system was unaccounted for. This includes meter errors, non-metered uses (fire, line flushing, etc.) and an unknown amount of leakage. A leak detection and repair program, concentrating on areas that had high percentages of unaccounted-for water, was initiated in 1976. When the program was temporarily curtailed in 1978, approximately 135 miles of water main had been inspected but relatively few leaks had been found. Consideration is being given to reviving the program.

2. Demineralization of Brackish Water. Large quantities of brackish ground water could be made available for domestic use if excess salt were removed. Demineralization techniques are available which, although more expensive than normal ground water development, are considerably less costly than desalting ocean water. It has been estimated that in 1982, construction of an 8 mgd reverse osmosis demineralization plant to treat water from the Pearl Harbor Springs would cost approximately \$11.4 million. The total annual cost of potable water from this plant would have been approximately \$1.60 per 1,000 gallons. However, 72% of this cost is for electric power. The major disadvantage with demineralization is the large amount of electric power required which, on Oahu, is mostly produced with non-renewable fossil

fuels. Apart from the environmental trade-offs necessitated by use of such resources, the cost of fuel for electric power has doubled over the last few years and will continue to escalate.

3. Exchanging Water with Agriculture. While no cost estimate is available, it potentially could be cost-effective for the BWS to exchange treated sewage effluent or brackish water for some potable water used to irrigate sugar cane on leeward and central Oahu. Oahu Sugar Company (OSC) would need to agree to such an exchange, and the BWS would need to develop a new source of irrigation water for use by OSC. In addition, the Board of Land and Natural Resources would need to approve any increase in BWS pumpage from the Pearl Harbor Ground Water Control Area (GWCA) made possible by a permanent decrease in pumpage from OSC wells in the Pearl Harbor GWCA.

Without dilution, only 7 mgd of well water now used by Oahu Sugar Company could meet the Federal requirement that chloride concentration in drinking water be less than 250 ppm. [Ref. 17] However, the Waiahole Ditch supplies Oahu Sugar Company with an average of 32 mgd of potentially high quality water from water development tunnels in the Koolau Range. [Ref. 23, p. 279] Waiahole Ditch water would be suitable for domestic use if given minimal treatment or carried in pipes instead of an open ditch.

Exchange of brackish water or treated sewage effluent for high quality irrigation water poses several risks. First, ground water could possibly be contaminated or rendered unpotable if minerals, chemical compounds (e.g. nitrates), or infectious agents are not adequately neutralized or filtered out as the water percolates through soil. Second, cane productivity could suffer. Third, the soil could become caked with salts and become less permeable, requiring more water to leach salts out of the soil. Fourth, treated sewage effluent might clog the drip irrigation tubes used in cane fields by encouraging growth of algae or bacteria or by having a high suspended solids content.

At this time, the most feasible option would be to exchange brackish water for high quality water used to irrigate sugar cane growing above relatively impermeable marine and sedimentary

deposits (caprock) on the Ewa Plain. Except in caprock areas, it is not possible to prevent return irrigation water from degrading basal water relative to chlorides and total dissolved salts. Unless percolation is restricted by caprock, it would be counterproductive to use brackish water for irrigation above parts of the basal lens which are a source of drinking water.

Initial studies using secondary treated sewage effluent from Mililani Wastewater Treatment Plant for irrigation indicate that problems with cane productivity and soil retention of salts can be resolved. However, it would be necessary to upgrade the County Honouliuli Wastewater Treatment Plant (WTP) to provide secondary treatment before sizable amounts of wastewater would be available for exchange with high quality irrigation water. Because of cost, County plans are only to upgrade Honouliuli WTP to provide advanced primary treatment.

4. Using Non-Potable Water for Landscaping. Brackish water could potentially be used instead of potable water to irrigate landscaping and parks located above caprock. For example, the BWS is currently exploring the feasibility of developing an extensive non-potable water system to service urban development on the Ewa Plain. Outside of caprock areas, numerous shallow alluvial wells which are susceptible to contamination could potentially be developed to supply water for irrigation. For example, water from the Halekou Interchange Relief Wells could be used for irrigation of the Pali Golf Course, Hawaii Loa College, and Hawaiian Memorial Park Cemetery.

5. Trapping Storm Runoff. The economics of trapping storm runoff has not been thoroughly investigated. At some time in the future, as a means of preserving coastal water quality and preventing coral kills, the State "208" Water Quality Program may require that large scale development incorporate ponding basins to trap storm runoff. A possible variation would be joint public and private programs to install dams to slow storm runoff out of natural drainage basins such as Waikele Stream. Besides reducing siltation of near shore waters, such measures would result in more efficient recharge to Oahu's basal water supply.

The environmental benefits of on-site and land-based disposal of storm water need to be balanced against the debits. First, storm water ponding basins require large areas. While some forms of agriculture can be located in a ponding basin, most land uses are precluded. Second, ponding basins can create breeding grounds for mosquitoes. Third, ponding basins will continually require maintenance because of silt build-up from flood flows. Preliminary BWS studies indicate cost per gallon saved is unfavorable because of high construction and land acquisition costs.

6. Tapping Stream Water. Surface water on Oahu could theoretically be treated and then used for human consumption. However, there would be formidable political and legal obstacles including the policies of the Hawaii CZM Program to preserve perennial streams. Punaluu and Kahana Streams on windward Oahu are the most feasible streams for water development. Their base flows are in the range of 9 to 12 mgd each. However, development and treatment of surface water from these streams would probably be more costly than to install wells and pump the ground water which is the major source of their flow.

7. Taking Agricultural Water. Simply taking State owned water away from the sugar companies would cause severe economic hardship. The BLNR has indicated that this approach will not be authorized if there are feasible alternatives. A more reasonable approach would be to require that if sugar cane fields are replaced with houses, then water used to irrigate these fields be provided to the BWS. For example, replacement of 1,000 acres of drip-irrigated sugar cane on the Ewa Plain with houses could free over 6 mgd of non-potable water for use by the BWS.

8. Increasing Water Prices. The rate for water assessed by the BWS is set so as to cover costs, including some development of new sources, but not to make a profit. For the first 13,000 gallons of water used in a month, all users are charged the same basic rate. In 1970, this rate was \$0.34 per 1,000 gallons. In July 1980, the basic rate was \$0.76 per 1,000 gallons, representing an

increase of around 8% per year. Above 13,000 gallons per month, only agricultural users are given a reduced rate of \$0.61 per 1,000 gallons. Prior to July 1980, industrial users were also given a reduced rate; but to encourage conservation, they are now charged the basic rate for all water used. Residential users continue to be charged the basic rate for all water used.

Increased water prices could lead to more efficient use of water and discourage waste. For this reason a study by the Hawaii Institute for Management and Analysis in Government (HIMAG), recommended imposition of peak-load (i.e. higher summer) prices for municipal water users along with a price break for agricultural water users connected to the BWS system. [Ref. 4, pp. 111-114] The logic of the HIMAG recommendation is based on the assumption that the low cost of municipal water discourages the application of available water-saving technology. If this assumption is correct, then peak load pricing could delay the time when the BWS will be forced to turn to more expensive water sources such as brackish spring water. Peak load pricing has not yet been adopted, but as previously noted, the discounted rate formerly given to large industrial users has been eliminated in order to encourage water conservation.

VI. NECESSARY APPROVALS

1. Approval of this EIS by the Governor.
2. BLNR easement for use of State land within Sacred Falls State Park.
3. County Special Management Area (SMA) permit for development of overhead power and telephone lines and an underground water transmission main within the SMA.
4. Other County permits (e.g. erosion control and building) to construct proposed facilities.
5. DOH approval of domestic use of water from the Kaluanui Wells pursuant to Title 11, Chapter 20, DOH Administrative Rules.

Since no development is planned within a wetland, a Department of the Army Permit and a Coastal Zone Management Consistency Certification (from DPED) are not required.

VII. SUMMARY OF UNRESOLVED ISSUES

Adequate ground water is available for the BWS Kaluanui Wells. However, allocation of remaining undeveloped ground water in the Koolauloa Basal Aquifer is an unresolved issue. If all proposed public and private water development projects in Koolauloa were implemented, then they would exceed the sustainable yield of the aquifer. Hence, it may soon become necessary for either the BWS or BLNR to restrict additional pumpage from the basal aquifer.

VIII. ORGANIZATIONS AND PARTIES CONSULTED

[Comments and Responses on the EIS Preparation Notice and Draft
EIS are Reproduced in Appendix D]

A. FEDERAL GOVERNMENT

- Department of Agriculture Soil Conservation Service (D-1, D-17)
- * Department of the Air Force, Headquarters 15th Air Base Wing (D-17)
- Department of the Army, Corps of Engineers Pacific Ocean Division
(D-1, D-18)
- Department of the Interior
 - * Fish and Wildlife Service (D-3, D-19)
 - * Geological Survey (D-20)
 - * Department of the Navy, Headquarters Naval Base, Pearl Harbor (D-20)
 - * Department of Transportation, Commander 14th Coast Guard District (D-21)

B. STATE OF HAWAII

- * Department of Accounting and General Services (D-21)
- Department of Agriculture (D-4, D-22)
- * Department of Defense (D-23)
- * Department of Health (D-23)
- Department of Land and Natural Resources (D-5, D-7, D-24)
- * Department of Planning and Economic Development (D-26)
- Department of Transportation (D-8, D-27)
- * Office of Environmental Quality Control (D-28)
- University of Hawaii
 - Environmental Center (D-9, D-29)
 - Water Resources Research Center (D-10, D-31)

C. CITY AND COUNTY OF HONOLULU

- * Building Department (D-32)
Department of General Planning (D-10, D-33)
- # * Department of Housing and Community Development
Department of Land Utilization (D-11, D-33)
- * Department of Parks and Recreation (D-34)
Department of Public Works (D-12, D-35)
Department of Transportation Services (D-13, D-36)
- * Fire Department (D-36)
- * Police Department (D-37)

D. COMMUNITY

- * Hawaiian Electric Company, Inc. (D-37)
- * Koolauloa Neighborhood Board (D-39)
- # Life of the Land (D-14)
- # * Sierra Club
- # * Audubon Society
- # * Punaluu Community Association
- # * Laie Community Association
- # * Kapaka Farm
- # * Hanahano Enterprises
- # * George Sakoda Realty

- * No response to the EIS Preparation Notice
- # No response to the Draft EIS

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APPENDIX A

BOTANICAL SURVEY

PROPOSED KALUANUI STREAM WATER WELL SITE

Report of Botanical Survey

Grant Gerrish
March 13, 1979

Vegetation Zone

According to Egler's (1939) zonation of the vegetation of Oahu, the proposed Kaluanui water well site is located in the Guava Zone. The native vegetation of this zone has largely been displaced by introduced herbaceous grasses and shrubs (Egler 1939).

Existing Vegetation

The site is covered by secondary scrub forest and an abandoned sugar cane (Saccharum officinarum) field. In the old field, untended sugar cane persists mixed with Brachiaria mutica (California grass), and other introduced herbaceous plants. Leucaena leucocephala trees occur mixed with the sugar cane.

The scrub forest on the site is dominated by Leucaena leucocephala at the lowest elevation, but upslope the Leucaena is replaced by a dense thicket of Schinus terebinthifolius with scattered Psidium guajava trees. The native shrub, Wikstroemia oahuensis, is infrequent at lower elevations but becomes more common upslope. Other native plants found in the Schinus thicket are Osteomeles anthyllidifolia and Peperomia latifolia. Scattered individuals of Eugenia cumini, Brassaia actinophylla, and Mangifera indica (mango) occur about the site.

Access Road

The unimproved road that provides access to the site from state highway 83, closely parallels Kaluanui Stream. The northwest side of the road is lined with old sugar cane fields and Leucaena trees. Brachiaria forms a dense ground cover beneath the Leucaena trees. Kaluanui Stream is on the southeast side of the road. The roadside and stream banks are covered by Leucaena and Eugenia cumini with an occasional Aleurites moluccana (kukui nut) tree. Brachiaria and Commelina diffusa dominate the herbaceous layer. Many common roadside weeds are found along the access road.

Reccomendations

The vegetation of the proposed well site is made up of common introduced plant species. None of the several native plants found on the site are listed as rare or endangered (Federal Register 1976).

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Kaluanui Stream Water Well Site - Species List

A listing of plants found at the proposed well site and along the access road leading to the site.

Nomenclature of flowering plants follows that of H. St. John. 1973. List and Summary of the flowering plants in the Hawaiian Islands.

N = Native; E = Exotic (introduced to Hawaii by man).

| <u>SPECIES</u> | <u>FAMILY</u> | <u>STATUS</u> <u>N/E</u> |
|--|---------------|-----------------------------|
| Ferns and Fern Allies | | |
| <u>Cyclossorus dentatus</u> (Forsk.) Ching | Aspidiaceae | N |
| <u>Microsorium scolopendria</u> (Burm.) Copel. | Polypodiaceae | E |
| <u>Nephrolepis exaltata</u> (L.) Schott | Davalliaceae | N |
| <u>Pleopeltis thunbergiana</u> Kaulf. | Polypodiaceae | N |
| <u>Psilotum nudum</u> (L.) Griseb. | Psilotaceae | N |
| Flowering Plants | | |
| <u>Aleurites moluccana</u> (L.) Wild. | Euphorbiaceae | E |
| <u>Bidens pilosa</u> L. | Compositae | E |
| <u>Brachiaria mutica</u> (Forsk.) Stapf | Gramineae | E |
| <u>Brassaia actinophylla</u> Endl. | Araliaceae | E |
| <u>Cassia leschenaultiana</u> DC. | Leguminosae | E |
| <u>Centella asiatica</u> (L.) Urban | Umbelliferae | E |
| <u>Chloris virgata</u> Sw. | Gramineae | E |
| <u>Coix lachryma-jobi</u> L. | Gramineae | E |
| <u>Commelina diffusa</u> Burm. f. | Commelinaceae | E |
| <u>Cordyline terminalis</u> (L.) Kunth | Liliaceae | E |
| <u>Crotolaria mucronata</u> Desv. | Leguminosae | E |
| <u>Desmodium uncinatum</u> (Jacq.) DC. | Leguminosae | E |

| <u>SPECIES</u> | <u>FAMILY</u> | <u>STATUS</u> <u>N/E</u> |
|---|----------------|-----------------------------|
| <u>Eleusine indica</u> (L.) Gaertn. | Gramineae | E |
| <u>Eugenia cumini</u> (L.) Druce | Myrtaceae | E |
| <u>Lantana camara</u> L. | Verbenaceae | E |
| <u>Leucaena leucocephala</u> (Lam.) de Wit | Leguminosae | E |
| <u>Mangifera indica</u> L. | Anacardiaceae | E |
| <u>Musa</u> sp. L. | Musaceae | E |
| <u>Osteomeles anthyllidifolia</u> Lindl. | Rosaceae | N |
| <u>Oxalis corniculata</u> L. | Oxalidaceae | E |
| <u>Paspalum fimbriatum</u> HBK | Gramineae | E |
| <u>Passiflora edulis</u> Sims | Passifloraceae | E |
| <u>Passiflora suberosa</u> L. | Passifloraceae | E |
| <u>Phyllanthus debilis</u> Klein ex Wild. | Euphorbiaceae | E |
| <u>Plantago major</u> L. | Plantaginaceae | E |
| <u>Pluchea odorata</u> (L.) Cass. | Compositae | E |
| <u>Psidium guajava</u> L. | Myrtaceae | E |
| <u>Saccharum officinarum</u> L. | Gramineae | E |
| <u>Schinus terebinthifolius</u> Raddi | Anacardiaceae | E |
| <u>Spathoglottis plicata</u> Bl. | Orchidaceae | E |
| <u>Stachytarpheta jamaicensis</u> (L.) Vahl | Verbenaceae | E |
| <u>Wikstroemia oahuensis</u> (Gray) Rock | Thymeliaceae | N |
| <u>Peperomia latifolia</u> Miq. | Piperaceae | N |

APPENDIX B

AQUATIC MACROFAUNA STUDY

Biological Reconnaissance of Kaluanui Stream, Oahu

by

Amadeo S. Timbol, Ph. D.
Aquatic Biologist

JUN 01

Introduction

This study was made at the request of VTN Pacific in connection with a proposed well for the Board of Water Supply in the vicinity of Kaluanui Stream. Kaluanui Stream, located between Punaluu and Hauula on the windward side of Oahu, is a perennial stream. It has a total of 13.7 km channel length and a watershed area of 5.7 km². The mainstream is continuous, while its north tributary is interrupted (see Methods for definitions). Kaluanui has a series of three waterfalls only one of which is easily accessible. Likewise, the stream channel is reasonably accessible only from the mouth up to the first waterfall (Sacred Falls). This accessible stream channel (3.6 km of mainstream and 2 km of the north tributary constituting 40% of total stream channel) was examined. A map showing the watershed, positions of mainstream and tributaries, and locations of sampling stations is found in Appendix A.

The objectives of this study are: (1) to determine the presence or absence of threatened species in Kaluanui Stream; (2) to compile a list of resident aquatic macrofauna and compare it with those of Punaluu and Ahui-manu streams, both also on windward Oahu; (3) to determine macrofaunal distribution and abundances; (4) discuss the possible effects of dewatering (e. g. elevated temperatures) on important stream residents; and (5) make an assessment of the stream's ecological quality status on the basis of its biological and physical features.

There are no published biological work on Kaluanui Stream. Kaluanui has been visited by biologists of the Division of Fish and Game and results of visual observations and non-quantitative collecting are in Shima (1965).

The evolutionary source or origin of a given species becomes important as environmental awareness increases. The fauna of Hawaii streams is characterized by a low diversity of species but a high degree of endemism. The more conspicuous of the native aquatic animals such as fishes and crustaceans are characteristic of the middle and lower stream areas. The lesser components are aquatic insects which are characteristic of the middle and upper reaches but may be found throughout the watercourse.

The conspicuous native animals in a stream typically numbers ten species (6 fishes, 2 shrimps, 1 mollusk, and 1 polychaete worm). Seven of these species (5 gobies and goby-like fishes, 1 prawn, 1 mollusk) are obligately diadromous - meaning they reside in streams but undergo larval development in the ocean. Thus, these seven species must have suitable environmental conditions throughout the stream channel for larvae to reach the ocean and for postlarvae to return weeks or months later to migrate upstream to their

places of permanent residence. One small shrimp is also diadromous but possibly can also complete its life cycle entirely in the stream. Habitat requirements for the polychaete worm has not been determined but it is possibly diadromous since the species is also found in brackish or estuarine localities elsewhere (Hartman 1959). The tenth species is a silvery perch-like marine fish whose juveniles are regular freshwater visitors.

