BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU

630 SOUTH BERETANIA

HONOLULU, HAWAII 96843

July 27, 1983

Mr. Roy Takemoto, Chairman
Environmental Quality Commission
550 Halekauwila Street
Honolulu, Hawaii 96813

Dear Mr. Takemoto:

Subject: Revised Environmental Impact Statement (EIS) for Iolekaa Well

The revised EIS was accepted by Mayor Anderson as required by the Environmental Impact Statement Regulations. Enclosed is a copy of the letter indicating Mayor Anderson's acceptance.

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

Very truly yours,

KAZU HAYASHIDA
Manager and Chief Engineer

Encl.
cc: VTN Pacific

'83 JUL -6 A10:57

MANAGING DIRECTOR'S OFFICE C & C HONOLULU

June 24, 1983

TO: HONORABLE EILEEN R. ANDERSON, MAYOR

VIA: ANDREW I.T. CHANG, MANAGING DIRECTOR

FROM: KAZU HAYASHIDA, BOARD OF WATER SUPPLY

SUBJECT: FINAL ENVIRONMENTAL IMPACT STATEMENT (EIS) FOR IOLEKAA WELL

We recommend your acceptance of the EIS for our proposed water development project. The EIS complies with all the requirements of Chapter 343, Hawaii Revised Statutes.

According to Chapter 343, your acceptance is a formal determination that the EIS adequately describes identifiable environmental impacts and satisfactorily responds to comments received during the review of the statement.

The Iolekaa Well project would add 0.3 million gallons of water to the Windward-Honolulu Water District. This source is necessary to meet projected demands due to population growth.

We have enclosed a copy of the environmental document for your information.

If you have any questions, please contact me at 527-6180.

Kazu Hayashida

KAZU HAYASHIDA
Manager and Chief Engineer

Enc.

CONCUR:

Andrew I.T. Chang

Andrew I.T. Chang
Managing Director

ACCEPTED:

Eileen R. Anderson

Eileen R. Anderson, Mayor
City and County of Honolulu

LHYW:bl
bcc: Managing Director
cc: K. Hayashida, L. Whang
P-859

Revised
Environmental Impact Statement
FOR

IOLEKAA WELL

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU

CITY AND COUNTY OF HONOLULU

BOARD OF WATER SUPPLY

REVISED ENVIRONMENTAL IMPACT STATEMENT

FOR

IOLEKAA WELL

Kaneohe, Oahu, Hawaii

Tax Map Key: 4-6-27:11

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:

Mayor, City and County of Honolulu

BOARD MEMBERS:

Yoshie H. Fujinaka, Chairman
Robert A. Souza, Vice Chairman
Ryokichi Higashionna
Donna M. Howard
Michael J. Chun
Milton J. Agader
Walter A. Dods, Jr.

Kazu Hayashida Date 5/20/83
KAZU HAYASHIDA
Manager and Chief Engineer

PREPARED BY:

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

SUMMARY

The Honolulu Board of Water Supply (BWS) is proposing to install a pump and related infrastructure to bring the existing Iolekaa Well into production by 1984. The project site is a terrace cut into a weathered basalt ridge which separates Haiku and Iolekaa Valleys in Kaneohe, Oahu. Approximately 0.3 million gallons per day (mgd) will be pumped from Iolekaa Well into an adjoining reservoir. This will "free" the same amount of water from the Haiku Tunnel to service windward Oahu from Kaneohe through Waimanalo. Any surplus water would be exported to the Honolulu Water District.

Iolekaa Well is located between Haiku and Iolekaa Streams, both of which are tributaries of Heeia Stream. During dry periods, Heeia Stream is the source of much of the water entering the Heeia Meadowlands, a 155 acre coastal wetland. Heeia Stream has been altered with both lined concrete channels and elevated culverts. Almost all stream macrofauna in Heeia Stream and its tributaries are common introduced species such as swordtails and guppies. The Heeia Meadowlands provide habitat for two species of endangered endemic waterbirds: the Hawaiian gallinule and coot. No rare or endangered native species of vegetation are present within the Meadowlands.

During dry periods, Iolekaa Stream gains most of its base flow above an elevation of 390 feet, and Haiku Stream gains most of its base flow below an elevation of 320 feet. Because the static head of ground water being tapped by Iolekaa Well is 321 feet, the well is unlikely to significantly affect the low flow of Iolekaa Stream. However, over the long term, it is possible that the cumulative pumping of 1.0 mgd from the new BWS Haiku Well and 0.3 mgd from Iolekaa Well may reduce the base flow of Haiku and Heeia Streams.

In order to determine long-term impacts, the BWS will contract with the U.S. Geological Survey to reactivate a gaging station on Haiku Stream at an elevation of about 270 feet and take supplemental stream flow measurements at lower elevations. Pumpage from the BWS Iolekaa and/or Haiku Wells will be reduced whenever necessary to implement any minimum stream flow standards established by the State.

Because additional well sites will be needed to meet Oahu's growing water needs, the BWS has rejected the "no project" alternative. Other feasible approaches to Oahu water demand include conservation, use of high quality irrigation water made available by urbanization of sugar cane fields, exchange of brackish water for high quality irrigation water, and possibly seasonal "peak-load" water prices.

REVISED ENVIRONMENTAL IMPACT STATEMENT

FOR

IOLEKAA WELL

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I. DESCRIPTION OF THE PROPOSED PROJECT

A. LOCATION

Iolekaa Well (DOWALD No. 2549-01) is located at an elevation of 485 feet on a terrace cut into the north side of a ridge which separates Haiku and Iolekaa Valleys in Kaneohe, Oahu. (Figure 1) It is sited on a 1.767 acre City owned parcel identified by Tax Map Key: 4-6-27:11. The parcel is within the State Urban District and is City zoned R-1. Access to the well site is from a road easement at the mauka end of Hololio Street in the Haiku Plantation subdivision.

B. DESCRIPTION

Iolekaa Well was drilled and test pumped in 1966 and then capped. The well is 421 feet deep and has 305 feet of casing with an inside diameter of 12 inches. When completed, the static head was at 321 feet. In 1967, a 0.5 million gallon Board of Water Supply reservoir was constructed adjacent to the capped well. (Plates 1 and 2) This reservoir stores water from Haiku Tunnel and primarily serves the Haiku Plantation subdivision.