Methods

Seven stations were selected: six on the mainstream and one on the north tributary. Two of the six mainstream stations are downstream of the project site. A resume of features for each station are in Appendix B and their approximate locations in the stream are in Appendix A.

A stretch of 20 x 1 m of stream channel was pre-measured and animals which could be seen were identified and counted. Some specimens were caught with a hand net, identified, and counted, and released live at the same site. Boulders, rocks, and stones were examined for native mollusks (e.g. Neritina granosa or hihwai). Where found, efforts were made not to disturb the animals. A count was made visually and where visibility was limited, by running my hands around the sides of boulders. In only one instance was a stone with hihwai lifted out of the water, only long enough to take a couple of pictures. The stone (with hihwai) was returned to the same position.

Macrobenthos (bottom-dwelling insect larvae, minute snails and worms) were sampled with a surber sampler at about the middle of the stream bed. The net was set downstream of a 0.09 m² frame from which the collection is to be made. Large stones were picked and organisms were washed from them into the net. After the larger stones had been picked up, washed and discarded, the remainder of the area inside the frame was gently churned to wash burrowing forms into the net. The contents of the net were placed in an ice chest while in the field and later, in the freezer. The animals were sorted, identified, and counted within the week of collection.

The resulting macrofauna list was checked for endangered and threatened species using the following list and scientific publications: USFWS List of Endangered and Threatened Species (1977), Maciolek (in press), and Miller (1972).

Terms used in the text are: depleted which means that the organisms are still found in numbers adequate for survival but has been heavily depleted and continues to decline substantially (Miller 1972); rare are those not under immediate threat of extinction but occurs in small numbers; endangered are those that are actively threatened with extinction; and threatened species include those which are depleted, rare, or endangered. Additional terms needing clarification are: endemic, which means occurring naturally in Hawaii only; indigenous means occurring naturally in Hawaii and elsewhere; native includes both indigenous and endemic; and introduced (= exotic) means that the animal was brought to Hawaii either accidentally or intentionally.

On the basis of water source, flow and biological features, a perennial stream has water in all or part of its channel throughout the year and harbour aquatic animals that need water continuously. A perennial stream may be continuous when it flows naturally to the sea year-round under normal conditions or it may be interrupted when it sometimes flows on or sometimes below the surface. An interrupted stream normally discharges into the sea only during wet seasons. Perennial streams receive their waters mostly through seepage and springs and subsurface water. In the immediate drainage area, the water table usually stands at a higher level than the floor of the stream.

For purposes of this report, abundant (+++) means many individuals, from 6 to 100 or more. Common (++) indicates that between 2 and 5 were observed or caught, while uncommon (+) means that only one was sighted or caught. Absent (0) means it was neither seen nor collected.

Results

Conspicuous macrofauna was sampled using a combination of visual observation and hand netting techniques. Other workers (Ford 1974, USFWS 1977, Norton, et al. 1978, Timbol and Maciolek 1978) use backpack electroshockers. Visual observation-hand netting is more "efficient" on non-secretive species such as Awaous stamineus (o'opu nakea) and Xiphophorus helleri (swordtail). On the other hand, electroshocking allows the detection and capture of species that are hidden diurnally (e. g. Clarias fuscus or Chinese catfish and Misgurnus anguillicaudatus or dojo). The special characteristics of each method should be considered in comparing results in this study with those obtained by other workers. Thus, it is possible that the dojo is under-represented while the swordtail could be over-represented in this survey.

The less conspicuous macrofauna (macrobenthos) was obtained using standard methods, making results directly comparable with previous studies.

Inventory

Results, based on two collections per station, indicate at least 26 species of aquatic and semi-aquatic animals are in Kaluanui Stream and its north tributary (Table 1). These are: 11 fishes, 2 amphibians, 3 crustaceans, 1 mollusk, 2 annelids, and 7 insects. Of these, 13 species (50% of total) are native to Hawaii.

The important components of the animal community are the diadromous native animals, namely 5 fishes, 2 decapod crustaceans, and 1 mollusk. Of these eight diadromous species, three (Awaous stamineus, Sicydium stimpsoni, and Neritina granosa) are listed as threatened in scientific publications (see Table 1). Absent at Kaluanui is the native goby, Lentipes concolor (o'opu alamo'o), a candidate for the endangered species list. This is to be expected since this species had not been collected on Oahu for several years now.

The more important of the resident animals are the three threatened species, the endemic shrimp Atya bisulcata (o'pae kala-ole) and the exotic poeciliid, Xiphophorus helleri (swordtail). Each is briefly described as follows:

4

Table 1. List of Aquatic Macrofauna in Kaluanui Stream and Its (North) Tributary, Oahu (March - May 1979).

| Scientific Name | Local Name | Origin | List ¹ |
|---|----------------------|--------------|-----------------------|
| A. PISCES | | | |
| 1. <u>Awaous genivittatus</u> | o'opu naniha | indigenous | none |
| 2. <u>Awaous stamineus</u> | o'opu nakea | endemic | depleted ² |
| 3. <u>Clarias fuscus</u> | Chinese catfish | introduced | none |
| 4. <u>Eleotris sandwicensis</u> | o'opu okuhe | endemic | none |
| 5. <u>Kuhlia sandwicensis</u> | aholehole | endemic | none |
| 6. <u>Misgurnus anguillicaudatus</u> | dojo | introduced | none |
| 7. <u>Mugil cephalus</u> fingerlings ³ | mullet | indigenous | none |
| 8. <u>Poeciliid</u> fry ⁴ | poeciliids | introduced | none |
| 9. <u>Sicydium stimpsoni</u> | o'opu nopili | endemic | rare ⁵ |
| 10. <u>Tilapia (=Sarotherodon)</u> <u>mossambica</u> | tilapia ⁶ | introduced | none |
| 11. <u>Xiphophorus helleri</u> | swordtail | introduced | none |
| B. AMPHIBIA | | | |
| 1. <u>Bufo marinus</u> adults | toad | introduced | none |
| 2. <u>Rana rugosa</u> adults | frog | introduced | none |
| C. CRUSTACEA | | | |
| 1. <u>Atya bisulcata</u> | o'pae kala'ole | endemic | none |
| 2. <u>Macrobrachium grandimanus</u> | o'pae o'eha'a | endemic | none |
| 3. <u>Macrobrachium</u> lar | Tahitian prawn | introduced | none |
| D. MOLLUSCA | | | |
| 1. <u>Neritina granosa</u> | hihiwai | endemic | rare ⁷ |
| E. ANNELIDA | | | |
| 1. <u>Nemalycastis abioma</u> | polychaete worm | indigenous | none |
| 2. Hirudinea | leech | unknown | none |
| F. INSECTA | | | |
| 1. Diptera: Chironomidae | midge larvae | endemic | none |
| 2. Diptera: Empididae | | introduced | none |
| <u>Hemerodromia</u> sp. | | endemic | none |
| 3. Diptera: Ephydriidae | brinefly larvae | endemic | none |
| 4. Diptera: Tipulidae | crane-fly larvae | endemic | none |
| 5. Odonata: Zygoptera... | damselfly naiads | undetermined | none |
| 6. Trichoptera: <u>Cheumatopsyche</u> <u>analis</u> | daddisfly | introduced | none |
| 7. Trichoptera: <u>Oxyethira maya</u> | microcaddisfly | introduced | none |

¹ Considered as rare, endangered, threatened or depleted in official register or scientific publications.

² Miller 1972

- ³Possibly includes two other mullet species, Chelon engeli (introduced), and Neomyxus chaptalii (indigenous).
- ⁴Includes Xiphophorus fry and possibly Gambusia affinis (mosquitofish - introduced), and Poecilia reticulata (wild guppy - introduced) fry.
- ⁵Miller 1972
- ⁶Possibly includes one or more of the other tilapia species (T. macrochir, T. melanopleura, and T. zilli) known to be established in Hawaii's streams. All tilapia species are introduced.
- ⁷Maciolek, in press

1. Awaous stamineus (o'opu nakea)

The o'opu nakea is the largest (up to 35 cm) of the freshwater gobies. The life history of this endemic goby has been studied by Ego (1957). On Kauai, the nakea supports a seasonal, ethnic fishery. It is an obligately diadromous animal and needs suitable environmental conditions throughout the stream channel for the nakea larvae to reach the ocean and the post-larvae (hinana) to migrate upstream to their place of permanent residence

2. Sicydium stimpsoni (o'opu nopili)

The life history of o'opu nopili has been determined by Tomihama (1972). This endemic goby reaches up to 18 cm, is found in all stream areas, but mostly in the lower reaches of the streams. Each female produces several thousand eggs. The larvae are swept to sea, live as plankton and metamorphose into postlarvae at stream mouths and migrate upstream to places of permanent residences.

3. Xiphophorus helleri (swordtail)

This small (up to 15 cm), first introduced in 1922, live bearing pecciliid, originated from the American tropics and subtropics. Apparently two varieties have been introduced, the green swordtail and the red hybrid swordtail type. Males have an intromittent organ, the gonopodium, and fertilization is internal. Intervals between broods are approximately 30 days, with the young emerging live from females. The fish feeds on minute insects and other small animals.

4. Atya bisulcata (o'pae kala'ole)

This small (up to 8 cm) endemic shrimp (kala'ole = spineless) is frequently found abundant in most streams with perennial water, mostly in middle and upper reaches of the stream. Sometimes, it is nearly black. It is primarily a detrital (suspended organic matter) feeder and is usually abundant in most high grade streams where it thrives in the fastest riffles. It is a diadromous species but unlike obligately diadromous species (e. g. gobies), it apparently can also complete its life cycle in freshwater.

5. Neritina granosa (hihiwai)

This diadromous endemic mollusk (Fig. 1) is the largest neritid (up to 6 cm shell diameter). It is common in remote streams on other islands but occurs sparingly in only a few Oahu streams. Some aspects of biology of the hihiwai are found in Maciolek (in press) and Vermeij (1969). The hihiwai is usually found in clear, bouldery, steep-gradient streams. The hihiwai has been harvested for food since the old days. Today, it commands about 10 cents apiece. As in the diadromous gobies, the hihiwai larvae are swept to the ocean in outflowing water where they undergo transitional larval development as marine plankton. They reappear at stream mouths as prejuveniles and migrate upstream.

Results based on one collection per station show seven insect species. None of these are diadromous and none of these are in the threatened lists.

Distribution and Abundances

The occurrence and relative abundances of the stream animals are shown in Table 2. Three species (o'opu nakea, Tahitian prawn, and Chironomid larvae) are distributed throughout the mainstream. Thirteen species are found only in the lower reaches of the stream (Stations 1 and 2, downstream of project site). In general, there is an increase in the number of species in a downstream direction.

It should be noted that the north tributary is extremely poor in species as compared with the mainstream. This is due to the difference in water flow. The mainstream flows continuously while the tributary does not.

An important feature is the low population density of the three threatened species. The o'opu nakea (No. 2 among the fishes in Table 2) is common, meaning there were only between 2 and 5 in a 20 x 1 m stretch of stream channel. The o'opu nopili (No. 9 among fishes) is even lower in density, only one was found at only one station. The neritid mollusk is abundant in only one station, although it was also found in two other stations. That the nopili and the hihiwai are found in the middle elevations of the stream and not at the lower reaches is due to the nature of the stream. The middle reaches of the stream is strong-flowing and bouldery, a habitat characteristic of nopili and hihiwai populations. The lower reaches are silty (see Appendix B) and not favored by these two animals.

Comparison with Other Streams

Table 3 compares the stream macrofauna (fish, crustacea, and mollusk only) in Kaluanui with that of Punaluu Stream which drains the valley next to Kaluanui and Ahuimanu Stream, four valleys away. The drainage areas for both Punaluu and Kaluanui are relatively undeveloped while that of Ahuimanu is heavily so. The ratio of native animals in the streams with undeveloped watersheds is high (60% for Kaluanui and 63% for Punaluu) while that for a highly developed watershed (26% for Ahuimanu Stream) is very low, almost one-third lower.

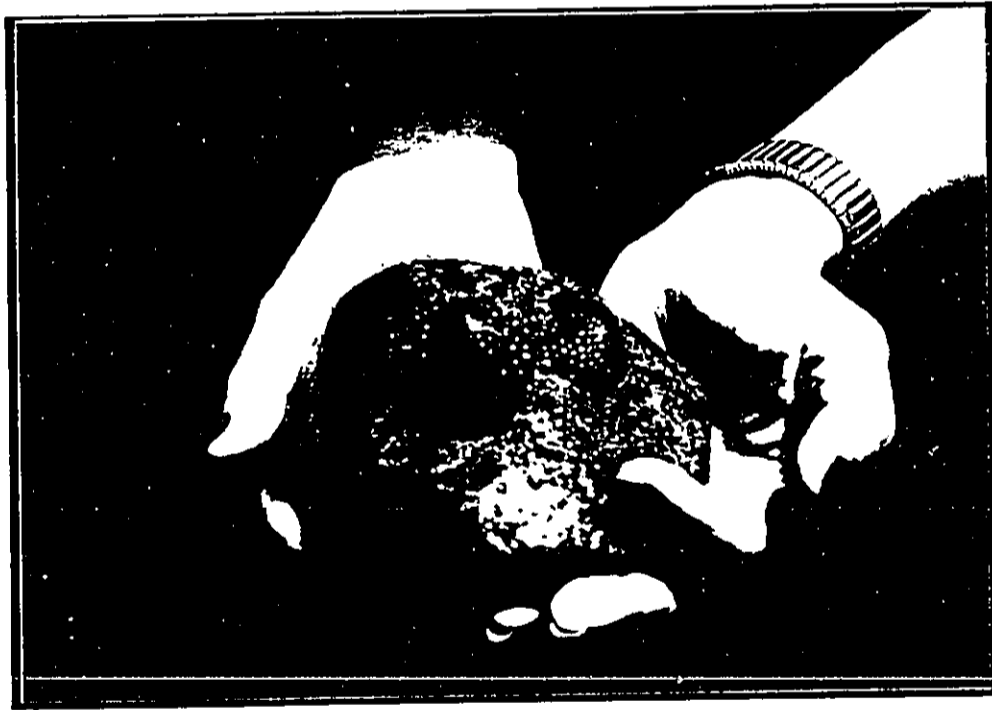
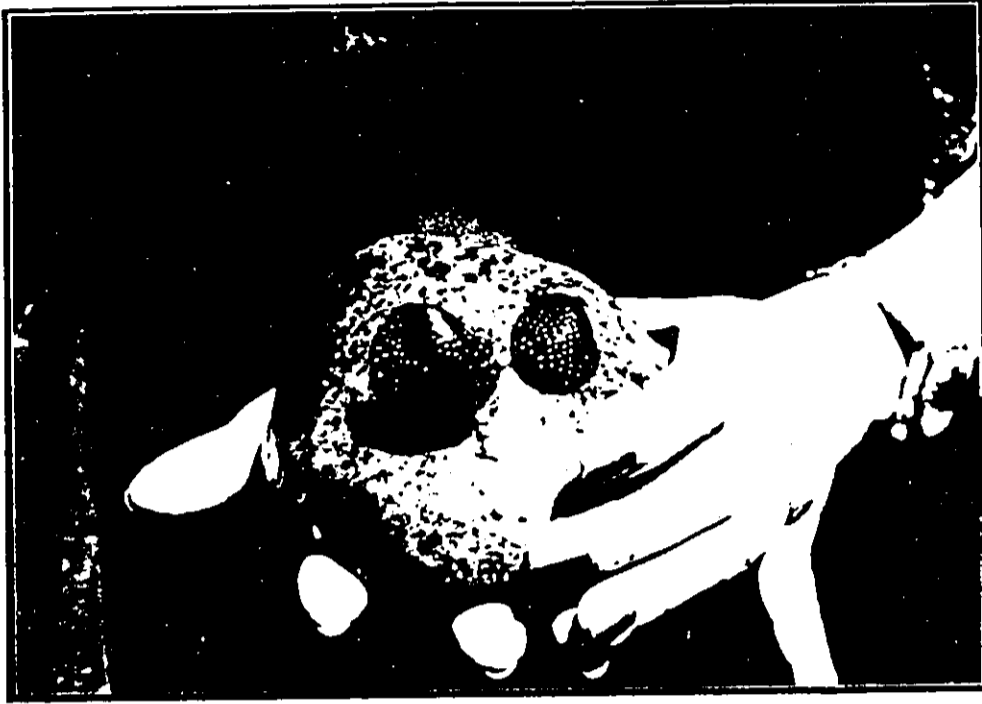


Fig. 1. Neritina granosa (hihiwai) from Station 5 in Kaluanui Stream.
Kaluanui is one of the few streams on Oahu in which the animal lives.

Table 2. Distribution and Relative Abundances of Aquatic and Semi-Aquatic Macrofauna in Kaluanui Stream and Its (North) Tributary, Oahu (March - May 1979; +++ = abundant, ++ = common, + = uncommon, 0 = absent or not seen).

| Scientific Name | Sampling Station | | | | | | |
|--|-------------------|-----|------------------------|-----|-----|-----|-------------|
| | Downstr. of P. S. | | Upstr. of Project Site | | | | North Trib. |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| A. FISH | | | | | | | |
| 1. <u>Awaous genivittatus</u> | ++ | + | 0 | 0 | 0 | 0 | 0 |
| 2. <u>Awaous stamineus</u> | + | ++ | ++ | ++ | ++ | ++ | 0 |
| 3. <u>Clarias fuscus</u> | ++ | + | 0 | 0 | 0 | 0 | 0 |
| 4. <u>Eleotris sandwicensis</u> | +++ | ++ | 0 | 0 | 0 | 0 | 0 |
| 5. <u>Kuhlia sandwicensis</u> | + | 0 | 0 | 0 | 0 | 0 | 0 |
| 6. <u>Misgurnus anguillicaudatus</u> | 0 | + | 0 | 0 | 0 | 0 | 0 |
| 7. <u>Mugil cephalus</u> | +++ | 0 | 0 | 0 | 0 | 0 | 0 |
| 8. <u>Poeciliid fry</u> | ++ | +++ | 0 | 0 | 0 | 0 | 0 |
| 9. <u>Sicydium stimpsoni</u> | 0 | 0 | 0 | 0 | + | 0 | 0 |
| 10. <u>Tilapia (=Sarotherodon) mossambica</u> | + | 0 | 0 | 0 | 0 | 0 | 0 |
| 11. <u>Xiphophorus helleri</u> | +++ | ++ | 0 | 0 | 0 | 0 | 0 |
| B. AMPHIBIA | | | | | | | |
| 1. <u>Bufo marinus</u> | + | 0 | 0 | 0 | 0 | 0 | + |
| 2. <u>Rana rugosa</u> | ++ | 0 | 0 | 0 | 0 | 0 | 0 |
| C. CRUSTACEA | | | | | | | |
| 1. <u>Atya bisulcata</u> | 0 | 0 | +++ | +++ | +++ | +++ | + |
| 2. <u>Macrobrachium grandimanus</u> | +++ | +++ | 0 | 0 | 0 | 0 | 0 |
| 3. <u>Macrobrachium lar</u> | 0 | ++ | ++ | ++ | +++ | +++ | 0 |
| D. MOLLUSK | | | | | | | |
| 1. <u>Neritina granosa</u> | 0 | 0 | + | + | +++ | 0 | 0 |
| E. ANNELID | | | | | | | |
| 1. <u>Nemalycastis abiurna</u> | + | + | 0 | 0 | 0 | 0 | 0 |
| 2. <u>Hirudinea</u> | 0 | 0 | 0 | + | + | ++ | 0 |
| F. INSECT | | | | | | | |
| 1. Diptera: Chironomidae | + | +++ | + | 0 | +++ | +++ | 0 |
| 2. Diptera: Empididae <u>Hemerodromia sp.</u> | 0 | 0 | 0 | 0 | + | 0 | 0 |
| 3. Diptera: Ephydriidae | 0 | 0 | 0 | 0 | + | 0 | 0 |
| 4. Diptera: Tipulidae | ++ | ++ | 0 | 0 | 0 | 0 | 0 |
| 5. Odonata: Zygoptera | 0 | 0 | 0 | + | 0 | 0 | + |
| 6. Trichoptera: <u>Cheumatopsyche analis</u> | 0 | + | ++ | ++ | 0 | + | 0 |
| 7. Trichoptera: <u>Oxyethira maya</u> | 0 | 0 | 0 | 0 | + | + | 0 |

Table 3. Comparison of conspicuous macrofauna in Kaluanui, Punaluu, and Ahuimanu Streams, all on windward Oahu. Legend: / = present, 0 = not seen nor collected.

| Scientific Name | Kaluanui: this study 3-245 m elev. | Ahuimanu: Timbol 1978 0-120 m | Punaluu: Kawate 1969 6-240 m |
|--------------------------------------|--|-------------------------------------|------------------------------------|
| A. Pisces | | | |
| 1. <u>Awaous genivittatus</u> | / | 0 | / |
| 2. <u>Awaous stamineus</u> | / | / | / |
| 3. <u>Clarias fuscus</u> | / | / | / |
| 4. <u>Eleotris sandwicensis</u> | / | / | / |
| 5. <u>Gambusia affinis</u> | 0 | / | 0 |
| 6. <u>Kuhlia sandwicensis</u> | / | 0 | / |
| 7. <u>Misgurnus anguillicaudatus</u> | / | / | 0 |
| 8. <u>Mugil cephalus</u> | / | 0 | 0 |
| 9. Poeciliid fry | / | 0 | 0 |
| 10. <u>Poecilia mexicana</u> | 0 | / | 0 |
| 11. <u>Poecilia reticulata</u> | 0 | / | / |
| 12. <u>Sicydium stimpsoni</u> | / | 0 | 0 |
| 13. <u>Tilapia mossambica</u> | / | / | 0 |
| 14. <u>Xiphophorus helleri</u> | / | / | / |
| B. Crustacea | | | |
| 1. <u>Atya bisulcata</u> | / | / | / |
| 2. <u>Macrobrachium grandimanus</u> | / | / | / |
| 3. <u>Macrobrachium lar</u> | / | / | 0 |
| 4. <u>Procambarus clarkii</u> | 0 | / | 0 |
| C. Mollusk | | | |
| 1. Lymnaeid snail | 0 | / | / |
| 2. <u>Melania</u> sp. | 0 | / | 0 |
| 3. <u>Neritina granosa</u> | / | 0 | / |
| Total Species | 15 | 15 | 11 |
| Native species | (9) | (4) | (7) |
| Introduced species | (6) | (11) | (4) |

Kaluanui's Physical Features

The mainstream channel from the mouth up to the Sacred Falls can be divided into three segments, based upon overall physical features. The first, from the mouth to about one km (includes Stations 1 and 2) of channel length. The stream bed is characterized as silty. There is no riparian canopy over the stream channel. Water is from slightly turbid to moderately turbid and flows slowly. The second, from about one km distance from the mouth up to about two km distance is characterized by the presence of some vegetative cover on most of the stream channel. Silt is minimal, substrate is bouldery and water is clear; water is clear and flows in strong riffles. This section includes Stations 4 through 6. This section exhibits the qualities of high ecological quality stream. Upstream beyond Sacred Falls, it can be surmised that the stream is in an almost pristine condition. As per USGS topographic map (Hauula quad), only one foot trail (Castle Trail) crosses the stream channel.

The north tributary have the same features as the third section except for the absence of a strong water flow and the Sacred Falls.

Discussion

Oceanic island resources are discrete, finite and especially fragile. For these reasons, McEachern and Towle (1972) argue for special programs to manage them. Commentaries relevant to Kaluanui Stream, a perennial, continuous stream are made for two purposes: (1) there is a need to protect the unique biota and conserve fishery resources and recreational opportunities, and (2) there is a demand for water for the economic and population growth in the State.

A simplistic description of a perennial stream's immediate water source is a water table located at a higher level than the stream floor. The yielding portion of the water table shrinks and expands with the dry and wet seasons (Hynes 1975). Artificial withdrawal (dewatering, as in pumping out) from the water table could result in the lowering of flow velocity (including a decrease in water depth and some loss of stream habitat), the magnitude of slowdown depending upon how much water is withdrawn.

The potential effects on Kaluanui's resident animals could be numerous. A discussion of all, or even many of these effects, are beyond the scope of this paper. Discussion will be limited to one immediate and important effect, that of elevated temperatures.

Elevated Temperatures on Conspicuous Stream Animals

The effects can be divided into three categories: lethal, metabolic, and behavioral. Lethal temperatures define the range within which the animal will die. Metabolic effects are "delayed action" effects as in growth acceleration resulting in the inability to reach and/or pass a critical point in the life cycle (Andrewartha and Birch 1954). Behavioral effects include the immediate positive and negative responses.

It is assumed in this paper, that a motile animal (e.g. fish) will elect to leave an area when streamflow conditions become unfavorable, and will generally not voluntarily remain in the area until conditions become lethal. An additional consideration to stream development is the diadromous character of most native animals. Among these are the three resident species (Awaous stamineus or o'opu nakea, Sicydium stimpsoni or o'opu nopili, and Neritina granosa or hihiwai) which are in the threatened lists (Miller 1972, Maciolek, in press). These diadromous animals live in streams but undergo larval development in the ocean. Thus, it is not possible to isolate these animals from the effects of stream development on downstream water quality as well as from the necessity of traversing developed or altered sections. There are many studies concerning the effects of temperature on aquatic life, mostly on cold water fishes. Studies relevant to this survey are those by Timbol and Maciolek (1978), Norton, et al. (1978), and especially Hathaway (1978). Most of the information that follows are after Hathaway's (op. cit.) with the following words of caution. The number of Hathaway's observations are limited, his results should be considered as "indicating a trend."

1. Lethal Temperatures.

Hathaway's (op. cit.) method was to raise water temperature in an aquarium of native animals at a steady rate. The temperature at which the first animal died and the temperature at which the last animal died (100% mortality) is the lethal temperature range. The temperature at which 50% of the animals are dead is the median lethal temperature (TLm or TL50). Pertinent data are presented as follows:

- a. Awaous stamineus (o'opu nakea). Lethal temperatures for adults ranged between 37.2 and 38.8 °C with 50% of the animals dead (LT₅₀) at 38.1 °C. Post-larvae nakea were more persistent with lethal temperature range between 39.0 and 39.3 °C and LT₅₀ at 39.3 °C.
- b. Sicydium stimpsoni (o'opu nopili). Lethal temperatures for adults ranged between 35.4 and 35.8 °C with LT₅₀ at 35.5 °C. Post-larvae were more resistant, with lethal temperature range between 36.2 and 36.5 °C and LT₅₀ at 36.4 °C.
- c. Poecilia mexicana (exotic topminnow or poeciliid fish). This species is not yet in Kaluanui but is discussed here to represent the poeciliid Xiphophorus helleri and other poeciliid fry present. Lethal temperatures for the adults were between 41.2 and 41.4 °C with LT₅₀ at 41.3 °C. No post-larvae were tested.
- d. Atya bisulcata (o'pae kala'ole). Lethal temperatures for adults ranged between 34.0 and 34.5 °C with LT₅₀ at 34.2 °C. As in the case of fishes, the post-larvae shrimps were more resistant with lethal temperature range between 34.9 and 36.1 °C. No LT₅₀ was recorded for the post-larvae.
- e. Neritina granosa (hihiwai). Lethal temperature range for adult hihiwai was between 38.4 and 40.1 °C with LT₅₀ at 38.8 °C. No post-larvae were tested. These results appear to be high, probably due to the difficulty of determining dead from dying snails.

2. Elevated Temperatures on Growth.

Awaous stamineus (o'opu nakea) post-larvae were tested for weight increase for 30-day periods in which water temperature was elevated to simulate natural heating both in rate and approximate peak (1400-1500 hrs) to temperatures above those in streams and then allowed to cool naturally until the following morning at which time heating would commence again. Results showed the trend of growth enhancement with increasing temperature up to 30 °C for apparent optimal growth. No tests were made on the four other animals discussed in the preceding section.

Elevated Temperatures on Macrobenthos

Detrimental effects of dewatering also extends to macroinvertebrates (e. g. insect larvae). While there is no study in Hawaiian situations, there is enough literature in U. S. mainland situations to provide a probable result in Hawaiian streams. The most serious result of reduction or total cessation of stream flow is on the numbers and diversity of the insect population. Ephemeroptera and Plecoptera are most affected by lowered water levels and are among the first to disappear (Norris, *et al.* 1974).

Lowered velocities decrease the mixing of oxygen with the air and the percent saturation can fluctuate widely. Lowered velocity also means that less oxygen (even in saturated conditions) passes by an organism in a unit of time. This is most detrimental to insects. Decreased velocity will promote siltation and this is also harmful to insects.

Ecological Quality Status

A completely natural Hawaiian stream is one that has not been changed detectably by human intervention, physically and biologically (Class AAA in Maciolek 1975, p. 14). No such stream exists today. What exists today are streams that show varying degrees of degradation. Timbol and Maciolek (1978) classified all perennial streams according to quality status. Kaluanui was given Class II, meaning it has moderate to high quality water or natural values. This class is recommended for controlled use to prevent excessive use. On Oahu, the best streams are in this class.

Kaluanui's natural values consists of a series of three falls, well vegetated stream channel and watershed. It has strong riffles and pools and clear water. The substrate is bouldery. Its biological qualities consists of 50% of total species being native and three of these natives are in the threatened lists.

A feature working against its continued high quality is the feeder road-foot trail that was built adjacent to the stream bed all the way up to the first falls. Already too many visitors travel the trail, a sure cause of erosion and added silt to the stream. Many visitors take vegetation (esp. ferns) out of the valley, a practice detrimental to the natural quality of the watershed.

Summary, Conclusions, and Recommendations

Summary

A. Inventory

1. There are 11 fishes, 7 insects, 3 crustaceans, 2 amphibians, 2 annelids, and 1 mollusk species in Kaluanui and its north tributary.
2. Fifty percent (or 13) of the total number of species are native to Hawaii. Ten of these 13 are endemic.
3. Eight of the 13 natives are diadromous animals and with possibly one exception, all are obligately so.
4. Two fish species (Awaous stamineus and Sicydium stimpsoni) and one mollusk species (Neritina granosa) are listed as threatened.

B. Distribution and Abundances

1. Three species are distributed throughout the mainstream. There are more species in the lower reaches than in the upper ones.
2. The three endemic animals classified as threatened are also found in low abundances and in limited areas.

C. Natural Features

1. Most of the stream channel and watershed area is in natural condition. The stream has the unique feature of having three falls, one of which is a tourist attraction.

Conclusions

1. In the event that the stream suffer elevated temperatures, death will occur in the following order: Atya bisulcata, Sicydium stimpsoni, Awaous stamineus, Neritina granosa, Poeciliids. Since under normal circumstances an animal will not stay beyond its "preferred" habitat, the animals will leave before lethal limits are reached.
2. Lowered flow velocities will cause the aquatic insect population a reduction in numbers of species and abundances.
3. Kaluanui Stream is of high ecological quality. Its grade II classification is well deserved. Sacred Falls adds to the stream's natural attractions.

Recommendations

1. The detrimental impact of dewatering on vertebrate and invertebrate populations can be minimized by controlling the removal of water to provide guaranteed minimal flows that are sufficient to maintain the integrity of the animal populations. It is essential to maintain adequate flows during

dry seasons when flows are normally lowest.

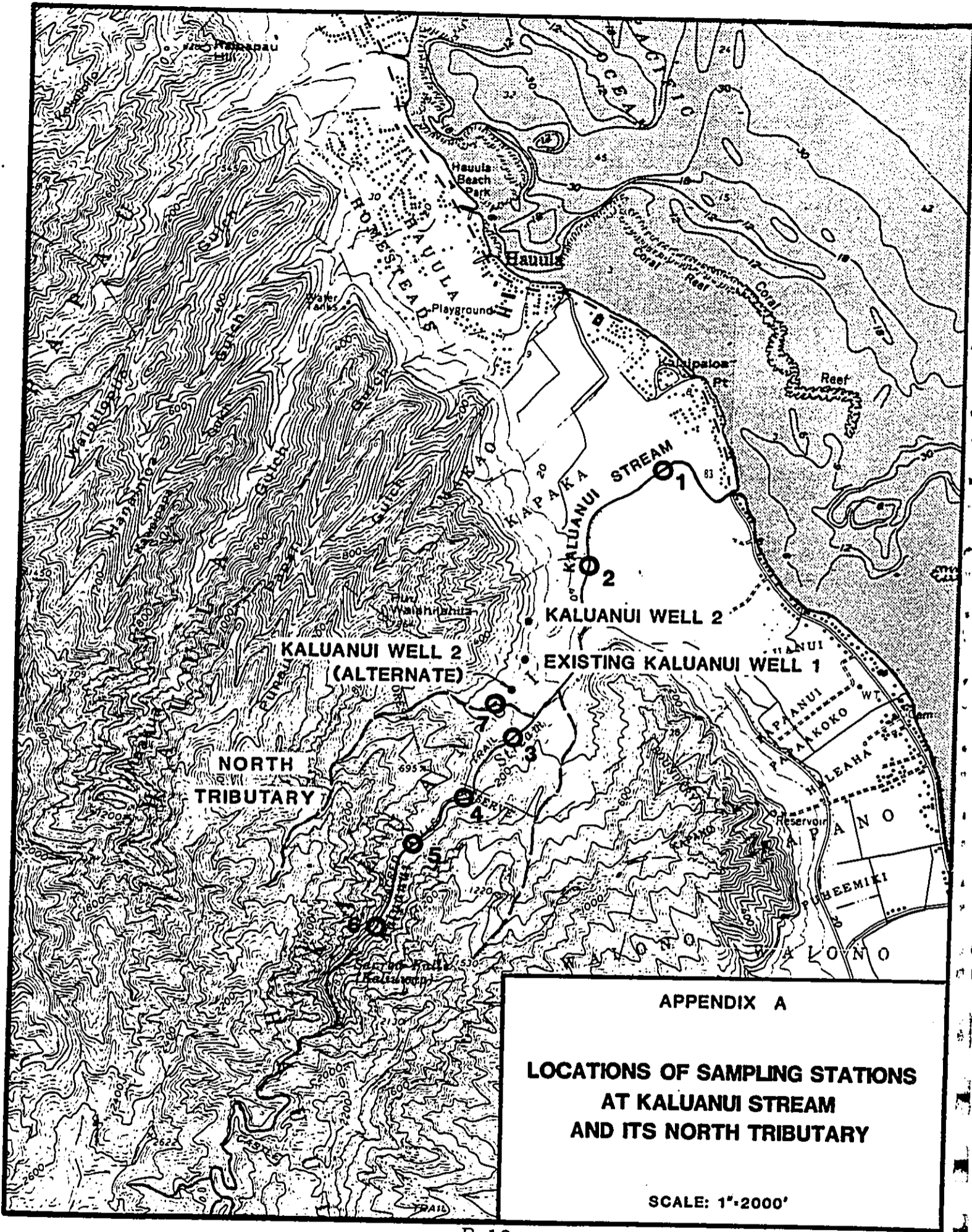
2. No additional feeder roads to the proposed well should be built. The use of the existing feeder road should be encouraged. This will minimize erosion, siltation and turbidity.

3. No riparian clearing between the existing feeder road and the lower reaches of the stream should be made. Removal of stream bank vegetation eliminates overhead cover, increases insolation (and elevated temperatures), and removes a source of regular organic input (leaves, etc.), an important item in the nutritional scheme of stream life. If it is at all possible, some suitable riparian (i. e. ornamental plants to make the development also aesthetically pleasing), should be planted between the present feeder road and the stream channel.