The Board of Water Supply (BWS) plans to install a pump and related infrastructure to bring Iolekaa Well into production by 1984. Approximately 0.3 million gallons per day (mgd) will be pumped from Iolekaa Well into the adjoining reservoir. This will "free" the same amount of water from the Haiku Tunnel to service windward Oahu from Kaneohe through Waimanalo. Any surplus water would be exported to the Honolulu Water District.

Proposed facilities will cost an estimated $0.5 million at 1981 prices. Facilities will include a submersible pump (to muffle pump noise), a 5' x 16' motor control center, a 1,000 gallon hydro-

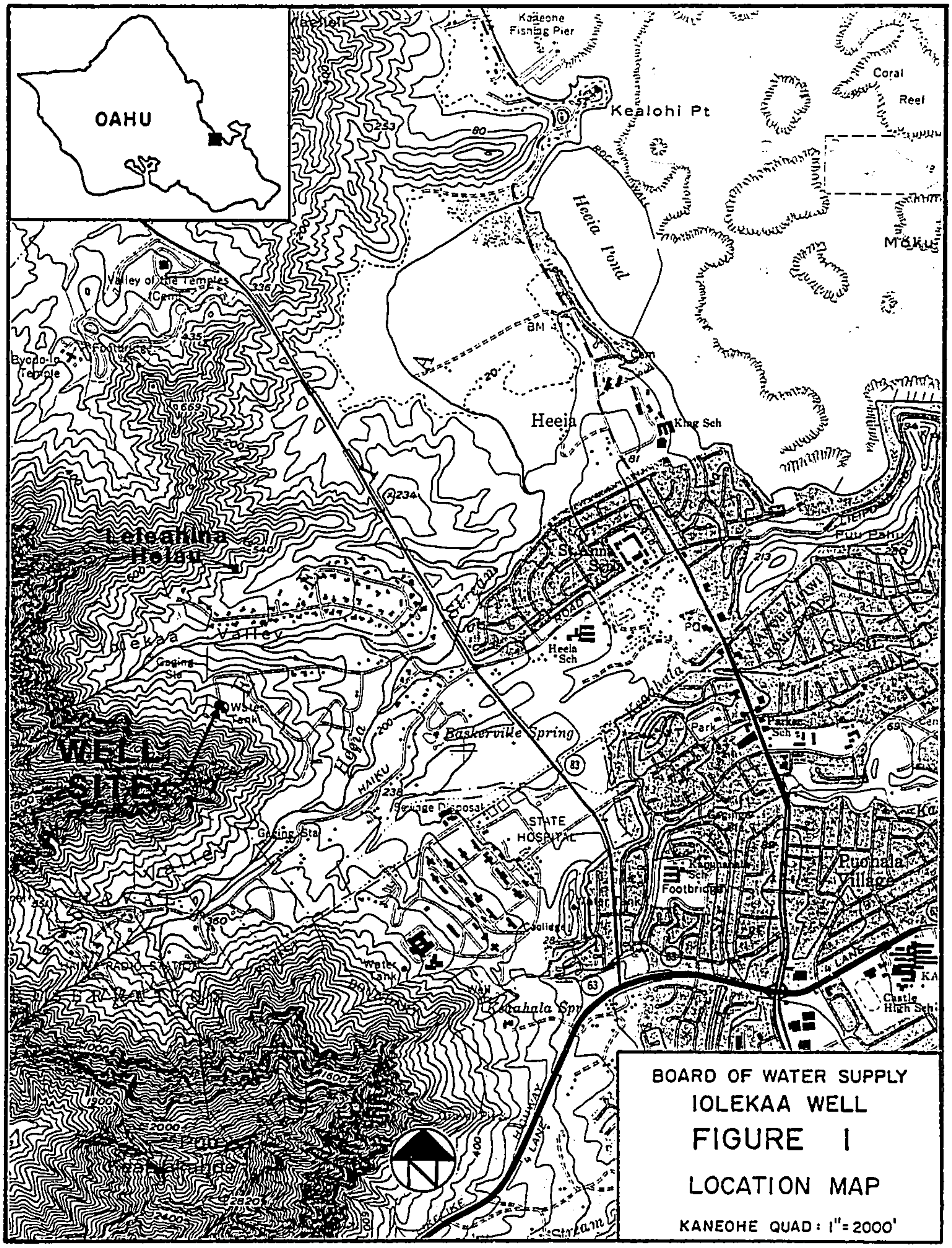
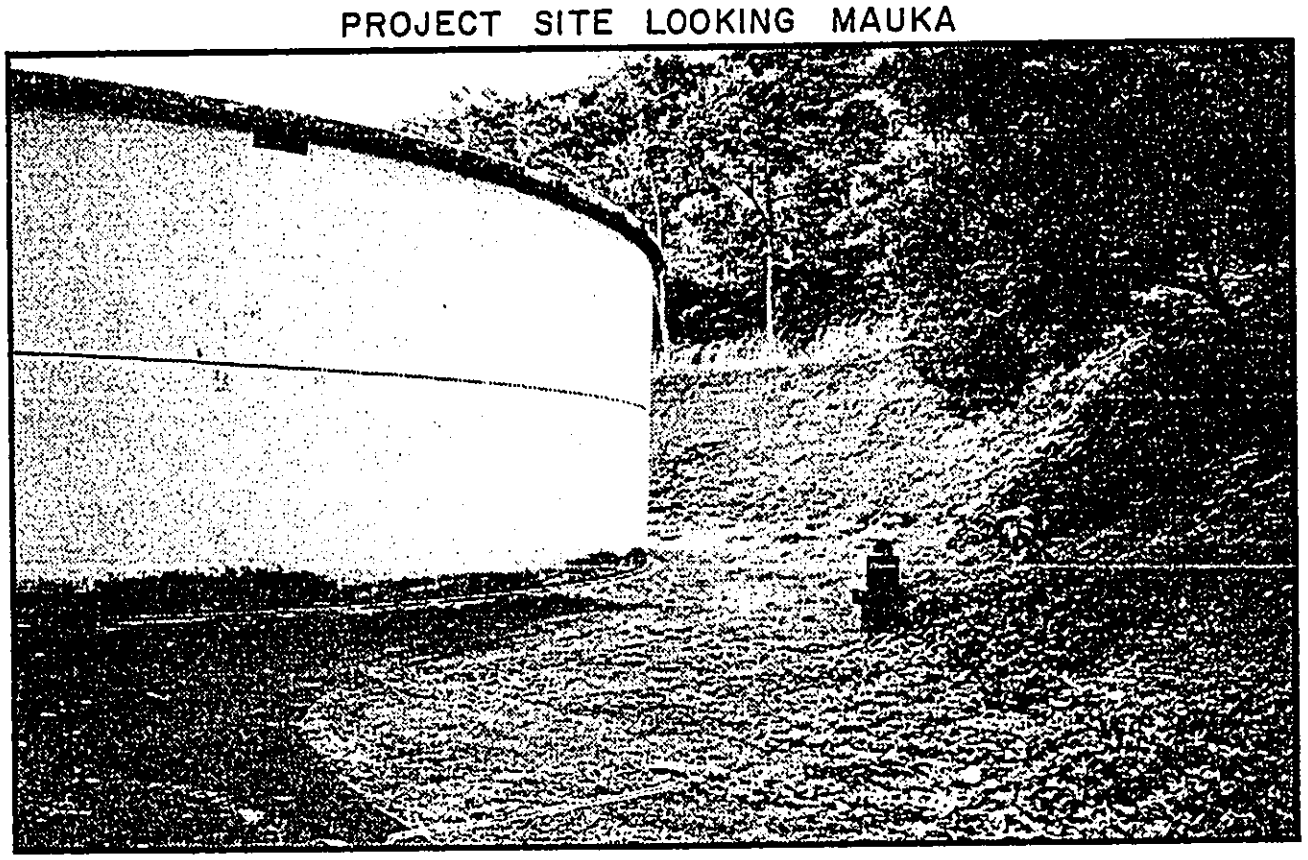