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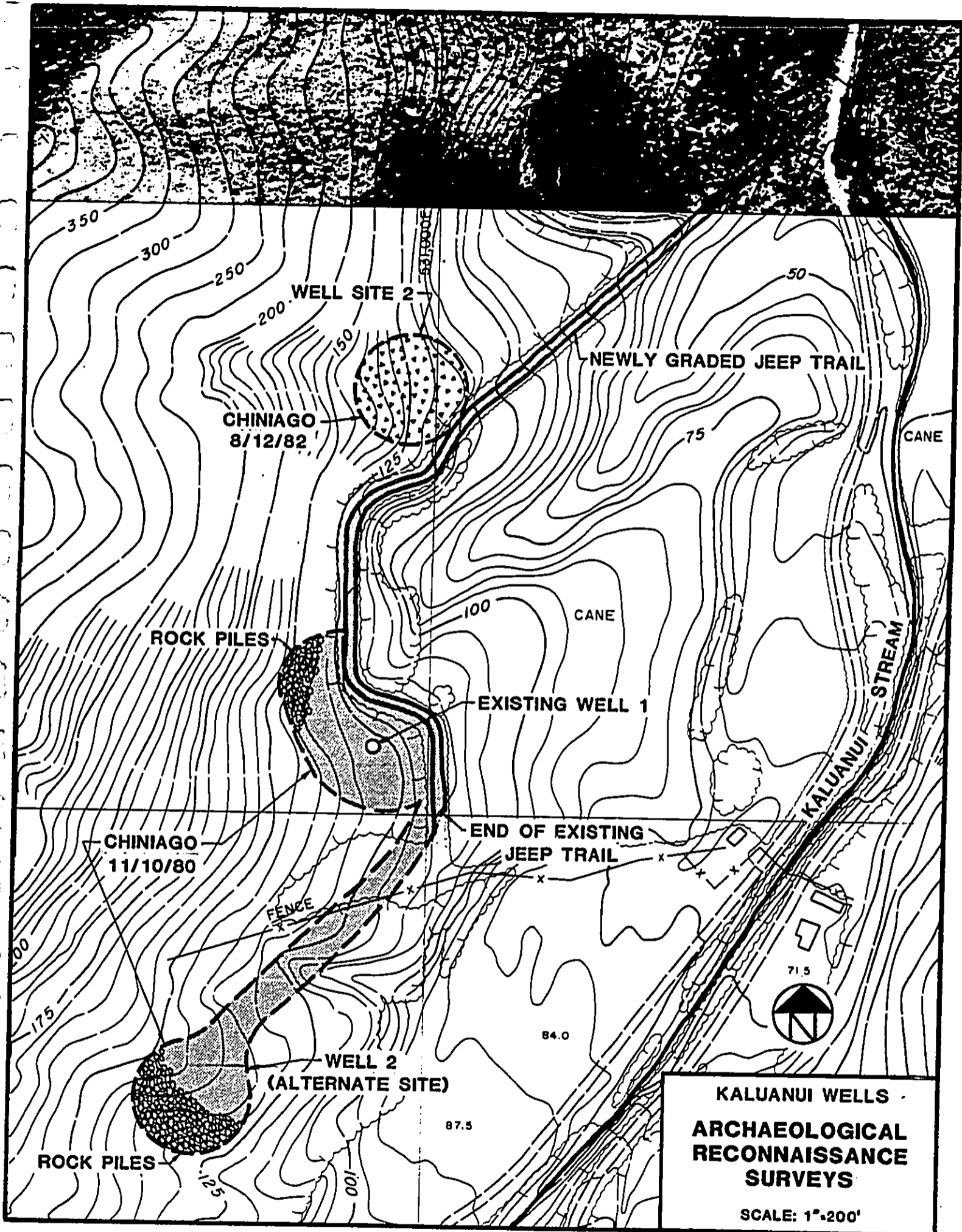


Some Physicochemical Features of Sampling Stations in Kaluanui Stream,
Oahu (March - May 1979).

| Station No., & Elevation | Feature | | |
|---------------------------------|--|---|----------------------------------|
| | Distance, from Stream, Mouth, Width, Depth | Water, Stream Flow | Stream Bed |
| 1. Kaluanui Stream, 3 m | distance = 0.2 km width = 1.8 m depth = 0.1 - 0.3 m | Water slightly tur- bid, riffle-pool, slow flow | Gravel - silt |
| 2. Kaluanui Stream, 6 m | distance = 1.1 km width = 3.4 m depth = 0.1 - 1.0 m | Clear water, riffle-pool, slow flow | Boulder - gravel with silt |
| 3. Kaluanui Stream, 25 m | distance = 2.1 km width = 3.7 m depth = 0.05 - 0.3 m | Clear water, riffle, fast flow | Boulder - gravel |
| 4. Kaluanui Stream, 60 m | distance = 2.6 km width = 5 m depth = 0.1 - 0.5 m | Clear water, riffle, fast flow | Boulder - gravel |
| 5. Kaluanui Stream, 110 m | distance = 3.1 km width = 2 m depth = 0.1 - 0.5 m | Clear water, riffle - pool, fast flow | Boulder - gravel |
| 6. Kaluanui Stream, 245 m | distance = 3.6 km width = 5 m depth = 0.1 - 0.3 m | Clear water, riffle - pool, fast flow | Boulder - gravel |
| 7. North Tributary, 25 m | distance = 2.2 km width = 2 m depth = 0.2 m | Clear water, temporary pool, not flowing | Boulder - gravel |

APPENDIX C

ARCHAEOLOGICAL RECONNAISSANCE SURVEYS



CHINIAGO INC.

Archaeological Consulting

76 N. KING STREET, ROOM 202 • HONOLULU, HAWAII 96817 • TELEPHONE: (808) 521-2785

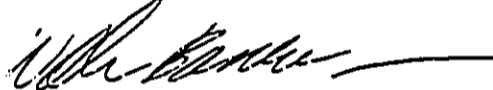
November 28, 1980

Mr. Fred Proby
VTN Pacific
1164 Bishop Street
Suite 906
Honolulu, Hawaii 96813

Dear Mr. Proby:

On November 10 we conducted an archaeological reconnaissance survey of two proposed well-sites at Kaluanui Valley, Oahu, each of which consisted of a 200-foot diameter circle [indicated on the enclosed map], plus a proposed roadway connecting them to the main valley access road. No definite archaeological or historical remains were found, but the presence of rock piles which may be of human origin requires that caution be exercised during construction. These remains, which are located at the northern edge of the easternmost well-site and on the western half of the westernmost well-site, should not represent any impediment to the project as there appears to be sufficient space available for the construction activities. We will be happy to show the Board of Water Supply people the locations of the areas which we recommend that they avoid.

Sincerely yours,



William Barrera, Jr.
President

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
P. O. BOX 821
HONOLULU, HAWAII 96809

5-1-10
SUSUMU ONO, CHAIRMAN
BOARD OF LAND & NATURAL RESOURCES
EDGAR A. HAMASU
DEPUTY TO THE CHAIRMAN

DIVISIONS:
CONSERVATION AND ENFORCEMENT
CONVEYANCES
FISH AND GAME
FORESTRY
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

JAN 12 1981

Mr. Larry Whang
Engineering Branch
Board of Water Supply
630 South Beretania Street
Honolulu, Hawaii 96843

Dear Mr. Whang:

SUBJECT: Evaluation of the archaeological report on the two
Board of Water Supply well sites and access road in
Kaluanui Valley, Koolauloa, Oahu. TMK: 5-3-11:por. 9

A review of the archaeological work carried out by William Barrera, Jr. for the Board of Water Supply well project at Kaluanui indicated that the work is not sufficient to evaluate the structural forms located during the archaeological survey. The report mentions the presence of several "rock piles" within the two well sites. From prior work in this vicinity, these piles appear cultural but of uncertain function and temporal period. For this phase of the archaeological survey, several recommendations for additional work in the well site areas are being made. These include:

- 1) A statement of the criteria for evaluating the features which involves criteria for cultural/non-cultural determinations and significance/non-significance.
- 2) A description of the rock piles with some indication of size, confirmation, and rock size and form.
- 3) A statement about the number of piles and their location. A more precise map would aid both the BWS planning and the State Park's archaeological program.
- 4) Photographs of the features would be a good means of recording the size and form of these rock piles and aid in the site evaluation. However, this need not be a requirement.

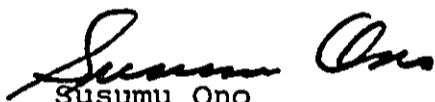
- 5) Consider the impact of the BWS project area on the adjacent archaeological site. There is a dryland agricultural complex located by Rosendahl during a 1973 survey that is near the southern well site.

There is agreement on Barrera's statement about exercising caution during construction. Because none of these rock piles have been tested, they are of uncertain value and significance. Consequently, it would be recommended that one of the piles be tested when the machinery is in the field and monitored by an archaeologist. The use of machinery will be required if the piles consist of huge boulders as noted elsewhere in Kaluanui. The BWS can determine if it is to their benefit to avoid these features or salvage them.

The planned trip with Barrera and the BWS engineers may alleviate some of the vagueness in the archaeological report. However, because there is a need to coordinate the BWS and State Park's archaeological programs, we are requesting a more detailed report. In this way, the cultural features in the BWS area can be incorporated into the larger Kaluanui archaeological complex.

Thank you for the opportunity to respond to this report.

Sincerely yours,



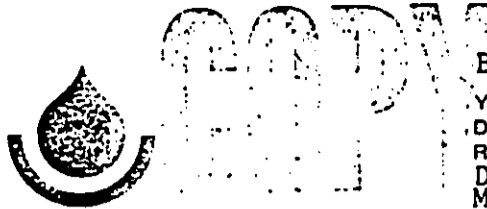
Susumu Ono
Chairman of the Board and
State Historic Preservation
Officer

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU

630 SOUTH BERETANIA

HONOLULU, HAWAII 96843



EILEEN ANDERSON, Mayor

YOSHIE H. FUJINAKA, Chairman

DAT QUON PANG, Vice Chairman

RYOKICHI HIGASHIONNA

Donna M. Howard

Michael J. Chun

ROBERT A. SOUZA

CLAUDE T. YAMAMOTO

January 30, 1981

KAZU HAYASHIDA
Manager and Chief Engineer

Mr. Susumu Ono
Chairman of the Board and State
Historic Preservation Officer
Board of Land and Natural Resources
State of Hawaii
P. O. Box 621
Honolulu, Hawaii 96809

Dear Mr. Ono:

Subject: Your Letter of January 12, 1981 on
the Evaluation of the Archaeological
Report on the Two Board of Water
Supply Well Sites and Access Road in
Kaluanui Valley, Koolauloa, Oahu
TMK: 5-3-11: por. 9

A field trip was made to the two well sites on Wednesday,
January 21, 1981, by the following persons:

1. State archaeologist, Martha Yent, Department of Land and Natural Resources
2. State archaeologist, Jason Ota, Department of Land and Natural Resources
3. Kaluanui Wells Environmental Impact Statement consultant, Fred Proby
4. Consultant's archaeologist, William Barrera, Jr.
5. Board of Water Supply engineers: Lawrence Whang, Francis Fung and Ernest Lau

After viewing and discussing the well sites with your staff, they informed us that William Barrera, Jr.'s archaeological report of the two well sites and access road was acceptable and no additional report is needed.

C-5



Mr. Susumu Ono

-2-

January 30, 1981

We have, however, selected the sites for the proposed well drilling, control building and appurtenances, and access road to avoid the rock piles.

Our project engineer for the Kaluanui Wells is Francis Fung who was present on the field trip. As project engineer, Francis Fung will coordinate any future construction and design to avoid the rock piles.

If you have any questions or require additional information, please call Lawrence Whang at 548-5221.

Very truly yours,

KAZU HAYASHIDA
Manager and Chief Engineer

cc: WTN Pacific

CHINIAGO INC.

Archaeological Consulting

1040-B SMITH STREET • HONOLULU, HAWAII 96817 • TELEPHONE: (808) 521-2785

August 16, 1982

Mr. Fred Proby
VTN Pacific
1164 Bishop Street
Suite 906
Honolulu, Hi. 96813

Dear Mr. Proby:

On August 12, 1982 I accompanied you, Mr. Larry Whang of the Department of Water Supply and Ms. Martha Yent of the Division of State Parks on an inspection of the proposed site of Kaluanui Exploratory Well #2 at Sacred Falls, Oahu. This letter is to confirm that nothing of archaeological or historical interest was located and that in our opinion the project may proceed as planned without fear of disturbing any such sites.

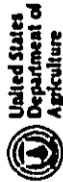
Sincerely yours



William Barrera, Jr.
President

APPENDIX D

COMMENTS ON THE EIS PREPARATION NOTICE AND EIS



Soil Conservation Service

P. O. Box 50006
Honolulu, Hawaii
96850



DEPARTMENT OF THE ARMY
U. S. ARMY ENGINEER DISTRICT, HONOLULU
BUILDING 230
FT. SHAFTER, HAWAII 96858

Fred Proby
VTN
1164 Bishop St., Suite 906
Honolulu, HI 96813

August 30, 1979

FOEDZ-FV

7 September 1979

Dear Fred:

Thank you for the opportunity to review the EIS Preparation Notices for the three proposed wells - Luluku Stream, Kaluannui Stream, and Waianae Kai.

D-1

I have no comment at this time but would appreciate an opportunity to review the EIS's when they are completed.

Sincerely,

Otis M. Gryde
OTIS M. GRYDE
District Conservationist

Mr. Fred Proby
Chief Environmental Scientist
VTN Engineers, Architects and Planners
1164 Bishop Street, Suite 906
Honolulu, Hawaii 96813

Dear Mr. Proby:

We have reviewed the Environmental Impact Statement Preparation Notice for the Luluku, Waianae and Kaluannui Water Wells that you forwarded to us on 22 August 1979. The water wells do not affect any US Army Corps of Engineers projects.

While details are not provided, the Luluku and Waianae wells appear to require the discharge of dredged or fill material into the respective streams for the construction of access roads and distribution lines. You have indicated that both of the streams have mean flows of two cubic feet per second. Thus, the discharge of dredged or fill material for any access road and pipeline crossings are authorized under nationwide permit provided the conditions in inclosure 1 are met. For further information, you are advised to contact the Operations Branch at 438-2264.

Specific comments concerning the content of the environmental impact statement are provided in inclosure 2. We appreciate the opportunity to participate in the review process.

Sincerely yours,

Kisuk Cheung
KISUK CHEUNG
Chief, Engineering Division

2 Incl
As stated



COMMENTS ON THE ENVIRONMENTAL IMPACT STATEMENT
PREPARATION NOTICE

1. When information is available, the environmental impact statement should provide the following information concerning the wells:
 - a. Amount of water withdrawn from the well;
 - b. Rate of pumping;
 - c. Rate of aquifer recharge;
 - d. Aquifer yield;
 - e. Salinity and water quality; and
 - f. Relationship of the water withdrawal to water development in the area.
2. In addition to developing more water sources to meet present and future demands, a program to conserve water and to reduce water consumption needs to be developed and implemented as part of regional land use planning and water development planning. Providing more water without efforts to conserve water may be a waste of the resources.
3. The preparation notice suggests that water withdrawal may affect stream flow. Efforts should be made to determine whether or not the stream flow is actually dependent upon seepage from the dike system being tapped by the water wells, and to establish and maintain in-stream flow standards or criteria.
4. Stream uses and aquatic flora and fauna need to be identified. Malunui Stream was identified as a unique stream to be preserved in the preparation notice. The stream is also the only stream on Oahu which harbors populations of *hihiwai* (*Heritina fransosa*). Water diversion from this stream may have a significant effect on the endemic snail. We suggest that the perennial flow of this stream be maintained.
5. The relationship of the project impacts (water diversion, reduction in stream flow) to State Coastal Zone Management and Water Quality Standard objectives should be addressed (maintenance of minimum stream flow, maintenance of water quality, water temperature, low dissolved oxygen content).
6. The environmental statement should address the probable effects on historic and archaeological resources.

CONDITIONS FOR NATION-WIDE PERMITS

1. The discharge will not be located in the proximity of a public water supply intake.
2. The discharge will not occur in areas of concentrated shellfish production.
3. The discharge will not destroy a threatened or endangered species as identified under the Endangered Species Act or endanger the critical habitat of such species.
4. The discharge will not disrupt the movement of those species of aquatic life indigenous to the waterbody.
5. The discharge will consist of suitable material free from toxic pollutants in other than trace quantities.
6. The fill created by the discharge will be properly maintained to prevent erosion and other non-point sources of pollution.
7. The discharge will not occur in a component of the National or State wild and scenic river system.

D
2

July 1

July 2

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU

COPY



United States Department of the Interior

FISH AND WILDLIFE SERVICE
300 ALA MOANA BOULEVARD
P.O. BOX 50157
HONOLULU, HAWAII 96810

IN REPLY REFER TO:
ES
Room 6307

September 25, 1979

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

Dear Sirs:

In accordance with the August 22, 1979 request by Mr. Fred Proby of VTN, the U. S. Fish and Wildlife Service has reviewed the EIS preparation notices for wells proposed for construction at Luluku Stream (Kaneohe), Kaluanui Stream (Hauula) and Wainae Kai (Kunaiipo Stream), Oahu. Each of the preparation notices indicates that pumping will affect stream base flows to an unknown degree. We are concerned that a reduction in existing stream flow could adversely impact aquatic organisms, especially population of native gobies and shrimp. This is particularly true for Kaluanui Stream which has thus far retained its high natural quality.

D
1
3

In view of the above, the project EIS's should thoroughly quantify the effects of project implementation on existing streamflows and aquatic organisms. In addition, project alternatives must be thoroughly explored from an environmental as well as budgetary standpoint.

We appreciate the opportunity to comment.

Sincerely yours,

Maurice H. Taylor

Maurice H. Taylor
Field Supervisor
Division of Ecological Services

cc: PIA
HDFC
WDFS
VTN (Attn: Mr. Fred Proby)



Save Energy and You Serve America!

October 3, 1979

Mr. Maurice H. Taylor
Field Supervisor
Fish and Wildlife Service
United States Department
of the Interior
300 Ala Moana Boulevard
Honolulu, Hawaii 96850

Dear Mr. Taylor:

Subject: Your Letter of September 25, 1979,
on The EIS Preparation Notices for
Luluku, Kaluanui, and Wainae Wells

Thank you for your comments.

The effects of our well projects on the aquatic organisms in the streams and existing stream flows will be addressed in the EIS.

A UEGS stream gaging station located above our proposed Kaluanui Well shows the upper reach of the stream to be perennial. This perennial flow is due to rainfall. However, where the stream passes our proposed well site, the flow is intermittent.

Should you have questions or require additional information, please call Lawrence Whang at 548-5221.

Very truly yours,

Fritz Kiyoshiki

KAZU HAYASHIDA
Manager and Chief Engineer

cc: VTN Pacific

GEORGE B. ANTONIO
SECRETARY



JOHN FARIAS, JR.
CHAIRMAN, BOARD OF AGRICULTURE
YUNOBI TAGAMA
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF AGRICULTURE
1425 SO. KING STREET
HONOLULU, HAWAII 96814

October 4, 1979

MEMORANDUM

To: Mr. Kazu Hayashida, Manager & Chief Engineer
Board of Water Supply, CSC of Honolulu

Subject: EIS Preparation Notice
Waianae Water Well - TMK: 8-5-06; Por. of Parcel 8
Kulanui Water Wells - TMK: 5-3-12; Por. of Parcel 41
Luluku Water Well - TMK: 4-5-41; Por. of Parcel 1

The Department of Agriculture has reviewed the preparation notice for each of the subject well projects.

1. The Waianae region is one of Oahu's significant agricultural production areas. Water needs for farming are barely being met so any impact upon agricultural water supplies should be addressed.
2. The Kahuku-Punaluu region is planned to be a major water exporting area in the future. The EIS should address how future water needs will be met if agricultural use in the area is intensified. Agricultural parks are planned for Kahuku, and Waihole Valley. Water needs for these specific projects have not been determined at this time.
3. The EIS for the Luluku Well should address the impact of the loss of 1/2 acre of land on the banana plantation.

The improvement of water supply systems at the subject sites will have long-term implications in regard to population growth and future land use. It is the Department's main concern that the respective EIS's prepared for the wells address the effects of the water source developments on agricultural water use, as well as urban and domestic requirements.