OAHU
Kaaeone Fishing Pier
Kealohi Pt
Coral Reef
Heeia Pond
Heeia
King Sch
Valley of the Temples
Byodo-In Temple
Leleahina Heiau
Valley
Gaging Sta
WELL SITE
Baskerville Spring
HAIKU
Sewage Disposal
STATE HOSPITAL
Heeia Sch
PO
Park
Puohala Village
Footbridge
Castle High Sch
BOARD OF WATER SUPPLY
IOLEKAA WELL
FIGURE 1
LOCATION MAP
KANEOHE QUAD: 1"=2000'

PLATE 1

PROJECT SITE LOOKING MAKAI

PLATE 2

PROJECT SITE LOOKING MAUKA



pneumatic tank, and an 11' x 18' pump room primarily containing hydropneumatic system pumps and controls, an air compressor, an irrigation pump, and a chlorinator. The pump room, motor control center, and hydropneumatic tank will be partially sunk into the hillside mauka of Iolekaa Well while other facilities will be placed on the open terrace close to the well. A site plan is shown in Figure 2. No alterations of Iolekaa Well are proposed.

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 Iolekaa Well 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. These estimates are based on 1978 "II-F" population projections by the State Department of Planning and Economic Development and use assumptions about population and employment distribution 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. To prevent further salt water encroachment into the fresh water lens, 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. 4) Water from windward sources not used for windward needs will be pumped around Makapuu to Hawaii Kai. This may "free" water from leeward sources that now is used in Hawaii Kai for use elsewhere in the Honolulu Water District.

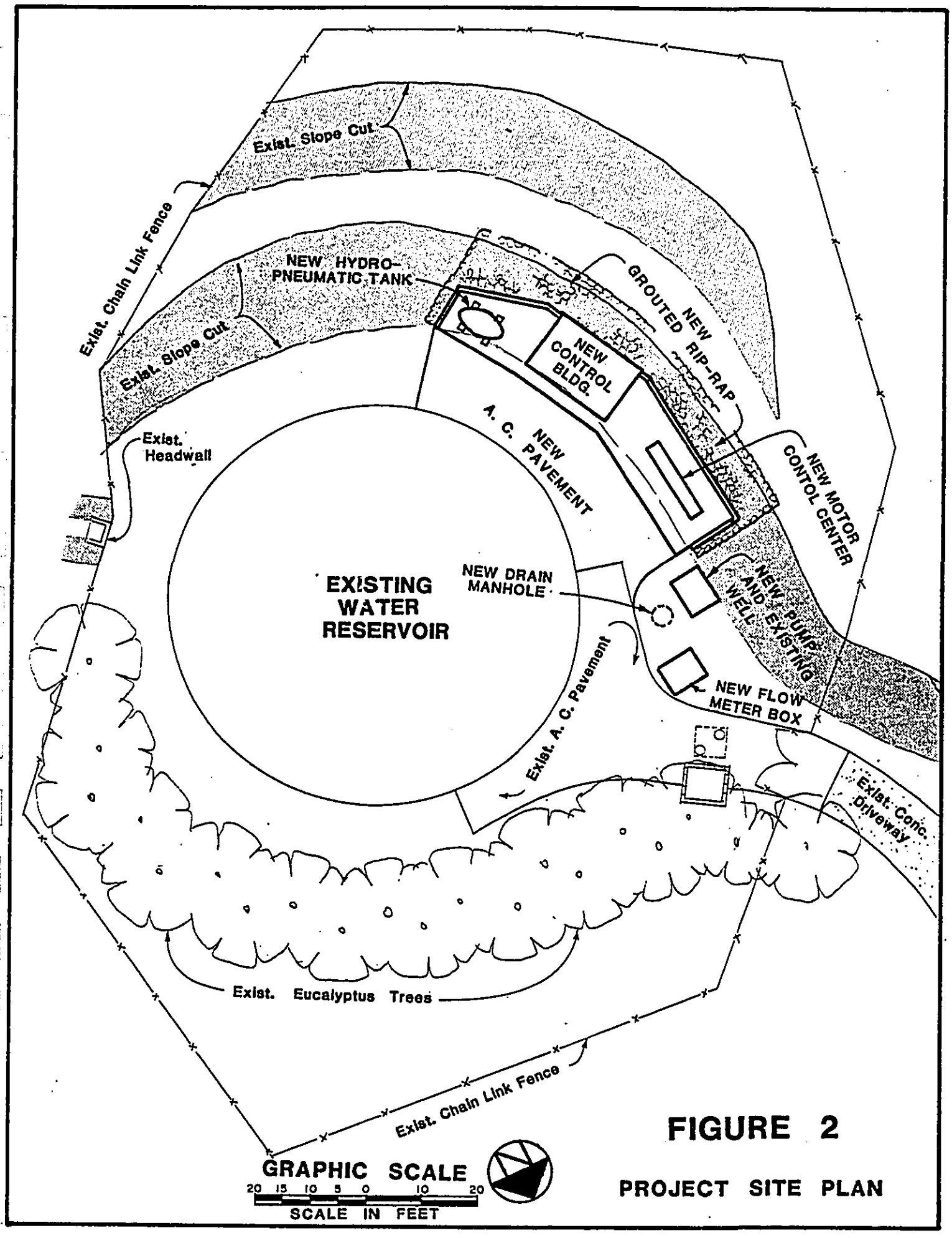


FIGURE 2

PROJECT SITE PLAN

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.