Thank you for the opportunity to comment.

John Farias, Jr.
JOHN FARIAS, JR.
Chairman, Board of Agriculture

cc: Fred Proby, Chief Environmental Scientist
VTN Engineers Architects Planners

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



FRANK F. FASI, Mayor
YOSHIE H. FUJIMAKA, Chairman
DAN OJON PANG, Vice Chairman
RYOICHI HIGASHIMOTO
TERESITA R. JOBINSKY
WALLACE E. MIYAHARA
ROBERT A. SOUZA
CLAUDE T. YAMAMOTO

November 26, 1979

KAZU HAYASHIDA
Manager and Chief Engineer

Mr. John Farias, Jr.
Chairman, Board of Agriculture
State of Hawaii
1428 South King Street
Honolulu, Hawaii 96814

Dear Mr. Farias:

Subject: Your Letter of October 4, 1979,
Commenting on the EIS Preparation
Notices for Our Proposed Waianae,
Kulanui, and Luluku Wells

1. The average daily consumption in calendar year 1978 for Makaha-Waianae was 3.8 mgd and for Maile-Nanakuli, it was 2.8 mgd, or over 6.5 mgd per day for the combined areas. Our sources in the Makaha to Nanakuli area produced about 2.5 mgd in 1978, and the balance was imported from the Pearl Harbor water district. Since we have reached the limit of groundwater development in the Pearl Harbor Basin, there is an urgent need to develop the remaining groundwater supply in the Makaha-Waianae area for whatever future development that occurs in that area.

Our policy is to serve water whenever possible to meet the total community needs of the area, which include those of agriculture. However, we believe that development and use of marginal quality water by agriculture (chlorides ranging about 500 mg/l or higher) would be to the best interests of both of our departments. Department of Land and Natural Resources is already drilling a well in Waianae Valley at the 400-foot elevation to meet agricultural needs and, if feasible, we will propose that the system be integrated with ours to service both the agricultural and domestic requirements of that area.

Pure Water... man's greatest need - use it wisely

COPY



GEORGE S. ARIYOSHI
GOVERNOR OF HAWAII



DIVISIONS:
CONSERVATION
GROW AND CARE
- FORESTRY
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF STATE PARKS
P. O. BOX 631
HONOLULU, HAWAII 96808
November 26, 1979

Mr. John Farias, Jr.
Page 2
November 26, 1979

2. Your report titled "Final Environmental Impact Statement for an Agricultural Park on Oahu at Pohakea in Kunia," December 1973 and March 1975, discusses the Kahuku and other alternative sites but does not include Waiahole Valley. We will address the agricultural water needs in Waiahole Valley when we receive data on the extent of your Waiahole Valley Agricultural Park and its water needs.

The estimated long-term recharge for the Kahuku area is 12 mgd. Existing water demand is 1 mgd for domestic use and 6 mgd for agricultural use. If 9 to 10 mgd is the sustainable figure based on an 80 to 85 percent recovery factor, then approximately 2 to 3 mgd may be additionally developed. Our Opana well development is planned for 2-1.5 mgd wells. As noted in our Kahuku Water Development EIS, "the project scope may need to be evaluated." We foresee no problem in meeting both agricultural and urban water demands in this area, as long as both activities are planned on a coordinated basis.

3. We will address the impact of the loss of 1/2-acre of land on the banana plantation in our EIS for the Luluku Well.

Should you have questions or require additional information, please call Lawrence Whang at 548-5221.

Very truly yours,

KAZU HAYASHIDA
Manager and Chief Engineer

cc: VTN Engineers

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

Gentlemen:

SUBJECT: EIS Preparation Notice Statements for
Three Water Board Projects
Maianae Water Well THK 8-5-06:8 por
Kaluanui Water Well THK 5-3-12:41 por
Luluku Water Well THK 4-5-41:1 por

Recently we received from Mr. Fred Proby of VTN Pacific, the EIS Preparation Notice for the above named projects with his request that we address any concerns regarding these projects to you directly which are as follows:

Maianae Water Well

On August 6, 1979, contract archaeologists from the Board of Land and Natural Resources conducted a reconnaissance of the road and test well impact area and noted several archaeological features. On August 24, 1979, they made a monitoring trip to the work area and discussed their recommendations with the roadway construction crew. The archaeological features were pointed out in the field and the need for caution and preservation was stressed. Therefore, because it is known there are archaeological features in the area, we recommend that close coordination with an archaeological contractor is advised for this project.

Kaluanui Water Well - Hauula

It is our recommendation that an archaeological reconnaissance be conducted within the area of impact as it now extends outside the area planted in sugar cane into the slopes of the hillside (pg. 3 and 9) where there is a higher probability that archaeological resources may still exist.

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

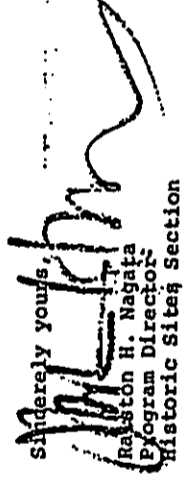
FRANK F. FASI, Mayor
SHIE H. FUJIMAKA, Chairman
T. QUON PANG, Vice Chairman
TOKIHI HIGASHIONINA
ERESITA R. JUBINSKY
ALLACE S. MIYAHARA
ROBERT A. SOUZA
LAUOE T. YAMAMOTO



Board of Water Supply -2- November 26, 1979

Luluku Water Well - Kaneohe

Since the impact area for this well has previously been planted in bananas, it is unlikely that any archaeological features still remain. Therefore, we have no reservations for the project to proceed.

Sincerely yours,

Ralston H. Nagata
Program Director
Historic Sites Section

cc: Mr. Fred Proby
VTN Pacific
1164 Bishop Street
Suite 906
Honolulu, HI 96813

D - 6

December 7, 1979

KAZU HAYASHIDA
Manager and Chief Engineer

Mr. Susumu Ono
Chairman of the Board
Department of Land and
Natural Resources
State of Hawaii
P. O. Box 621
Honolulu, Hawaii 96809

Attention: Mr. Ralston H. Nagata

Dear Mr. Ono:

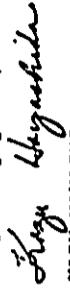
Subject: Mr. Ralston Nagata's Letter of
November 26, 1979 on EIS
Preparation Notices for Luluku
Well, Kaluanui Well, and Waianae
Well

Thank you for your comments on our proposed well projects.

Archaeological surveys will be made at the proposed Waianae and Kaluanui Well sites. Pertinent information gained from the surveys will be incorporated into the appropriate environmental impact statement. All significant archaeological sites will be staked-out before construction and will be avoided in our design of the facilities.

Should you have questions or require additional information, please call Lawrence Whang at 548-5221.

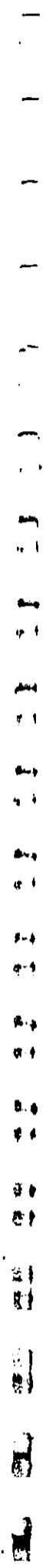
Very truly yours,



KAZU HAYASHIDA
Manager and Chief Engineer

cc: VTN Pacific

Pure Water... man's greatest need - use it wisely



DIVISIONS:
CONSERVATION
FISH AND GAME
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF WATER AND LAND DEVELOPMENT
P. O. BOX 272
HONOLULU, HAWAII 96843

September 11, 1978

GEORGE R. ARYOHKI
GOVERNOR OF HAWAII

DIVISIONS:
CONSERVATION
FISH AND GAME
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FISH AND GAME
1167 KUMUHONUA STREET
HONOLULU, HAWAII 96813

August 31, 1979

GEORGE R. ARYOHKI
GOVERNOR OF HAWAII

Mr. Kazu Hayashida
Manager & Chief Engineer
Board of Water Supply
City & County of Honolulu
630 S. Beretania Street
Honolulu, Hawaii 96843

Dear Kazu:

EIS Preparation Notices

With reference to receipt of copies of EIS Preparation Notices for proposed water wells at Lulukū Stream in Kaneohe, Kalaanui Stream in Hauula, and Waiānae, our Division wishes to be a consulted party in the preparation of the EIS's.

We will be interested in any impact these well projects might have on the Department's proposed Kahuku agricultural park, Waiānae agricultural park and on any downstream water uses.

Very truly yours

Bob

ROBERT T. CHUCK
Manager-Chief Engineer

DL: dh



Mr. Kazu Hayashida
Manager and Chief Engineer
Board of Water Supply
City and County of Honolulu
630 South Beretania Street
Honolulu, Hawaii 96843

Dear Kazu:

Thank you for the opportunity to review EIS Preparation Notices for proposed water wells at Lulukū Stream, Kalaanui Stream and Waiānae Kai (copies were transmitted to us by your consultant, VTN Pacific, with a letter dated August 22, 1979).

We do not presently have any comments to offer, but we do look forward to reviewing the forthcoming Environmental Impact Statements.

Sincerely yours,

Kenji Ego

KENJI EGO, Director
Division of Fish and Game

KE:RNY:cm

cc: VTN Pacific

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU

 **COPY**

LETTER TO DIRECTOR
9-21-79, a



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
KAHAIKUA CAMPUS (H1E1)
HONOLULU, HAWAII

September 21, 1979

September 14, 1979

STP 8-5683

HONOLULU, HAWAII 96813

REPLY TO: STANLEY
JACK K. SUBA
JANIS M. CARUS
PO BOX 5, HONOLULU

61814714111110

Mr. Robert T. Chuck
Manager-Chief Engineer
Division of Water and
Land Development
Department of Land and
Natural Resources
State of Hawaii
P. O. Box 373
Honolulu, Hawaii 96809


Dear Mr. ^{back}Chuck:

Subject: Your Letter of September 11, 1979
Responding to the EIS Preparation
Notices for Luluku, Kaluanui, and
Maianae Water Wells

Thank you for your comments. We have added your
department to our consulted parties list for the proposed
Luluku, Kaluanui, and Maianae water wells.

Should you have questions or require additional
information, please call Lawrence Whang at 548-5221.

Very truly yours,


KAZU HIGASHIO
Manager and Chief Engineer

cc: VTN Pacific

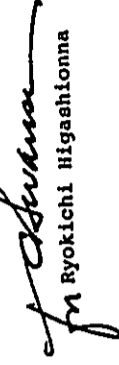
Mr. Fred Proby
Chief Environmental Scientist
VTN Pacific
1164 Bishop Street, Suite 906
Honolulu, Hawaii 96813

Dear Mr. Proby:

Subject: EIS Preparation Notices for
Water Wells at Luluku Stream,
Kaluanui Stream, and Maianae Kai

Thank you very much for giving us the opportunity to
review and comment on the above-captioned EIS preparation
notices. We have no substantive comments to offer which
could improve the documents.

Very truly yours,


Ryokichi Higashionna

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100



University of Hawaii at Manoa

Environmental Center
Crawford 317 • 2550 Campus Road
Honolulu, Hawaii 96822
Telephone (808) 948-7381

Office of the Director

Mr. Fred Proby
Chief Environmental Scientist
VTN Pacific
Suite 906
1164 Bishop Street
Honolulu, Hawaii 96813

Dear Mr. Proby:

Environmental Impact Statement Preparation Notices

1. Luluku Stream, Kaneohe
2. Kaluanui Stream, Hauula
3. Maianae Kai, Maianae

The Environmental Center has received the above cited Preparation Notices from VTN. In all attempt to improve our evaluation procedures, we are now directing our attention, when appropriate, to those areas within the preparation notices that would benefit from closer analysis.

The following are some concerns regarding the proposed well projects:

1. Luluku Well

The preparation Notice indicates that use of the proposed production well will probably result in a significant decrease in the flow of Luluku Stream. The EIS should address the ecological and esthetic consequences of the decrease.

2. Kaluanui Well

The preparation notice indicates that the use of the proposed production well will probably result in a significant decrease in the groundwater contribution to the lower part of Kaluanui Stream. It suggests that the effect will be estimated from a 5-day running test. The results of the earlier use of Kahuku Plantation wells may be of greater significance to the estimation then the results of a test of such short duration. The EIS should address any ecological and esthetic consequences of the decrease in stream flow.

AN EQUAL OPPORTUNITY EMPLOYER

Mr. Fred Proby

3. Maianae Well

The preparation notice indicates that the use of the proposed production well will probably result in a significant decrease in the flow of Kamaipo Stream. The EIS should address any ecological and esthetic effects of this decrease.

August 30, 1979

PN:0003

-2-

August 30, 1979

Yours very truly,

Doak C. Cox

Doak C. Cox
Director

DCC/dh

cc: Barbara Vogt

RECEIVED
BD OF WATER SUPPLY
OCT 10 2 30 PM '79

UNIVERSITY OF HAWAII

Water Resources Research Center

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



GEORGE S. MORIGUCHI
CHIEF PLANNING OFFICER

DGP8/79-2810 (CT)

FRANK P. PARI
DIRECTOR

2 October 1979

Mr. Kazuyoshi Hayashida
Manager and Chief Engineer
Board of Water Supply
City and County of Honolulu
630 S. Beretania St.
Honolulu, Hawaii 96843

Dear Mr. Hayashida:

Subject: EIS Preparation Notices for proposed water wells located at Luluku Stream (Kaneohe), Kaluanui Stream (Hauula), and Waianae Kai

We have reviewed the subject EIS and have no immediate comments. We, too, feel that the proper time for detailed EIS will come when the exploratory phases have been completed.

Sincerely,
Paul C. Ekern
Paul C. Ekern
WRRC EIS Coordinator

PCE:jao
cc: F. Peterson
Enclosure

September 12, 1979

MEMORANDUM

TO : MR. KAZU HAYASHIDA, MANAGER AND CHIEF ENGINEER
BOARD OF WATER SUPPLY

FROM : GEORGE S. MORIGUCHI, CHIEF PLANNING OFFICER

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICES FOR PROPOSED WELLS AT KALUANUI, WAIANA'E AND LULUKU
COMMENTS REQUESTED AUGUST 22, 1979

The environmental impact statements for these should discuss the impacts on agricultural and other present uses which might be affected by reductions in stream flow. The preparation notice for the Kaluanui wells indicates that "the coastal plain below the site still supports various agricultural land uses" but does not indicate whether any of these use water from the stream.

Thank you for affording us the opportunity of reviewing the preparation notices.

George S. Moriguchi
GEORGE S. MORIGUCHI
Chief Planning Officer

GSM:fat
cc: VTI Pacific

AN EQUAL OPPORTUNITY EMPLOYER
2510 Dole Street - Honolulu, Hawaii 96822

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU

COPY

DEPARTMENT OF LAND UTILIZATION
CITY AND COUNTY OF HONOLULU
850 SOUTH KING STREET
HONOLULU, HAWAII 96813 • (808) 523-4011



FRANK L. KUSAO
DIRECTOR

TYRONE T. KUSAO
DIRECTOR

September 18, 1979

LU8/79-3499 (SE)
79/EC-4,5,68

September 11, 1979

TO : MR. GEORGE S. MORIGUCHI
CHIEF PLANNING OFFICER
DEPARTMENT OF GENERAL PLANNING

FROM : KAZU HAYASHIDA
BOARD OF WATER SUPPLY

SUBJECT: YOUR LETTER OF SEPTEMBER 12, 1979, COMMENTING ON
THE EIS PREPARATION NOTICES FOR PROPOSED WELLS
AT KALUANUI, WAIANAE, AND LULUKU

D-11
Thank you for your comments on our EIS preparation notices.

We will include any impacts on agriculture and on other uses which may be caused by any reduction in stream flow in the environmental impact statement for the proposed wells.

Should you have questions or require additional information, please call Lawrence Whang at 548-5221.

KAZU HAYASHIDA
Manager and Chief Engineer

cc: VTH Pacific

MEMORANDUM

TO : KAZU HAYASHIDA, MANAGER & CHIEF ENGINEER
BOARD OF WATER SUPPLY

FROM : TYRONE T. KUSAO, DIRECTOR

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICES
FOR THE WAIANAE WATER WELL, LULUKU WATER WELL,
(KANEONE), AND KALUANUI WATER WELL (HAUULA)

The EIS Preparation Notices for the above proposed wells have been reviewed. We hope you will include a discussion of regional demand, specific geological resource units and ranges of sustainable yields of those units, and potential export of water resources outside of resource areas, as part of the Draft EIS for each project.

We may have more specific comments to make during the consultation and formal review period.

Should you have any questions on the above comments, please contact Scott Ezer of our staff at 523-4077.

TYRONE T. KUSAO
Director of Land Utilization

TTK:ey
cc: VTN, Attn. Fred Proby

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

COPY

FRANK F. FASI, Mayor
YOSHIE H. FUJIMAKA, Chairman
DAY CLOON PANG, Vice Chairman
RYOKICHI HIGASHIONNA
TERESITA R. JUBINSKY
WALLACE R. MIYAHIRA
ROBERT A. SOUZA
CLAUDE T. YAMAMOTO

September 14, 1979

TO : MR. WALLACE MIYAHIRA
DIRECTOR AND CHIEF ENGINEER
DEPARTMENT OF PUBLIC WORKS

FROM : KAZU HAYASHIDA
BOARD OF WATER SUPPLY

SUBJECT: YOUR MEMORANDUM OF AUGUST 28, 1979, ON
EIS PREPARATION NOTICE FOR KALUANUI, LULUKU,
AND WAIANAE WATER WELLS

KAZU HAYASHIDA
Manager and Chief Engineer

Thank you for your comments on our well projects.

In regards to the siting of the proposed sewage treatment plant on the property just makai of our proposed well, we do not anticipate any conflicts. However, we will not permit the construction of any deep injection wells for effluent disposal in the "pass zone."

Should you have questions or require additional information, please call Lawrence Whang at 548-5221.

Lawrence Whang

KAZU HAYASHIDA
Manager and Chief Engineer

cc: VTN Pacific

DEPARTMENT OF TRANSPORTATION SERVICES
CITY AND COUNTY OF HONOLULU
HONOLULU MUNICIPAL BUILDING
650 SOUTH KING STREET
HONOLULU, HAWAII 96813



FRANK F. FASI
Mayor

September 12, 1979

MEMORANDUM

TO : KAZU HAYASHIDA, MANAGER AND CHIEF ENGINEER
BOARD OF WATER SUPPLY

FROM : ROBERT R. WAY, DIRECTOR

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE
FOR THE KALUANUI WATER WELLS
HAUULA, OAHU, HAWAII

We have no comments on the Environmental Impact Statement Preparation Notice.

Robert R. Way
ROBERT R. WAY
Director

cc: VTN Pacific

RECEIVED
 BOARD OF WATER SUPPLY
 SEP 12 11 00 AM '79
 ASST. 48-064
 R/E

79-3723

LIFE OF THE LAND
 A GROUP FOR ENVIRONMENTAL RESEARCH AND ACTION
 September 6, 1979

greater emphasis to the conservation alternative mentioned above.

Another alternative is the bulkheading of existing high level tunnels which would increase available supplies during high demand periods.

cc: Department of Agriculture
 Division of Water and Land Development
 Punaluu Community Association
 Neighborhood Board #28
 Board of Water Supply

To: OEQC
 From: Life of the Land
 Subject: EIS Preparation Notice for Kaluanui Water Wells

B. Need for the Project: the fact that present maximum capacity of the system has fallen below the present maximum day demand is attributed to the Waihee Wells Circuit Court injunction. Why not attribute the short fall to the lower than expected yield from the Kahana Wells? Or the refusal of the BLNR to release 4 mgd of Waiahole Ditch Waters to the BMS for windward water supply? Or at least a combination of those factors? If there is a need for this project, understanding why there is such a need is important for future best management and planning of our water systems.

IV Summary of the Impacts and Mitigation Measures
 B. Growth and Land Use Impacts

If the proposed wells are completed, where will water for agriculturally zoned land in the area come from? Since some of this water would be used to serve future urban demands, what makes possible or probable future urban demands take priority over this water source and those waters which reach Kaluanui Stream?

There are very few streams left on Oahu with anything approaching natural quality. Thus, the nomination of Kaluanui Stream for preservation status is all the more significant, and this significance is underlined by its presence in an agricultural area and the Sacred Falls State Park.

V Alternatives

No mention is made of conservation. The report of the State Water Commission states: "Appliances and fixtures now available can reduce total water use in the average household by as much as 35%, and savings for commercial establishments can be as high as 50%." "If per capita water consumption could be reduced by 25% under 1975 levels, most existing domestic water systems would be adequate with minor additions through the year 2000."

On page 1, the EIS Preparation Notice talks of scheduled BMS construction of wells in the Windward District by the year 2020. But the Manager and Chief Engineer of the BMS at a BLNR hearing on August 23, 1979 stated groundwater sources on Oahu may be at their maximum development and use as early as 1990. This adds

Ph

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

FRANK F. FASI, Mayor
YOSHIE H. FUJIMAKI, Chairman
DAY QUN FANG, Vice Chairman
RYOKICHI HIGASHIYAMA
TERESITA R. JOBINSKY
WALLACE E. MIYANISHI
ROBERT A. SOUZA
CLAUDIO T. YAMAMOTO

September 28, 1979

Life of the Land
404 Piikoi Street
Honolulu, Hawaii 96814

Gentlemen:

Subject: Your Letter of September 6, 1979
on the EIS Preparation Notice
for Kaluanui Water Wells

We submit the following comments to your questions:

"The fact that present maximum capacity of the system has fallen below the present maximum day demand is attributed to the Wahee Wells Circuit Court injunction. Why not attribute the short fall to the lower than expected yield from the Kahana Wells? Or the refusal of the DLNR to release 4 mgd of Waiahole Ditch Waters to the BMS for windward water supply? Or at least a combination of those factors?"

We do not deny that all factors, as stated, are true. However, we must re-emphasize that the Circuit Court injunction was the major factor contributing to the lowering of the sustainable capacity below the average day demand. This injunction prompted the request for the Waiahole Ditch Water.

DLNR denied our request and recommended total development of the Windward sources before considering the Waiahole Ditch Water. The preliminary work in progress for Kaluanui Wells is part of this program.

We do intend to develop more water from Kahana Valley and will pursue the release of 4.0 mgd of Waiahole Ditch water when necessary and when we can exchange the water for an alternative source such as sewage effluent.

D-1-5

Pure Water...men's greatest need - use it wisely

Life of the Land

-2-

September 28, 1979

2. "If the proposed wells are completed, where will water for agriculturally zoned land in the area come from? Since some of this water would be used to serve future urban demands, what makes possible or probable future urban demands take priority over this water source and those waters which reach Kaluanui Stream?"

At the present time, private wells are being used for agriculture.

The location of the well field should not significantly affect Kaluanui Stream. A USGS gage located above the proposed well field shows that perennial flow is due to high rainfall.

Where the stream passes the well field, flow is intermittent because perennial flow is lost to the alluvium during periods of low flow.

"No mention is made of conservation. The report of the State Water Commission states: 'Appliances and fixtures now available can reduce total water use in the average household by as much as 35%, and savings for commercial establishments can be reduced by as 50%.' 'If per capita water consumption could be reduced by 25% under 1975 levels, most existing domestic water systems would be adequate with minor additions through the year 2000.'"

Conservation is an ongoing program and is emphasized daily by the Board. Our most recent effort is the addendum to the Plumbing Code (Ordinance No. 79-27). As a result of this ordinance, all new plumbing installations from November 9, 1979 on are required to use either a flow restrictor, limited discharge tank-type water closet, or a recirculating system for cooling equipment.

"Another alternative is the bulkheading of existing high level tunnels which would increase available supplies during high demand periods."

Life of the Land

-3-

September 28, 1979



Some of our tunnels have been bulkheaded and investigation is now in progress to determine if other tunnels can be bulkheaded. However, this alternative would not benefit this area because there are no existing high level tunnels in the district.

Should you have questions or require further information, please call Lawrence Whang at 548-5221.

Very truly yours,

KAZU HAYASHIDA
Manager and Chief Engineer

D-16

cc: Dept. of Agriculture
Dept. of Land and Natural Resources
Punaluu Community Association
Neighborhood Board #28
VTN Pacific



United States
Department of
Agriculture

Soil
Conservation
Service

P.O. Box 50004
Honolulu, Hawaii
96850



DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 18TH AIR BASE WING (PACAF)
HICKAM AIR FORCE BASE, HAWAII 96813

March 1, 1984

Ms. Letitia N. Uyehara
Interim Director
Office of Environmental Quality Control
550 Halekauiila Street, Room 301
Honolulu, Hawaii 96813

RECEIVED
MAR 2 1984

VTN PACIRC

REPLY TO
ATTN OF: DEEV (Mr Yamada, 449-1831)

15 FEB 1984

SUBJECT: Environmental Impact Statement for the Kaluanui Wells

TO: Ms Letitia N. Uyehara, Interim Director
Office of Environmental Quality Control
550 Halekauiila Street, Room 301
Honolulu, HI 96813

Dear Ms. Uyehara:

Subject: EIS for Kaluanui Wells, Koolauloa, Oahu

We have reviewed subject document and have no comments to make.

Thank you for the opportunity to review the EIS.

Sincerely,

D-17

Francis C. H. Luu
FRANCIS C.H. LUU
State Conservationist

cc: Board of Water Supply
City and County of Honolulu
630 South Beretania Street
Honolulu, HI 96843

VTN Pacific
1164 Bishop St., Suite 906
Honolulu, Hawaii 96813

1. This office has reviewed the subject EIS and has no comment relative to the proposed project.

2. We greatly appreciate your cooperative efforts in keeping the Air Force apprised of your project and thank you for the opportunity to review the document. The EIS is returned for your file.

Robert M. Okazaki

ROBERT M. OKAZAKI
Chief, Engrg & Envtl Plng Div
Directorate of Civil Engineering

1 Atch
EIS

cc: Board of Water Supply
City and County of Honolulu
630 South Beretania Street
Honolulu, HI 96843

VTN Pacific
1164 Bishop Street, Suite 906
Honolulu, HI 96813

RECEIVED

FEB 16 1984

VTN PACIRC

The Soil Conservation Service
is an agency of the
Department of Agriculture



MAVRO
ATTENTION

DEPARTMENT OF THE ARMY
PACIFIC OCEAN DIVISION, CORPS OF ENGINEERS
FT. SHAFTER, HAWAII 96818

March 6, 1984

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NO. OF PAGES: 1
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RECEIVED
MAR 20 1984

Mr. Kasu Hayashida, Director
Board of Water Supply
City and County of Honolulu
630 South Beretania Street
Honolulu, Hawaii 96843

WM PACIFIC

Dear Mr. Hayashida:

Thank you for the opportunity to review and comment on the Environmental Impact Statement for Kaluanui Wells. The following comments are offered:

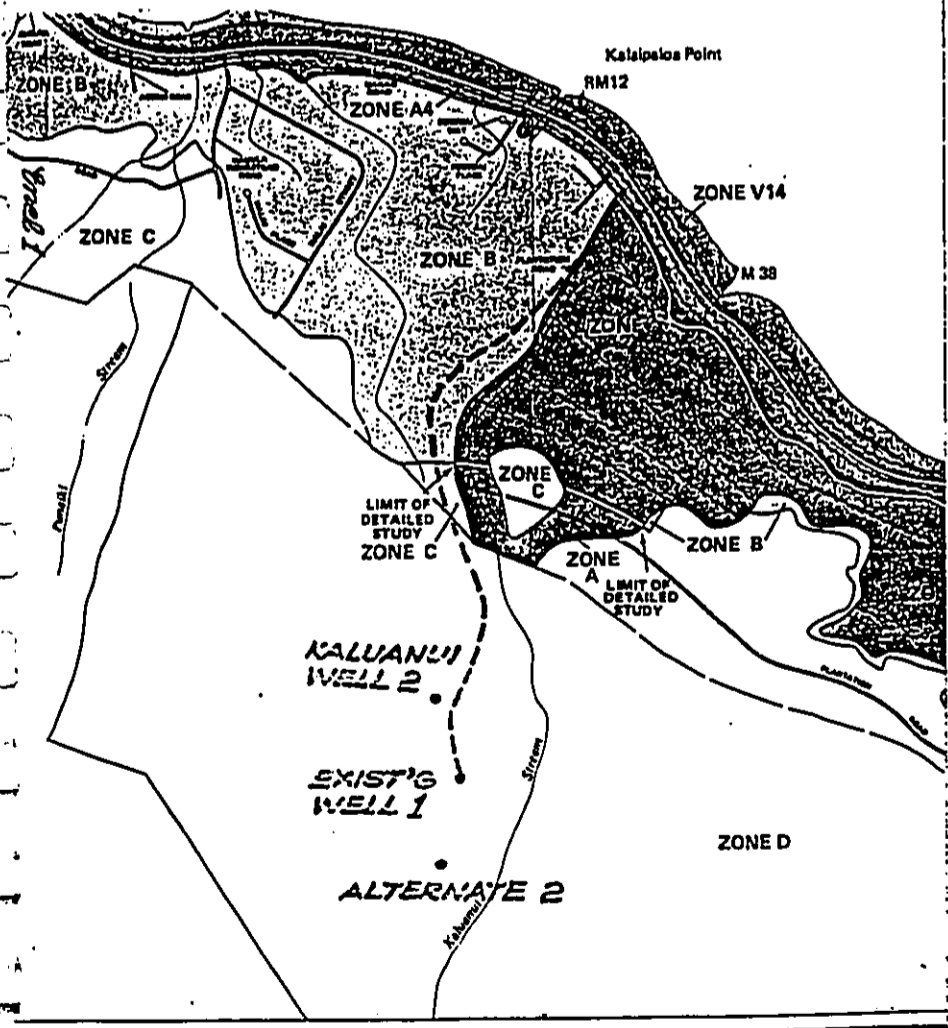
- a. A Department of the Army permit is not required.
- b. According to the flood hazard map for the Hawaii area prepared by the Federal Insurance Administration as part of the Flood Insurance Study for Oahu, (Enclosure), the well sites and a portion of the alignment for water and electrical utilities are situated in Zone D, or area of undetermined but possible flood hazards. A portion of the alignment is also designated Zone C, or area of minimal flooding; and Zone B, or areas of the 100-year flood of depths less than 1 foot.
- c. A portion of the alignment is situated in the Kaluanui Stream 100-year riverine floodplain of Zone A2 designation; and is also subject to tsunami flood hazards of Zones A4 and V14 designations. Under the requirements of the National Flood Insurance Program, all public utilities and facilities should be located and constructed to minimize or eliminate flood damage and the infiltration of flood waters into the systems.

Sincerely,

Kasut Cheung
Chief, Engineering Division

Enclosure

D-18



NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

CITY AND COUNTY OF
HONOLULU, HAWAII

PANEL 15 OF 135
(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
150001 0015 A

EFFECTIVE DATE:
SEPTEMBER 3, 1980

U.S. DEPARTMENT OF HOUSING
AND URBAN DEVELOPMENT
FEDERAL INSURANCE ADMINISTRATION

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU

COPY



United States Department of the Interior

FISH AND WILDLIFE SERVICE
100 ALA MOANA BOULEVARD
P. O. BOX 50127
HONOLULU, HAWAII 96850

IN REPLY, REFER TO:

ES
Room 6307

FEB 13 1984

RECEIVED

FEB 14 1984

VTN PACIFIC

RECEIVED

MAR 20 1984

VTN PACIFIC

March 14, 1984

Mr. Kisuik Cheung
Chief, Engineering Division
Corps of Engineers
Pacific Ocean Division
Department of the Army
Fort Shafter, Hawaii 96858

Dear Mr. Cheung:

Subject: Your Letter of March 6, 1984 on the Draft
Environmental Impact Statement for Kaluanui Wells,
Koolauloa, Oahu.

Thank you for reviewing and commenting on the draft
environmental document for our proposed water development
project. Your letter will be appended to the revised
environmental impact statement (REIS).

In response to your comments, we will note in the REIS that a
Department of the Army permit is not required and that the
project will be sited in various flood hazard zones.

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

Very truly yours,

K. H. HAVASHIDA
KAZU HAVASHIDA
Manager and Chief Engineer

cc: VTN Pacific, Inc.

Ms. Letitia M. Uyehara
Interim Director
Office of Environmental
Quality Control
550 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

Re: EIS for the Kaluanui
Wells, Koolauloa, Oahu,
Hawaii

Dear Ms. Uyehara:

The Service has reviewed the subject Environmental Impact
Statement (EIS) which we received with your letter of February 6,
1984. The EIS adequately discusses fish and wildlife resources
and resource issues within our jurisdiction. We appreciate this
opportunity to comment.

Sincerely yours,

Ernest Kosaka
Ernest Kosaka
Project Leader
Office of Environmental Services

cc: Board of Water Supply
VTN Pacific
NMFS - WPP0
HDF&W
HDAR
EPA, San Francisco



Save Energy and You Serve America!



United States Department of the Interior

GEOLOGICAL SURVEY
Water Resources Division
P.O. Box 50166
Honolulu, Hawaii 96850

March 8, 1984

RECEIVED
MAR 9 1984

VTN PACIFIC

Ms. Letitia M. Uyehara, Interim Director
Office of Environmental Quality Control
550 Halekauwila Street, Room 301
Honolulu, HI 96813

Dear Ms. Uyehara:

We have reviewed the Environmental Impact Statement for the Kaluanui Wells and have no comment to make.

Thank you for the opportunity to review the document.

Aloha,

Stanley F. Kapustka
District Chief

cc: Honolulu Board of Water Supply
VTN Pacific



HEADQUARTERS
NAVAL BASE PEARL HARBOR
PEARL HARBOR, HAWAII 96860

IN REPLY REFER TO:
002B:MKL:Jam
Ser 122
9 FEB 1984

RECEIVED
FEB 10 1984

VTN PACIFIC

Ms. Letitia M. Uyehara, Interim Director
Office of Environmental Quality Control
550 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

Dear Ms. Uyehara:

Environmental Impact Statement
Kaluanui Wells

The EIS for the Kaluanui Wells has been reviewed and the Navy has no comments to offer. As this command has no further use for the EIS, the EIS is being returned.

Thank you for the opportunity to review the EIS.

Sincerely,

M. M. DALLAM
CAPTAIN, CEC. U. S. NAVY
FACILITIES ENGINEER
BY DIRECTION OF THE COMMANDER

Enclosure

Copy to:
Board of Water Supply
City & County of Honolulu
630 South Beretania Street
Honolulu, Hawaii 96843

VTN Pacific
1164 Bishop Street, Suite 906
Honolulu, Hawaii 96813



Commander (dpl)
Fourteenth Coast Guard District

Pihoa Kalahelele
Federal Building
500 Ala Moana Blvd.
Honolulu, Hawaii 96850
Phone: (808) 546-2861

RECEIVED
FEB 10 1984

VTN PACIFIC

11900
Serial No. 4/025
7 Feb 84

FEB 14 1984

(P)1083.4

RECEIVED
FEB 15 1984
VTN PACIFIC

Ms. Letitia H. Uyebara, Interim Director
Office of Environmental Quality Control
550 Halekauwila Street, Room 301
Honolulu, HI 96813

Dear Ms. Uyebara:

The Fourteenth Coast Guard District has reviewed the
EIS for the Kalaunui Wells and has no objection or
constructive comments to offer at the present time.

Sincerely,

J. E. SCHWARTZ
Commander, U. S. Coast Guard
District Planning Officer
By direction of Commander,
Fourteenth Coast Guard District

Copy to: Board of Water Supply
VTN Pacific

Ms. Letitia H. Uyebara
Interim Director
Office of Environmental
Quality Control
550 Halekauwila Street
Honolulu, Hawaii 96813

Dear Ms. Uyebara:

Subject: Environmental Impact Statement for the
Kalaunui Wells, Koolauloa, Oahu, Hawaii

We have reviewed the subject environmental impact state-
ment and have no comments to offer.

Thank you for the opportunity to review the environmental
impact statement.

Very truly yours,

RIKIO HISHIOKA
State Public Works Engineer

RYS:m
cc: Board of Water Supply
VTN Pacific

GEORGE R. ARIYOSHI
GOVERNOR



JACK K. SUWA
CHAIRMAN, BOARD OF AGRICULTURE
SUZANNE D. PETERSON
DEPUTY TO THE CHAIRMAN

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU

COPY

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

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

February 10, 1984

RECEIVED
FEB 14 1984
VTN PACIFIC

MEMORANDUM

To: Ms. Letitia M. Uyehara, Interim Director
Office of Environmental Quality Control

Subject: Environmental Impact Statement (EIS) for
Kaluauui Wells
Board of Water Supply
TRK: 5-3-09:2
6-3-10:1
5-3-12:4)

Kaluauui, Oahu, Acres: Approx. 1

D-22

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

According to the document, the applicant is proposing to establish a two-well system and associated facilities within Kaluauui Valley. The applicant has drilled and tested one well and proposes to drill another well on one of two alternative sites approximately 600 feet from the existing well. The associated facilities, which include a water transmission main and utility lines, are tentatively proposed to be constructed under or adjacent to an existing jeep trail and access road.

We find that the proposed project's impact on agricultural water requirements in the region (Department of Agriculture memorandum to the Board of Water Supply Re: EIS Preparation Notice, dated October 4, 1979) has been addressed. Design work for the Kahuku Agricultural Park is proceeding on the assumption that 1 million gallons per day will be available for the project. We are therefore concerned that, as stated in the EIS, if all proposed water development projects in Koolauoua were implemented, the sustainable yield of the aquifer would be exceeded and additional pumpage may have to be restricted. We are aware that the water sources for the Mahohoe Agricultural Park are situated in a different basal aquifer.