II. DESCRIPTION OF THE ENVIRONMENTAL SETTING

Potential areas of concern for an analysis of Iolekaa Well's environmental impacts include the project site, nearby streams tributary to Heeia Stream, and the Heeia wetlands into which Heeia Stream flows. If Iolekaa well significantly decreases stream flow, then there could be adverse effects on stream and wetland fauna.

A. PROJECT SITE

1. Aesthetics. Iolekaa Well, the adjoining BWS reservoir, and the terrace on which they are situated are shown in Plates 1 and 2. The project site is at the mauka end of a steep access road and is visible from a few houses in the Haiku Plantation Subdivision. A row of eucalyptus trees makai of the project area shields most of the site from view from Kaneohe.

2. Soils. The terrace area and adjacent slope shown in Plate 2 are weathered basalt which have been denuded of top soil. Undisturbed soil on the surrounding slopes is well-drained silty clay developed on colluvium from the Koolau Range. The Soil Conservation Service has classified soils in the area as Lolekaa series. [Ref. 32, p.83, Map 59]

3. Climate. Most rain in Kaneohe results from cooling of warm moist air when the predominant northeast trade winds are deflected up by the Koolau Range. Kona (southerly) winds occasionally bring rain to the entire island. Average annual rainfall increases from 50" near the coast to 100" near the crest of the Koolau Range immediately inland of Iolekaa Valley. At the project site, rainfall averages 75" per year. The average monthly temperature at the well site ranges from 69° to 79°. [Ref. 20, pp. 8, 9]

4. Air Quality and Noise. There are no significant air pollution sources in the project area. Noise measurements were made at the project entrance gate in the afternoon on a day with light trade winds in February 1981. The ambient sound level ranged from 40 to 45 dBA, which is typical of rural settings.

5. Vegetation and Wildlife. The terrace area and adjacent slope were cleared of vegetation when grading took place in 1966. Absence of top soil has retarded return of plant life. Most of the grasses and shrubs present are introduced species and none are rare native species.

The vegetation at the project site does not provide habitat for any rare or endangered species and is not particularly attractive to introduced species. No animals were observed during a site inspection in February 1981,although native forest birds could conceivably visit the site.

6. Current Use. Access to the project area is restricted by a chain link fence and locked gate at the end of the access road. Hence, the project area is used only by the BWS as described above.

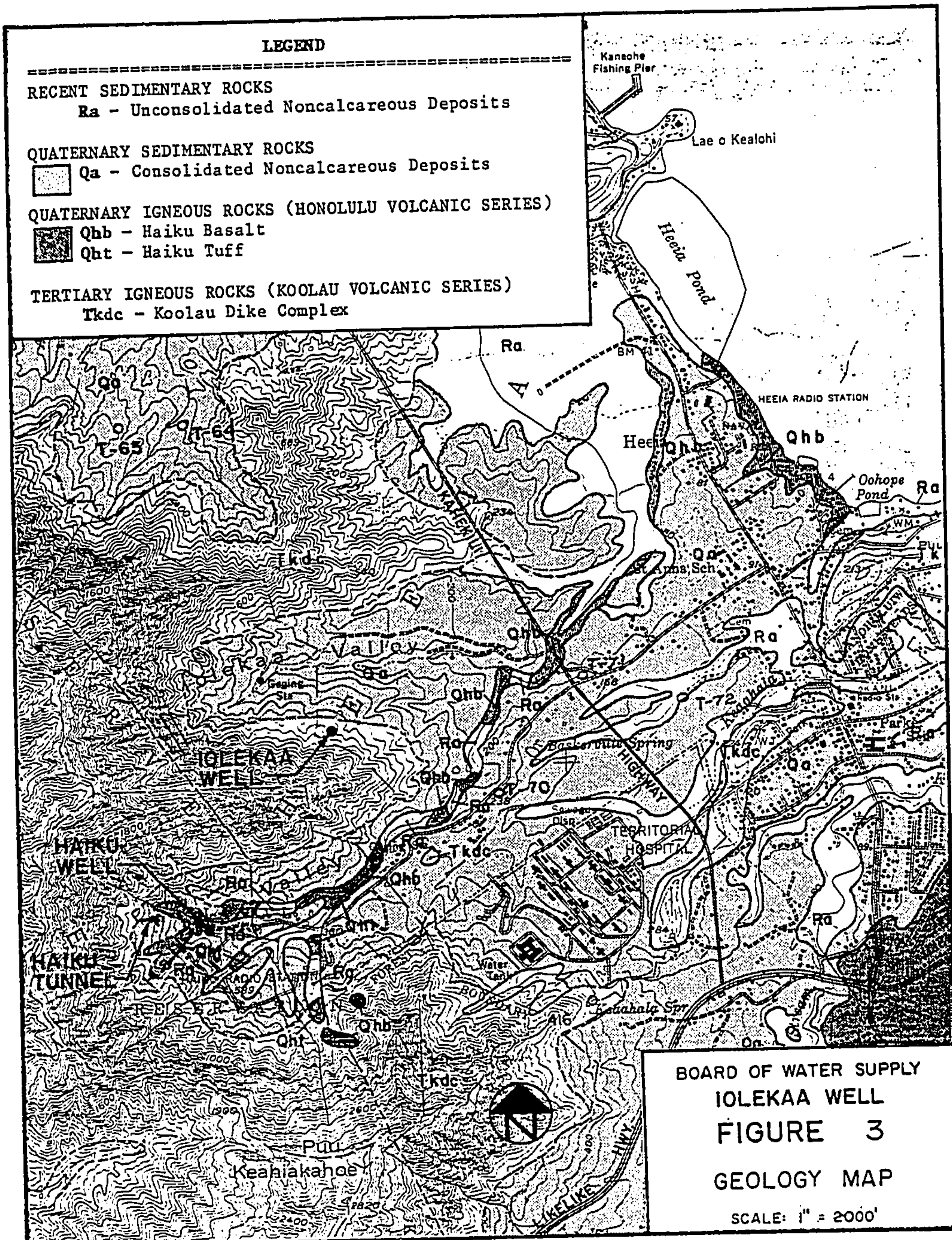
7. Infrastructure. Water and electrical power are available at the site. Sewer and gas service are not.