Thank you for the opportunity to comment.

cc: Board of Water Supply
VTN Pacific
Dept. of Land & Natural Resources
"Support Hawaiian Agricultural Products"

Jack K. Suwa
JACK K. SUWA
Chairman, Board of Agriculture

February 24, 1984

RECEIVED
MAR 1 1984
VTN PACIFIC

Mr. Jack K. Suwa, Chairperson
Board of Agriculture
State of Hawaii
P. O. Box 22159
Honolulu, Hawaii 96822

Dear Mr. Suwa:

Subject: Your Memorandum of February 10, 1984 On The Draft Environmental Impact Statement (EIS) for Kaluauui Wells, Koolauoua

Thank you for reviewing and commenting on the environmental document for our proposed water development project. Your memorandum will be appended to the Revised EIS.

Our well development projects in that area will not have any effect on the water for the proposed Kahuku Agricultural Park. In our previous meeting with your staff, DNR and Mr. John Hink, we established the sustainable yield of the Kahuku groundwater basin and agreed to the additional water development for the Agricultural Park. We are still working on the basis of that arrangement.

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

Very truly yours,
Kazu Hayashida

KAZU HAYASHIDA
Manager and Chief Engineer

cc: Office of Environmental Quality Control
VTN Pacific, Inc.

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31



CHARLES G. CLARK
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH

P. O. BOX 2019
HONOLULU, HAWAII 96811

February 27, 1984

RECEIVED

FEB 29 1984

VIN PACIFIC

GEORGE R. JANTON
DIRECTOR OF WATER

RECEIVED
BD OF WATER SUPPLY
FEB 13 1 25 PM '84

State of Hawaii
DEPARTMENT OF HEALTH
OFFICE OF THE ATTORNEY GENERAL
340 Punchbowl Road, 14th Fl.
Honolulu, Hawaii 96813

MEMORANDUM

To: Ms. Letitia Uyehara, Interim Director
Office of Environmental Quality Control

From: Deputy Director for Environmental Health

Subject: Environmental Impact Statement (EIS) for Kaluanui Wells, Koolauloa, Oahu

Thank you for the opportunity to comment and review on the subject document. We understand that the Board of Water Supply is planning to drill at least one more exploratory well at Kaluanui Valley within Sacred Falls State Park. Construction of water transmission main and electrical and telephone lines between the wells and Kamehameha Highway is also proposed.

The Department of Health is vested with the responsibility to assure that public water systems in the State are providing water which is in compliance with the State's drinking water regulations known as Chapter 20, Title 11, Administrative Rules, and are in compliance with all other applicable terms and conditions of Chapter 20. A public water system is defined as a system serving 25 or more individuals at least 60 days per year or having a minimum of 15 service connections. In the event that the new well is intended to serve these minimum numbers of persons or service connections, please be advised that the well and distribution system will be subject to the terms of Section 11-20-29 and Section 11-20-30 of Chapter 20 respectively.

Briefly, Section 11-20-29 of Chapter 20 requires all new sources of potable water serving public water systems to be approved by the Director of Health prior to their use to serve potable water. Such approval is based primarily upon the satisfactory submission of an engineering report which adequately addresses all concerns as set down in Section 11-20-29. The engineering report must be prepared by a registered professional engineer and bear his or her seal upon submittal.

We realize that the statements are general in nature due to preliminary plans being the sole source of discussion. We, therefore, reserve the right to impose future environmental restrictions on the project at the time final plans are submitted to this office for review.

cc: Board of Water Supply
VIN Pacific

Melvin K. Kotzura
MELVIN K. KOTZURA

Ms. Letitia M. Uyehara, Interim Director
Office of Environmental Quality Control
550 Halekauwila Street, Rm. 301
Honolulu, Hawaii 96813

Kaluanui Wells

Thank you for providing us the opportunity to review the proposed project, "Kaluanui Wells" Environmental Impact Statement.

We have completed our review and have no comments to offer at this time.

Yours truly,

JERRY M. MATSUDA
Major, HARC
Contr & Engr Officer

cc: Board of Water Supply
VIN Pacific

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BOARD OF WATER SUPPLY
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MAR 12 1984
VTN PACIFIC

March 6, 1984

Mr. Charles G. Clark, Director
Department of Health
State of Hawaii
P. O. Box 3378
Honolulu, Hawaii 96801

Attention: Mr. Melvin K. Koizumi

Dear Mr. Clark:

Subject: Your Letter of February 27, 1984, on the Draft
Environmental Impact Statement for Kaluanui Wells,
Koolauloa, Oahu

Thank you for reviewing and commenting on the environmental document for our proposed water development project. Your letter will be appended to the revised document.

In response to your comment, we will submit an engineering report in accordance with Sections 11-20-29 and 11-20-30 of Chapter 20 for your approval prior to use of the source. We acknowledge that you may impose future environmental restrictions on the project.

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

Very truly yours,
Kazu Hayashida
KAZU HAYASHIDA
Manager and Chief Engineer

cc: Office of Environmental Quality Control
VTN Pacific, Inc.

March 1, 1984

RECEIVED
MAR 19 1984
VTN PACIFIC

Ms. Letitia Uyehara, Interim Director
Office of Environmental Quality Control
550 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

Dear Ms. Uyehara:

We have reviewed the environmental impact statement (EIS) for the proposed Kaluanui Wells. Thank you for this opportunity to express our concerns for the project.

Historic Sites

As pointed out, the three well sites and the access road were surveyed for archaeological and historical remains by William Barrera of Chinigo, Inc., and field inspected by State Parks archaeologists Vent and Ota.

From the archaeological testing conducted by State Parks archaeologists at Sacred Falls State Park, the rock pile features appear merely to be surface sites without associated cultural remains. It may be that many of these rock piles were from field clearing of the lower valley slopes. If the rock pile feature in the alternate site for well 2 will be disturbed during construction, then this work should be monitored by an archaeologist. We also request that the State Parks archaeologists be notified in advance when any trenching is to be conducted in order to examine the trenches for any cultural remains.

Recreation

We have serious objections to Kaluanui Well 2 (alternative site) adjacent to our campground. This well will be located on the perimeter of a campground we plan to build. It will be about 300 feet from a comfort station. The well pumps are to be muted, but sounds may also be amplified by the acoustics of the enclosed valley.

We have been working with the Board of Water Supply on the siting of the one-story control building between existing well site 1 and well site 2. We seek to have this building be as unobtrusive as possible.

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Ms. Letitia Uyehara, OEQC
Kaluauui Wells EIS
Page Two
MAR 1 1984

The well system is an intrusion into Sacred Falls Park, not only for aesthetics reasons, but also because of acoustical problems and incompatibility with the natural setting of a public park. This impact will be both adverse and unavoidable under present plans. The impact should be addressed fully. If it is not, we deem the EIS to be inadequate.

Aquatic and Water Resources

The EIS points out that Kaluauui Stream is intermittent in its middle and lower reaches and that the stream source is runoff and high level dike-confined water rather than basal ground water. Therefore, withdrawal of basal ground water is not expected to affect stream flow or Sacred Falls.

Since Kaluauui Stream provides habitat for endemic *Maritima granosa* (hiihiiwai), we suggest that stream flow be monitored before, during, and after test pumping of the exploratory well to check for site specific geologic anomalies affecting stream flow.

Sincerely,

Susumu Ono

SUSUMU ONO
Chairperson
and

State Historic Preservation Officer

cc: Board of Water Supply
VTN Pacific

March 13, 1984

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MAR 19 1984
VTN PACIFIC

Mr. Susumu Ono, Chairperson
Board of Land and Natural
Resources
State of Hawaii
P. O. Box 621
Honolulu, Hawaii 96809

Dear Mr. Ono:

Your Letter of March 1, 1984, on the Draft
Environmental Impact Statement for Kaluauui Wells,
Koolauloa, Oahu

Thank you for reviewing and commenting on the environmental document for our proposed water development project. Your letter will be appended to the revised environmental document.

In response to your comments, we offer the following:

Historical Sites - We will hire an archaeologist to monitor all clearing, trenching, and grading work in the vicinity of the rock pile feature at the alternate site for Well 2 if our plans show that we will disturb the rock pile feature. We will also notify the State Parks archaeologists in advance of trenching work.

Recreation - We concur with your concerns on the aesthetic impacts of the project and are working closely with your Park's personnel in trying to make our facilities as unobtrusive as possible.

To minimize noise from the pumping units, submersible pumps will be installed instead of the usual line shaft pumps with mutes. Submersible pumps emit very low intensity noise and, therefore, the wells should not detract from the natural setting of the proposed park.

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU

COPY



DEPARTMENT OF PLANNING
AND ECONOMIC DEVELOPMENT

STATE OF HAWAII
DEPARTMENT OF PLANNING AND ECONOMIC DEVELOPMENT
150 SOUTH KING STREET, SUITE 200
HONOLULU, HAWAII 96813

GEORGE E. ANTON
KENT H. KEITH
JOHN R. PINGREE
MARTIN J. WATSON
MARGARET E. TOMAL

2100'S
ECONOMIC DEVELOPMENT ENGINEER
PLANNING AND ECONOMIC DEVELOPMENT
HONOLULU, HAWAII 96813
TELEPHONE: 521-1100
FAX: 521-1101
HONOLULU, HAWAII 96813
TELEPHONE: 521-1100
FAX: 521-1101

Mr. Susumu Ono
Page 2

March 13, 1984

Ref. No. 8391

March 9, 1984

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MAR 12 1984
YMN PACIFIC

Aquatic and Water Resources - We will coordinate stream flow monitoring with your Forestry Division.

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

Ms. Leticia N. Uyehara
Interim Director
Office of Environmental Quality Control
550 Halekuanila Street, Room 301
Honolulu, Hawaii 96813

Very truly yours,
Kazu Hayashida
KASU HAYASHIDA
Manager and Chief Engineer

Dear Ms. Uyehara:
Subject: EIS for the Kalahele Wetlands, Koolauloa, Maui

We have reviewed the subject EIS and have the following comments.

cc: Office of Environmental Quality Control
YMN Pacific, Inc.

The U.S. Army Corps of Engineers recently designated a lower portion of the valley adjacent to Kalahele Stream as a wetland. The U.S. Fish and Wildlife Service has required mitigation of habitat loss for endangered species of waterbirds in the wetland area because of unauthorized fill in portion of the area.

Thank you for the opportunity to review this document.
Very truly yours,

Kent H. Keith

cc: Board of Water Supply
YMN Pacific

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU

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FEB 24 1984
VTN PACIFIC

February 21, 1984

MEMORANDUM
TO: Ms. Leticia N. Uyehara, Interim Director
Office of Environmental Quality Control
FROM: Director of Transportation
SUBJECT: KALUANUI WELLS
KOOLAULOA, OAHU
ENVIRONMENTAL IMPACT STATEMENT

The establishment of the Kaluanui Wells will not have a significant impact on the State Highway System.
Thank you for allowing us to comment on the environmental statement.

Wayne J. Yamasaki
Wayne J. Yamasaki

KYA:ko
cc: HWI-PA
STP (KYA)
BJS
VTN Pacific

March 16, 1984
RECEIVED
MAR 22 1984
VTN PACIFIC

Mr. Kent M. Keith, Director
Department of Planning and
Economic Development
State of Hawaii
P. O. Box 2359
Honolulu, Hawaii 96804

Dear Mr. Keith:

Subject: Your Letter of March 9, 1984 on the Draft EIS for
Kaluanui Wells, Koolauloa, Oahu

Thank you for reviewing and commenting on the draft environmental document for our proposed water development project. Your letter will be appended to the Revised EIS.
We will indicate in the Revised EIS that a portion of the lower valley has been designated as a wetland and any work that may impact this wetland will be coordinated with the U. S. Army Corps of Engineers and the U. S. Fish and Wildlife Service.

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

Very truly yours,

Kazu Hayashida
KAZU HAYASHIDA
Manager and Chief Engineer

cc: Office of Environmental Quality Control
VTN Pacific, Inc.

COPY

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU

RECEIVED
FEB 21 10 53 AM '84
STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
5th FLOOR
550 HALEKAUWILA STREET
HONOLULU, HAWAII 96813

Letitia N. Uyebara
Interim Director
TELEPHONE NO. 548-5015

February 28, 1984

RECEIVED
MAR 2 1984
VTN PACIFIC

Ms. Letitia N. Uyebara
Interim Director
Office of Environmental
Quality Control
State of Hawaii
550 Halekauwila Street
Honolulu, Hawaii 96813

Dear Ms. Uyebara:

Subject: Your Letter of February 16, 1984, On The Draft
Environmental Impact Statement (EIS) for
Kaluanui Wells, Koolauloa, Oahu

Thank you for reviewing and commenting on the draft EIS for our
proposed water development project. Your letter will be appended
to the revised EIS.

In response to your comment concerning minimum stream flow and
impacts to stream fauna, we offer the following:

1. As mentioned in the draft EIS (pg. i, 20) the proposed
wells are not anticipated to affect stream flow.
Kaluanui Stream is perennial at high elevations, but is
intermittent in the middle and lower portions of the
valley (pg. i, 11, 15). The proposed wells are sited
within the lower portion of the valley. To date the
Department of Land and Natural Resources has not
established in-stream standards for Kaluanui Stream.
However, the Board will comply with any in-stream
standards that may be established for the stream.
2. Since the proposed wells are not anticipated to affect
stream flow, no adverse impacts to stream fauna are
expected.

Very truly yours,
Kazu Hayashida
KAZU HAYASHIDA
Manager and Chief Engineer

cc: VTN Pacific

Mr. Uyebara 2-21-84
AK - files
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MAR 2 1984
VTN PACIFIC

Mr. Kazu Hayashida
Manager and Chief Engineer
Board of Water Supply
City and County of Honolulu
630 South Beretania Street
Honolulu, Hawaii 96843

Dear Mr. Hayashida:

Subject: Draft EIS for Kaluanui Wells, Koolauloa, Oahu

Whenever wells are drilled for water usage, nearby streams
generally experience a decrease in flow. Our primary
concern regarding this project is the maintenance of flow
of Kaluanui Stream such that stream fauna will not be
significantly affected. We suggest that a discussion on
minimum stream flow be included in the final EIS.
Presently, the draft EIS discusses stream fauna but not in
context with decreased stream flow.

Sincerely,

Letitia N. Uyebara
Letitia N. Uyebara
Interim Director

cc: VTN Pacific

D 1200



University of Hawaii at Manoa

Environmental Center
Crawford 317 • 2550 Campus Road
Honolulu, Hawaii 96822
Telephone (808) 946-7361

RECEIVED March 22, 1984
RE:0399

MAR 29 1984

VTN PACIFIC

Ms. Letitia N. Uyehara, Interim Director
Office of Environmental Quality Control
550 Halekauwila Street
Honolulu, Hawaii 96813

Dear Ms. Uyehara:

Draft Environmental Impact Statement
Kaluauui Wells
Koolauloa, Oahu

D-20

We have reviewed this document with the assistance of Matthew Spriggs, Anthropology; James Parrish, Hawaii Cooperative Fishery Research Unit; Jacquelin Miller and Mark Inouye, Environmental Center. Unfortunately, the Center inadvertently missed the response deadline of 9 March 1984. Nonetheless, we hope that our concerns and comments can still be addressed in the Final EIS.

Hydrology

Sustainable yield values are listed (p. 22, fig. 7) for the Koolauloa based aquifer and its subregions. However, the bases for the estimates are not given. The Final EIS should provide these bases.

The statement is made (p. 29, para. 2) that because the sources of flow in Kaluauui Stream are surface runoff from rainfall and high level dike confined water, pumping of basal water from the BWS Kaluauui Wells will not affect the stream flow or Sacred Falls. Such an absolute statement cannot be made. Pumping at 3 mgd from the Kaluauui Wells will lower the basal water level in the region (pump test results were not given so we cannot tell by how much) which in turn may increase leakage between the dike confined and basal groundwater bodies. If this happens the head of dike confined waters will be lowered which in turn could reduce streamflow. Such an effect, if it occurs will probably be small, but it cannot be totally ruled out.

Stream Fauna

Kaluauui Stream, although intermittent in its middle and lower portions, appears to be a very important stream in that it provides a habitat for several endemic aqua fauna. This stream is the only one on Oahu where *Lentipes concolor*, a rare endemic goby, has been found. Although only one specimen was found in 1979 it is not yet considered fully extinct on Oahu. If any *Lentipes* do remain in the stream, any reduction in its flow resulting from draft from the Kaluauui Wells may further jeopardize their existence.

AN EQUAL OPPORTUNITY EMPLOYER

March 22, 1984

-2-

Ms. Letitia N. Uyehara

Kaluauui Stream is also one of two streams on Oahu in which *Neritina granosa*, an endemic mollusk, is found. This mollusk spends part of its life cycle in the ocean, therefore, it must migrate between the ocean and to its habitat in the stream. Another endemic organism, the *Atya bisulcata*, a shrimp, also migrates up the stream to its present habitat. Migration up the stream plays an important role in the life cycle of both these endemic organisms. The effects on their migration of any change in stream regime induced by the draft from the Kaluauui Wells should be discussed in the EIS.

We appreciate the opportunity to comment on this DEIS and hope you will find our comments useful in the preparation of the revised document.

Yours truly,

Doak C. Cox
Director

cc: Board of Water Supply

- VTN Pacific ✓
- Matthew Spriggs
- James Parrish
- Jacquelin Miller
- Mark Inouye
- Pamela Bahnsen

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April 6, 1984

Dr. Doak C. Cox
Page 2

April 6, 1984

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APR 10 1984

VIN PACIFIC

Dr. Doak C. Cox, Director
Environmental Center
Crawford 317
2550 Campus Road,
Honolulu, Hawaii 96822

would adversely impact the habitat for endemic aqua fauna,
especially in the perennial portions of the stream.

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

Dear Dr. Cox:

Very truly yours,

Subject: Your Letter of March 22, 1984, on the Draft
Environmental Impact Statement (DEIS) for the Kaluanui
Wells, Koolauloa, Oahu

Kazu Hayashida
KAZU HAYASHIDA
Manager and Chief Engineer

Thank you for reviewing the DEIS for our proposed water
development project. Your letter will be appended to the revised
environmental document.

cc: OEQC
VIN Pacific, Inc.

In response to your comments, we offer the following:

Hydrology:

The sustainable yields (p. 22, fig. 7) for the Koolauloa
basal aquifer and its subregions were based on estimates of
infiltration recoverability derived from hydrological
budgeting methods.

We concur that pumpage from our proposed wells could reduce
streamflow, but the effects should not be significant.
However we shall monitor the streamflows during the
operation of the wells.

Stream Fauna:

As noted in the DEIS, we are aware that Kaluanui provides a
habitat for several endemic aqua fauna. However, we
anticipate no significant reduction in streamflow that



University of Hawaii at Manoa

Water Resources Research Center
Holmes Hall 283 - 2540 Dole Street
Honolulu, Hawaii 96822

21 February 1984

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FEB 23 1984

VTN PACIFIC

Ms. Leticia N. Uyehara, Interim Director
Office of Environmental Quality Control
550 Halekawaile Street, Room 301
Honolulu, Hawaii 96813

Dear Ms. Uyehara:

SUBJECT: Environmental Impact Statement for the Kaluanui Wells,
Koolauloa, Oahu, Hawaii, January 1984

We have reviewed the subject EIS and offer the following comments:

1. P. 22, Fig. 7. Sustainable yield values are listed for the Koolauloa basal aquifer and its sub-regions. How were these values determined?
2. P. 29, para. 2. The flat statement is made that because the sources of flow in Kaluanui stream are surface runoff from rainfall and high level dike confined water, pumping of basal water from the BMS Kaluanui wells will not affect the stream flow or Sacred Falls. Such an absolute statement probably cannot be made. Pumping at 3 mgd from the Kaluanui wells will lower the basal water level in the region (pump test results were not given so I do not know by how much) which in turn may increase leakage between the dike confined and basal groundwater bodies. If this happens the head of dike confined waters will be lowered which in turn could reduce streamflow. Such an effect, if it occurred at all probably would be small, but it cannot be totally ruled out.

Thank you for the opportunity to comment. This material was reviewed by WRRC and affiliate personnel.

*Frank Peterson, Ph.D.

Sincerely,

Edwin T. Murabayashi
Edwin T. Murabayashi
EIS Coordinator

ETH:jm
cc: BMS
VTN Pacific

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BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU

COPY

March 1, 1984

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MAR 8 1984

VTN PACIFIC

Water Resources Research
Center
University of Hawaii at Manoa
Holmes Hall 283
2540 Dole Street
Honolulu, Hawaii 96822

Attention: Mr. Edwin T. Murabayashi
Gentlemen:

Subject: Your Letter of February 21, 1984, on the Draft
Environmental Impact Statement (EIS) for the
Kaluanui Wells, Koolauloa, Oahu

Thank you for reviewing and commenting on the draft
environmental document for our proposed water development
project. Your letter will be appended to the Revised EIS.

We offer the following in response to your comments:

1. "P. 22, Fig. 7. Sustainable yield values are listed for the Koolauloa basal aquifer and its sub-regions. How were these values determined?"
The sustainable yield values were determined by hydrological budgeting and operational experience of existing wells in the adjacent Punaluu area. Data from Mr. John Mink's study was also used.
2. "P. 29, para. 2. The flat statement is made that because the sources of flow in Kaluanui stream are surface runoff from rainfall and high level dike confined water, pumping of basal water from the BMS Kaluanui wells will not affect the stream flow or Sacred Falls. Such an absolute statement probably cannot be made. Pumping at 3 mgd from the Kaluanui wells will lower the basal water level in the

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Water Resources Research Center
Page 2

March 1, 1984

PB 84-105

February 9, 1984

region (pump test results were not given so I do not know by how much) which in turn may increase leakage between the dike confined and basal groundwater bodies. If this happens, the head of dike confined waters will be lowered which in turn could reduce streamflow. Such an effect, if it occurred at all probably would be small, but it cannot be totally ruled out."

We concur with your comment and will ravorid this paragraph to indicate that pumpage from the proposed wells is unlikely to affect streamflow. Also, since the yield of the proposed wells is within the sustainable limits for the region, the adjacent dike reservoirs should be relatively unaffected.

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

Very truly yours,

Ray Haysida

KAZU HAYASHIDA
Manager and Chief Engineer

cc: Office of Environmental Quality Control
VTN Pacific, Inc.

Ms. Letitia N. Uyehara, Interim Director
Office of Environmental Quality Control
550 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

Dear Ms. Uyehara:

Subject: EIS for the Kaluanui Wells
Koolauloa, Oahu

We have reviewed the EIS for the Kaluanui Wells and have no comments.

Thank you for the opportunity to review the EIS.

Very truly yours,

Roy H. Tanji

ROY H. TANJI
Director and Building Superintendent

TH:jo
cc: Board of Water Supply
VTN Pacific

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MAR 8 1984
VTN PACIFIC

DEPARTMENT OF LAND UTILIZATION
CITY AND COUNTY OF HONOLULU
 550 SOUTH KING STREET
 HONOLULU, HAWAII 96813 (808) 535-6111



MICHAEL H. McELROY
 DIRECTOR
 ROBERT B. JONES
 SENIOR MANAGER

LU2/84-525(SH)

February 15, 1984

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FEB 16 1984
 VTN PACIFIC

Ms. Letitia N. Uyebara, Interim Director
 Office of Environmental Quality Control
 State of Hawaii
 550 Halekauwila Street, Room 301
 Honolulu, Hawaii 96813

Dear Ms. Uyebara:

Comments to Draft EIS - Kaluanui Wells
Upper Kaluanui Stream Area, Koolauloa, Oahu

We have reviewed the above and offer the following comments:

1. This document appears to adequately address the issues surrounding the implementation of this well project.
2. It is unclear as to what is actually in the Special Management Area, i.e., location, scope, time required for construction, construction costs, and impacts. This information should be included in the EIS so that this document can be used when the Board of Water Supply applies for a Special Management Area Use Permit.

If there are any further questions, please contact Sampson Har of our staff at 537-5933.

Very truly yours,

MICHAEL H. McELROY
 Director of Land Utilization

MHM:s

cc: BMS
 VTN Pacific

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



WILLARD T. CHOW
 CHIEF PLANNING OFFICER
 RALPH KAWAHOTO
 SENIOR CHIEF PLANNING OFFICER

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 VTN PACIFIC

March 1, 1984
 VTN PACIFIC

Ms. Letitia N. Uyebara, Interim Director
 Office of Environmental Quality Control
 550 Halekauwila Street, Room 301
 Honolulu, Hawaii 96813

Dear Ms. Uyebara:

Environmental Impact Statement
for Kaluanui Wells

We have reviewed the subject EIS and have no comments. Thank you for including us in the review process.

Sincerely,

 RALPH KAWAHOTO
 Planner

APPROVED:

WILLARD T. CHOW

cc: Board of Water Supply
 VTN Pacific
 Development Planning Branch

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU

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DEPARTMENT OF PARKS AND RECREATION
CITY AND COUNTY OF HONOLULU
850 SOUTH KING STREET
HONOLULU, HAWAII 96813

EMIKO I. KUDO
DIRECTOR
SAM L. CARL
DEPUTY DIRECTOR
OSCAR M. ABAMA
EXECUTIVE ASSISTANT



SILKEN R. ANDERSON
VICE

February 17, 1984

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FEB 23 1984

VTN PACIFIC

TO: MICHAEL M. McELROY, DIRECTOR
DEPARTMENT OF LAND UTILIZATION
FROM: KASU HAYASHIDA, MANAGER AND CHIEF ENGINEER
BOARD OF WATER SUPPLY

SUBJECT: YOUR LETTER OF FEBRUARY 15, 1984, ON THE DRAFT EIS
FOR KALUANUI WELLS, KOOLAULOA

Thank you for reviewing and commenting on the draft environmental document for our proposed water development project. Your letter will be appended to the revised EIS.

We shall include additional discussion on the impacts of the project, the scope of work, construction time and costs, and the location of the Special Management Area boundaries relative to the project in our revised environmental document.

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

L. Whang
LAWRENCE WHANG
For Manager and Chief Engineer

cc: OEOC
VTN Pacific, Inc.

February 21, 1984

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FEB 24 1984

VTN PACIFIC

Ms. Letitia W. Uyehara
Interim Director
Office of Environmental Quality Control
550 Halekuanila Street, Room 301
Honolulu, Hawaii 96813

Dear Ms. Uyehara:

Subject: Environmental Impact Statement
Kaluanui Wells

The proposed Kaluanui Wells project will not have any detrimental impact on parks and recreation facilities in proximity to the project site.

Thank you for the opportunity to review the EIS.

Sincerely yours,

(Mrs.) EMIKO I. KUDO, Director

EIK:vc

cc: BVS
VTN-Pacifc, Inc

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



SILEEN R. ANDERSON
DIRECTOR

MICHAEL J. CHUN, Ph.D.
DIRECTOR AND CHIEF ENGINEER

MAURICE N. KAYA
DEPUTY DIRECTOR

ENV 84-42

February 8, 1984

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FEB 14 1984

VTN PACIFIC

Ms. Letitia N. Uyehara
Interim Director
Office of Environmental Quality
Control
State of Hawaii
550 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

Dear Ms. Uyehara:

RE: EIS for Kalaunui Wells,
Koolauloa, Oahu, Hawaii

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

1. There are no existing public works facilities that will be affected by the proposed project.
2. In addition, there are no plans now to construct a wastewater treatment plant in the adjacent area as reported in our memorandum (ENV 79-273) to the Board of Water Supply dated August 28, 1979.

Me ke aloha pumehana,

MICHAEL J. CHUN
Director and Chief Engineer

cc: BWS
VTN Pacific
WMA

February 16, 1984

TO: MICHAEL J. CHUN, DIRECTOR AND CHIEF ENGINEER
DEPARTMENT OF PUBLIC WORKS

FROM: KAZU HAYASHIDA, MANAGER AND CHIEF ENGINEER
BOARD OF WATER SUPPLY

SUBJECT: YOUR MEMORANDUM OF FEBRUARY 9, 1984, ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT (EIS) FOR KALUANUI WELLS

Thank you for reviewing and commenting on the environmental document for our proposed water development project. Your memorandum will be appended to the final EIS.

We will indicate in the revised document that your department has no present plans to construct a wastewater treatment plant on the adjacent properties.

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

Kazu Hayashida
KAZU HAYASHIDA
Manager and Chief Engineer

MHS:ja
cc: K. Hayashida
L. Whang
84-352

DEPARTMENT OF TRANSPORTATION SERVICES
CITY AND COUNTY OF HONOLULU
 HONOLULU MUNICIPAL BUILDING
 550 SOUTH KING STREET
 HONOLULU, HAWAII 96813



EILEEN R. ANDERSON
 MAYOR
 ANDREW T. CHANG
 HONOLULU DIRECTOR

WILLIAM A. BONNETT
 DIRECTOR
 DAIL WHEE
 DEPUTY DIRECTOR

EILEEN R. ANDERSON
 MAYOR

FIRE DEPARTMENT
CITY AND COUNTY OF HONOLULU
 1635 S. KEMERUA STREET, ROOM 303
 HONOLULU, HAWAII 96814



MELVIN M. NONAKA
 FIRE CHIEF
 THOMAS C. BLOKIN
 FIRE DEPUTY CHIEF

March 2, 1984

TE2/84-512

March 5, 1984

RECEIVED

MAR 9 1984

VTN PACIFIC

Ms. Letitia N. Uyehara
 Interim Director
 Office of Environmental
 Quality Control
 550 Halekauwila Street, Room 301
 Honolulu, Hawaii 96813

Dear Ms. Uyehara:

Subject: Kaluauui Wells EIS

We have reviewed the EIS for the subject project and have no comments.

We thank you for providing us this opportunity to review and comment on the project.

Sincerely,

William A. Bonnet
 WILLIAM A. BONNETT
 Director

cc: Board of Water Supply
 VTN Pacific

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MAR 6 1984

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TO: MS. LETITIA N. UYEHARA, INTERIM DIRECTOR
 OFFICE OF ENVIRONMENTAL QUALITY CONTROL

FROM: MELVIN M. NONAKA, FIRE CHIEF

SUBJECT: EIS FOR KALUAUUI WELLS

We have reviewed the EIS subject project and have no substantive comments to offer at this time.

The EIS is being returned to the Office of Environmental Quality Control.

MELVIN M. NONAKA,
 Fire Chief

NON:ct/NSKY
 ENC. - EIS FOR KALUAUUI WELLS

Board of Water Supply
 City & County of Honolulu
 and
 VTN Pacific

POLICE DEPARTMENT
CITY AND COUNTY OF HONOLULU

1435 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96814 - AREA CODE (808) 935-3111



SILEEN R. ANDERSON
MAYOR

OUR REFERENCE DI-35

DOUGLAS G. GIBB
CHIEF
WARREN FERREIRA
DEPUTY CHIEF

February 29, 1984

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VTN PACIFIC

Ms. Letitia N. Uyebara, Interim Director
Office of Environmental Quality Control
550 Halekaunila Street, Room 301
Honolulu, Hawaii 96813

Dear Ms. Uyebara:

Thank you for giving us the opportunity to review the Environmental Impact Statement for the proposed Kaluanui Wells at Koolauloa, Oahu. Due to the rather isolated location of the proposed project and precautions taken to contain construction equipment on site, the Board of Water Supply Kaluanui Wells do not appear to have any significant impact on the public facilities or services provided by the Honolulu Police Department. Therefore, we do not have any objections to the proposal at this time.

Sincerely,

Warren Ferreira
DOUGLAS G. GIBB
for
Chief of Police

cc: Board of Water Supply
VTN Pacific

HAWAIIAN ELECTRIC COMPANY, INC.
Box 2750 / Honolulu, Hawaii / 96840

February 29, 1984

RICHARD L. O'CONNELL, P.E.
MANAGER, ENVIRONMENTAL DEPARTMENT
PH 348-1000

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ENV/6
VTN PACIFIC

Ms. Letitia N. Uyebara, Interim Director
Office of Environmental Quality Control
550 Halekaunila Street, Room 301
Honolulu, Hawaii 96813

Dear Ms. Uyebara:

Subject: Environmental Impact Statement for the Kaluanui Wells

We have reviewed the above Environmental Impact Statement and offer the following comments:

1. The Board of Water Supply should plan to assist HECO in obtaining the new easements on State owned parcels and on a portion of parcel owned by Zions Securities Corporation.
2. The Board of Water Supply should also plan to submit appropriate CDUA's on HECO's behalf as well as comply with the county special management area requirements.
3. Page 5 - The cost difference between overhead and underground installations for electrical service is a cost that must be borne by the customer and should be recognized as a project cost.

Thank you for the opportunity to comment on this Environmental Impact Statement.

Sincerely,

Richard L. O'Connell
Richard L. O'Connell
Manager, Environmental Department

JMP,jr.:cal
Enclosure

cc: Board of Water Supply
VTN Pacific ✓

COPY

Mr. Richard L. O'Connell
Page 2

March 8, 1984

3. "Page 5 - The cost difference between overhead and underground installations for electrical service is a cost that must be borne by the customer and should be recognized as a project cost."

We concur that the cost difference for installing electrical service to our facilities will be borne by the BMS.

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

Very truly yours,

Kazu Hayashida

KAZU HAYASHIDA
Manager and Chief Engineer

cc: Office of Environmental Quality Control
VTN Pacific

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MAR 14 1984

VTN PACIFIC

COPY

March 8, 1984

RECEIVED

MAR 14 1984

VTN PACIFIC

Mr. Richard L. O'Connell
Manager, Environmental
Department
Hawaiian Electric Company, Inc.
P. O. Box 2750
Honolulu, Hawaii 96840

Dear Mr. O'Connell:

Subject: Your Letter of February 29, 1984, on the Kaluanui Wells
Draft Environmental Impact Statement (EIS)

Thank you for reviewing and commenting on the Draft EIS for our proposed water development project. Your letter will be appended to the final revised document.

In response to your comments, we offer the following:

1. "The Board of Water Supply (BWS) should plan to assist HECO in obtaining the new easements on State owned parcels and on a portion of parcel owned by Zions Securities Corporation."

The BWS will assist HECO in obtaining easements for power line facilities on State owned and on Zions Securities Corporation lands to serve the proposed project.

2. "The BWS should also plan to submit appropriate CDUA's on HECO's behalf as well as comply with the county special management area requirements."

We will include all HECO work needed to serve our proposed facilities in our Special Management Area Permit application. No CDUA Permit is required for this project.

KOOLAULOA NEIGHBORHOOD BOARD NO. 28
(Kamae, Ltd., Hanalei, Punahele, Kamae-Kahala)
50 HAUULA SATELLITE CITY HALL
84-010 KUKUNA ROAD
HAUULA, HAWAII 96717



March 9, 1984

Ms. Letitia Uyehara
Interim Director
Office of Environmental Quality Control
State of Hawaii
550 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

Dear Ms. Uyehara:

The Koolauloa Neighborhood Board No. 28 took action, at its March 8, 1984 meeting, to send its comments regarding the Environmental Impact Statement for Kaluanui Wells:

1. Visual impacts be minimized so as to preserve the wilderness nature of the Kaliuwa State Park;
2. That the Board of Water Supply will assure that the wells presently used for Agriculture/Aquaculture (Hanohano, Kapaka and AmOrient) as well as proposed wells (Kaluanui Farmers-Sakoda, Holt's Project, Kahuku Agriculture Park) will continue without threat of reduced supply due to BMS existing and proposed wells.

Thank you for your consideration and opportunity for comment.

Sincerely,

Craigston Mattoon
CRAIGSTON MATTOON
Chairman

cc: Mr. Kazu Hayashida, Manager and Chief Engineer
Board of Water Supply
VTN Pacific
1164 Bishop Suite 906
Neighborhood Commission
Councilmember David Kahana

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU

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MAR 12 1984

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March 20, 1984

RECEIVED
MAR 22 1984

VTN PACIFIC

Mr. Creighton Mattoon, Chairman
Koolauloa Neighborhood
Board No. 28
c/o Hauula Satellite City Hall
54-010 Kukuna Road
Hauula, Hawaii 96717

Dear Mr. Mattoon:

Subject: Your Letter of March 9, 1984, on the Draft Environmental Impact Statement (EIS) for Kaluanui Wells, Koolauloa, Oahu

Thank you for reviewing and commenting on the Draft EIS for our proposed water development project. Your letter will be appended to the Revised EIS.

In response to your comments, we offer the following:

Visual Impacts - The siting and landscaping of our facilities are being coordinated with the State Parks Division to minimize visual impact as well as to make our facilities compatible with the master plan for the park.

Existing Water Wells - Our water development plans are based on the maintenance of the present withdrawals from the existing wells. Therefore, our well projects should not affect withdrawals from the existing wells.

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

Very truly yours,

Kazu Hayashida
KAZU HAYASHIDA
Manager and Chief Engineer

cc: Office of Environmental Quality Control
VTN Pacific, Inc.