8. Archaeological Features. The nearest known archaeological site is the Leleahina Heiau (Site No. 329), located on a ridge on the opposite side of Iolekaa Valley [Figure 1]. Heeia Fish Pond (Site No. 327) has also been designated as a historical site. It is unlikely that there ever were archaeological remains at the project area. Grading of the terrace and adjacent slopes has virtually eliminated any possiblity of finding Hawaiian artifacts. Should any such materials be encountered during construction, work will be stopped and the State Historic Preservation Officer notified.

9. Geology. As shown in Figure 3, Iolekaa Well penetrates flows of the Koolau volcanic series. The well is in the "dike complex" where volcanic dikes are numerous and closely spaced. Also shown in Figure 3 is Haiku Well which penetrates lava from the Honolulu volcanic series (Haiku Basalt) and underlying consolidated alluvium before entering Koolau basalts in the marginal dike zone.

10. Hydrology. Infiltrated rainfall is stored as high level ground water in the permeable basaltic lava flows of the Koolau Range between relatively impermeable intrusive basaltic dikes. Dikes are formed by molten rock which solidified in the fissure vents 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 erosion. High level ground water moves gradually from dike compartments with higher head to compartments with lower head. Water from dike reservoirs can also discharge directly into streams which have cut into the water-bearing rocks or seep through permeable alluvium and then into streams. Ultimately, ground water which is not lost to evapotranspiration discharges into the ocean via streams, offshore springs, or leakage through basaltic rocks and alluvium.

As shown by high drawdown of the water level in Iolekaa Well during test pumping in January 1966, the well taps ground water in a relatively small dike compartment or in rocks of low permeability. Drawdown stabilized at 118 feet for a pumping rate of 420 gallons per minute (0.6 mgd). The static head of well water was about 321 feet before test pumping. [Ref. 21] By comparison, the maximum elevation of ground water in the Koolau Range mauka of Iolekaa Well is known from borings for the H-3 Freeway to be more than 1,000 feet. [Ref. 24] Spring fed flow of North Halawa, Moanalua and other streams at this elevation suggests ground water discharge from high level dike reservoirs.


LEGEND
RECENT SEDIMENTARY ROCKS
Ra - Unconsolidated Noncalcareous Deposits
QUATERNARY SEDIMENTARY ROCKS
Qa - Consolidated Noncalcareous Deposits
QUATERNARY IGNEOUS ROCKS (HONOLULU VOLCANIC SERIES)
Qhb - Haiku Basalt
Qht - Haiku Tuff
TERTIARY IGNEOUS ROCKS (KOOLAU VOLCANIC SERIES)
Tkdc - Koolau Dike Complex
Kaneohe Fishing Pier
Lae o Kealohi
Heeia Pond
HEEIA RADIO STATION
Oohope Pond
IOLEKAA WELL
HAIKU WELL
HAIKU TUNNEL
Baskerville Spring
TERRITORIAL HOSPITAL
Puu Keahiakahoe
BOARD OF WATER SUPPLY
IOLEKAA WELL
FIGURE 3
GEOLOGY MAP
SCALE: 1" = 2000'

11. Natural Hazards. There are no known natural hazards at the well site. According to the County Flood Insurance Rate Maps, the project site is located in an area designated Zone D, which is an area of undetermined, but possible flood hazards. However, the site is at the top of a knoll making the possibility of flooding unlikely. [Ref. 25]

12. Traffic. Access to the project site is via an easement at the end of Hololio Street.

B. HEEIA STREAM AND TRIBUTARIES

1. Hydrology. As shown in Figures 1 and 4, Haiku Stream and Iolekaa Stream are tributaries of Heeia Stream. Like most perennial windward Oahu streams, the primary source of their discharge is dike-impounded ground water. Above an elevation of 200 feet, these streams gain water where they have cut into dike reservoirs of the Koolau Range. Below this elevation, no dikes are exposed and dike water can only reach the stream beds after seeping through alluvium. Since Iolekaa Steam is perched on consolidated alluvium, [Figure 3] it can also gain flow from rainfall stored in unconsolidated surface alluvial material overlying relatively impermeable alluvial conglomerates. Haiku Stream can also gain flow from rainfall stored in surface alluvium and in lava flows of the Honolulu volcanic series (Haiku Basalt). During storms, stream flow is temporarily increased by surface runoff.

In 1940-41, the 1,320-foot BWS Haiku Tunnel (DOWALD No. 2450-01) was excavated in Haiku Valley at an elevation of 550 feet in order to develop dike-impounded ground water for domestic use. Construction of the Haiku Tunnel lowered the elevation of ground water in the area and is thought to have reduced the discharge of high level springs feeding Haiku, Iolekaa, and (perhaps) Kahaluu

Streams. Construction of a 393-foot BWS water-development tunnel in Kahaluu Valley (DOWALD No. 2651-01) in 1946 at an elevation of 585 feet is believed to have had a similar but less pronounced effect. [Ref. 14; Ref. 18, p. M11; Ref. 20, pp. 102-3]

Water from the Haiku Tunnel is carried in a transmission main across the property of the U.S. Coast Guard Haiku Omega Station. As a result of an informal agreement, the Omega Station has an unmetered hookup to the transmission main near the tunnel portal. About 0.005 million gallons is pumped to the Omega Station every 3 to 4 weeks. [Ref. 33]

For several decades the BWS did not restrict the flow of water out of Haiku Tunnel, and the Coast Guard pump would occasionally suck air and burn out its bearings. To protect the Coast Guard pump, and to store water for use during periods of high demand, the BWS installed a back pressure valve on the transmission main near the Omega Station entrance gate. Beginning sometime in 1979, as evidenced by the decrease in water yield from Haiku Tunnel (Table 1), the back pressure valve has been used to keep the transmission main and Haiku Tunnel portal full of water.

For the last several years, water pressure at the Haiku Tunnel bulkhead has been maintained at a steady 13 to 14 pounds per square inch. Hence, restriction of flow from the tunnel has created a reservoir of water with a static head 30 to 32 feet higher than the elevation of the tunnel invert (550 feet). Despite increased water pressure, BWS personnel have not observed leakage or springs in the vicinity of the tunnel bulkhead. However, effects on the flow of Haiku Stream are unknown.

Because the BWS Haiku Tunnel is higher than the BWS Luluku Tunnel, and both tunnels are connected to the same water system, use of the back pressure valve on the Haiku transmission main has increased average annual yield from the Luluku Tunnel by over 0.5 mgd. This may have reduced leakage from the Luluku Tunnel which fed Luluku Stream.

The only long-term USGS gage on Haiku Stream is located at an elevation of 272 feet [Station H-3 on Figure 4]. Stream flow was

TABLE 1

HAIKU TUNNEL YIELD
[Million Gallons Per Day]

Fiscal Year	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	Mean
1981	0.89	0.98	1.01	0.99	1.10	1.05	0.88	1.03	0.96	0.94	0.99	1.00	0.98
1980	1.09	1.11	1.08	1.09	1.04	1.10	0.96	0.58	0.68	0.65	0.67	0.71	0.90
1979	1.50	1.50	1.50	1.48	1.25	1.02	0.99	1.00	1.06	0.99	1.01	1.03	1.20
* 1978	1.60	1.60	1.60	1.60	1.60	1.60	1.55	1.55	1.50	1.50	1.50	1.50	1.56
* 1977	1.80	1.80	1.75	1.75	1.70	1.70	1.65	1.65	1.60	1.65	1.65	1.65	1.69
* 1976	1.80	1.80	1.75	1.75	1.75	1.80	1.75	1.80	1.85	1.85	1.85	1.85	1.80
* 1975	1.70	1.70	1.70	1.70	1.80	1.80	1.88	1.81	1.82	1.83	1.85	1.85	1.79
1974	1.29	1.20	1.29	1.40	1.38	1.50	1.62	1.70	1.70	1.70	1.70	1.70	1.51
1973	1.98	1.90	1.79	1.78	1.99	1.81	1.61	1.75	1.70	1.70	1.61	1.47	1.76
1972	2.09	2.03	1.77	1.78	1.96	1.76	1.84	1.96	2.10	2.09	2.00	2.00	1.95
1971	2.06	2.11	2.26	2.02	2.01	1.80	1.88	1.92	1.84	1.78	2.02	2.02	1.98

* Estimated
Source: BWS

monitored between 1914 and 1919, and again between 1939 and 1977. The mean stream discharge at this station was approximately 1.4 mgd. The instantaneous maximum recorded discharge was 3,710 mgd (on 5/2/65) and the minimum was 0.13 mgd (on 7/20/57 and 9/17/61). The only long-term USGS gage on Iolekaa Stream is located at an elevation of 320 feet [Station I-2 on Figure 4]. Stream flow was monitored between 1940 and 1970. The mean stream flow was 0.4 mgd. The instantaneous maximum recorded discharge was 515 mgd (on 5/2/65) and the minimum was 0.04 mgd (on 2/12/67). [Ref. 17, p. 250; Ref. 19, p. 159] In addition to its long-term gages, the USGS has taken miscellaneous measurements along Heeia Stream's tributaries during dry periods when ground water supplies all of the stream base flow. Available flow data in mgd and measurement points are summarized in Figure 4.

While the complexity of the dike zone makes it extremely difficult to predict how ground water will move when BWS wells are pumped, the data presented in Figure 4 provides useful information on the elevation at which water enters the Heeia Stream system. Both tributaries are fed by ground water above an elevation of approximately 400 feet (i.e. measurements at that elevation record base flow). In general, both streams gain water down to an elevation of at least 90 feet (the lowest stream measurement point). The data in Figure 4 shows that Haiku Stream has a significant gain in base flow between the elevations of 272 feet and 145 feet, but Iolekaa Stream has only minor gains over the stretch that has been measured. (On several occasions the base flow of Iolekaa Stream decreased, probably due to storage in the alluvium of the stream bed.) These differences in water gain reflect variations in the structure of the dikes through which the streams have cut, and the relative capacity of the stream watersheds to store rainfall in surface alluvium.

2. **Stream Fauna.** Hawaii's native stream macrofauna includes six species of fish, two species of shrimp, and two species of mollusk. (Five of the fish species are endemic and one 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

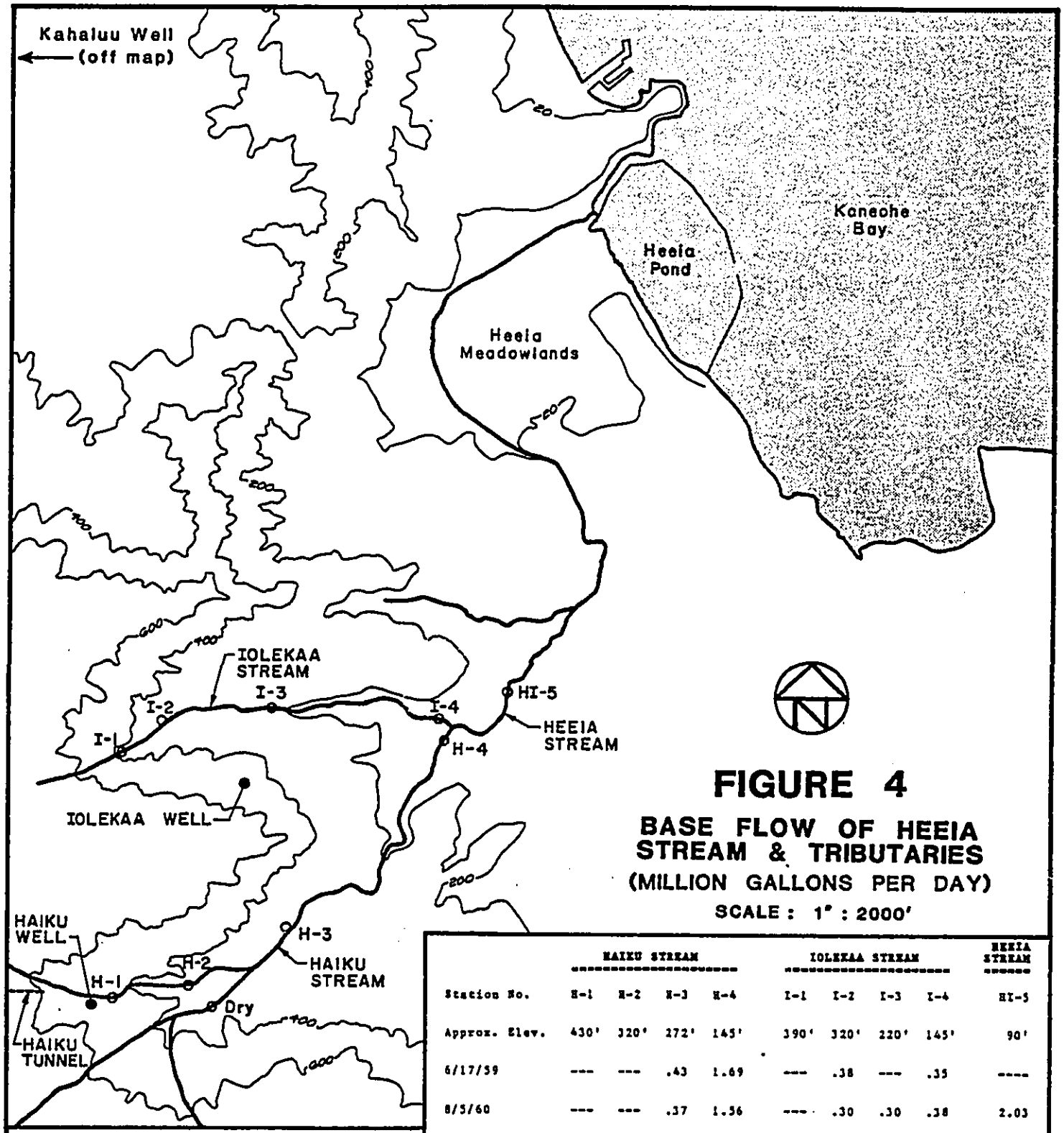


FIGURE 4

BASE FLOW OF HEEIA STREAM & TRIBUTARIES

(MILLION GALLONS PER DAY)

SCALE : 1" : 2000'

	HAIKU TUNNEL	HAIKU WELL	IOLEKAA WELL
OOWALD NO.	2450-01	2450-02	2549-01
Ground Elevation	550'	497'	485'
Static Head	*	327'	321'

*Controlled by bulkhead

	HAIKU STREAM				IOLEKAA STREAM				HEEIA STREAM
Station No.	H-1	H-2	H-3	H-4	I-1	I-2	I-3	I-4	HI-5
Approx. Elev.	430'	320'	272'	145'	390'	320'	220'	145'	90'
6/17/59	---	---	.43	1.69	---	.38	---	.35	----
8/5/60	---	---	.37	1.56	---	.30	.30	.38	2.03
1/30/61	.67	.90	.88	----	---	.36	---	---	----
3/8/61	---	---	.99	----	.29	.32	.34	---	----
8/11/61	---	.27	.37	1.47	---	.30	---	.18	1.76
1/24/62	.32	---	.73	----	---	.26	---	.34	2.00

Notes: 1. Stations H-3 and I-2 are long-term USGS gages.
2. There is a small taro farm between Stations I-2 and I-3.

Sources: Ref. 16; Ref. 20, Plate 3; Ref. 22

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. 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. 9, pp. 27-30; Ref. 12, pp. 6-14]

Heeia Stream has been altered with both lined concrete channels and elevated culverts. As previously discussed, average and base stream flow have been reduced by BWS water-development tunnels in the 1940s.

Two recent surveys of Heeia Stream makai of the lined channels and culverts (at Kahekili Highway) found that almost all stream macrofauna were introduced species. (See Appendix B.) Swordtails and guppies were the most abundant aquatic organisms. Two of the more common species of native goby were present in the lower portion of Heeia Stream, but native shrimp and snails were not observed. Mauka of Heeia Stream channel alterations, the same surveys found that almost all Haiku Stream macrofauna were introduced species. Guppies were the most abundant aquatic organisms. One of the native species of shrimp (Atya bisculcata) was present, but native fish and mollusks were not observed. [Ref. 9, p. 127; Ref. 12, pp. 7,11] Iolekaa Stream was not surveyed in these studies due to its low flow. However, casual observations by VTN Pacific personnel in February 1981 found its fauna to be similar to Haiku Stream. A number of Hawaii's native stream fauna are considered to be endangered or threatened (though not officially listed under the Endangered Species Act). However, none of these have been found in the Heeia Stream system.

3. Agricultural Water Use. A BWS field survey for the Haiku Well EIS found four agricultural enterprises which use water from Heeia Stream and its tributaries: a small taro patch at an elevation of about 300 feet adjoining Iolekaa Stream, a small truck farm where Heeia Stream enters the Heeia Meadowlands, and two cattle ranches at the makai end of the Meadowlands. However,

one of the ranches is primarily dependent on water supplied by the BWS. The total amount of agricultural use of stream water is estimated by the Hawaii Agricultural Reporting Service as less than 0.005 mgd. [Ref. 35, p. 18]

C. HEEIA MEADOWLANDS

1. Hydrology. The Heeia wetlands currently consist of a 35 acre mangrove swamp and approximately 120 acres of low wet grassy meadowlands along the makai portion of Heeia Stream. [Figure 3] An abandoned 85 acre fishpond is located at the mouth of Heeia Stream. Heeia Stream is the principal source of fresh water entering the fishpond. [Ref. 12, p. 40] Average annual rainfall on the Heeia wetlands (50 to 55 inches) is about equal to average annual evapotranspiration. [Ref. 20, pp. 8, 9, 20-22] The wetlands are situated over the dike complex and are formed by ground water coming to the surface as it flows seaward. Heeia Stream helps to maintain the wetlands when the water table periodically drops with dry weather. Low soil permeability and low gradient promote constant saturation. Since 1930, the wetlands have declined in area, which in part may be due to a permanent lowering of the water table. [Ref. 12, pp. 36, 46]

2. Vegetation. In 1900, as a result of extensive rice and taro production, the Kaneohe Bay Region contained an estimated 1,300 acres of wetlands. Large parts of what are now the Heeia wetlands were also under cultivation. By 1968, because of urbanization and the decline of wetland agriculture, the Heeia wetlands comprised 155 acres of the estimated 222 acres of wetlands remaining in the Kaneohe Bay Region. Because the Heeia wetlands are privately owned, within the State Urban District, and zoned R-6 by the County, they also are threatened with residential development.

Since the establishment of mangroves in Hawaii during the 1930s, two species of mangroves have formed dense growths around the

mouth of Heeia Stream and most of the interior perimeter of Heeia Fishpond. Hau and milo are present, but not abundant, in the mangrove swamp. The predominant vegetation in the wet meadowlands is paragrass. Primrose willow, bulrush, arrowhead, and honohono grass are also common. No rare or endangered native species are present. [Ref. 1, pp. 89-93; Ref. 12, pp. 40-42]

3. **Fauna.** The Heeia wetlands provide habitat for two endangered endemic waterbirds: the Hawaiian gallinule and coot. Other birds frequenting Heeia marsh include the black crowned night heron, cattle egret, Hawaiian owl, and various shorebirds. [Ref. 12, p. 42; Ref. 11, p. 109] The Hawaiian Waterbirds Recovery Plan classifies the Heeia wetlands as a "secondary" habitat for endangered waterbirds, i.e., an area that should be preserved, but of lower priority than other areas. However, Dr. Robert Shallenberger, who is one of Hawaii's leading authorities on native waterbirds, considers the Heeia marsh to be of major significance as habitat for the Hawaiian gallinule. [Ref. 10, p. 39; Ref. 11, pp. 105, 109]

The U.S. Fish and Wildlife Service believes that lowering of the water table in the Heeia wetlands (association with reduction of Heeia Stream flow in the 1940s) has caused significant adverse impacts on waterbird habitat. Habitat has also been adversely affected by inland erosion, artificial filling, and introduction of predators. [Ref. 12, p. 46] Without artificial creation of shallow water impoundments and removal of excess vegetation, the quality and quantity of waterbird habitat is likely to continuously decline as silt is trapped within the Meadowlands and mangroves encroach within the Heeia estuary. [Ref. 11, p. 263]

III. ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

A. PROJECT SITE

The proposed action will increase the number of structures on the project site. However, the site is only visible from the several residences located nearby. The pump for the well will be a submersible type to prevent noise from annoying nearby residents.

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 and exhaust emissions in compliance with DOH codes. Construction equipment will mostly remain on site and will not significantly affect traffic in the Haiku Plantation Subdivision.

Development of production facilities for the most part will only require removal of a few common introduced plants. No rare or endangered species will be affected. Likewise, development of proposed facilities will not affect any rare or endangered species of birds, mammals, or snails. Effects on common species also will be negligible.

There are no known archaeological resources at the Iolekaa Well site. Known sites in the area are too distant to be affected by the proposed action. If any cultural materials are encountered, then construction will stop and the BWS will notify the DLNR Historic Sites Office.

B. HEEIA STREAM AND TRIBUTARIES

Since ground water is the source of the base flow in Heeia Stream and its tributaries, removal of ground water potentially could reduce

stream flow. The degree to which water withdrawal from Iolekaa Well would affect Iolekaa or Haiku Stream is very difficult to predict since the relationship between stream flow and ground water is very complex. There are four basic ways that a well in a dike compartment could reduce stream flow:

1) If the dike compartment tapped by the well directly discharges to the stream, and if the well lowers the water level below the discharge point, then an immediate reduction in stream flow would occur. This effect could be anticipated if the well is close to the stream and the water level (static head) in the well prior to pumping is at a slightly higher elevation relative to a nearby spring or point of water gain within the stream bed.

2) The dike compartment that is tapped by the well might not directly discharge to the stream, but it might overflow into other dike compartments or alluvium which at some lower point discharge into the stream. If this overflow is intercepted by the well then the lower dike compartments or alluvium might not have excess water to discharge to the stream. The well could thus reduce or eliminate a point of stream gain at an elevation below the static head of the well. This effect may not be detected by standard test pumping procedures, but might show up only after a long period of drawdown in the dike compartment.

3) The previous two avenues of impact to stream flow have been based on the idea of water overflowing the top of a dike compartment. However, water also flows through dikes. The amount of this leakage is a function of, among other things, the water pressure in dike compartments. If a well lowers the head in a dike compartment, then there would be less pressure and less water would leak out. If this leakage shows up as a spring, then the flow of the spring would be reduced.

4) In cases where water flows through dikes, if a well lowered the water level in one dike compartment, then there potentially could be greater leakage from adjacent ("upstream") compartments. Other things being equal, if two dike compartments are hydraulically connected, then the leakage between them will be proportional to their difference in head. Hence, it theoretically

is possible for a well to increase leakage out of "upstream" dike compartments and thus reduce dike reservoir discharge into streams above the static head of the well. However, given the complexity of prismoidal dike reservoirs, it is much more likely for a high level well to affect stream base flow below rather than above the static head of the well.

Unlike wells, water development tunnels typically drain many dike compartments and can have far-reaching effects on springs and stream flow above the elevation of the tunnel. For example, some hydrologists believe that the Haiku Tunnel reduced the base flow of Kahaluu Stream, 2-1/2 miles away. [Ref. 20, p. 70]

The Iolekaa Well is 1,500 feet from Iolekaa Stream and 2,500 feet from Haiku Stream. The complexity of the dike zone reduces the likelihood that the compartment tapped by the well discharges directly to either stream. Three hours of test pumping of Iolekaa Well at 0.6 mgd on January 27, 1966 did not appear to affect the flow of either Iolekaa or Haiku Stream at the respective USGS gages. [Ref. 17, pp. 247, 250; Ref. 21] Also, USGS measurements have shown that continuous pumping of the new BWS Haiku Well at 1.4 mgd for five days in February 1981 did not adversely affect the flow of either Haiku or Iolekaa Stream. [Ref. 22] The BWS plans to pump 0.3 mgd from the Iolekaa Well and 1.0 mgd from the Haiku Well. It is therefore reasonable to assume that these wells will not have a direct and immediate impact on stream flow. However, one or more of the indirect impacts described above might eventually occur, especially considering the cumulative effect of both wells.

The tunnels for the proposed H-3 highway in Haiku Valley are unlikely to affect the flow of Heeia Stream and its tributaries. The invert of the lowest point of the H-3 tunnels will be higher than the highest level ground water that was encountered during construction of BWS tunnels. [Ref. 23, Appendix 4.(g); Ref. 24, p. 200]

The dynamics of ground water in the dike zone are not well enough understood to predict the amount of stream flow reduction that might occur with a given rate of water withdrawal. Nevertheless it is possible to estimate a worst case loss of stream flow assuming a well will not affect stream base flow above the static head of the well

(321 feet for Iolekaa Well and 327 feet for Haiku Well). Based on very limited data [Figure 4], Iolekaa Stream appears to gain almost no base flow below an elevation of 320 feet, while Haiku Stream gains most of its flow below an elevation of 320 feet. If the Haiku and Iolekaa Wells intercept all of the gain in base flow below an elevation of 320 feet (which is virtually impossible), then the loss would amount to roughly 1.0 mgd or 50% of the base flow at the 90-foot elevation on Heeia Stream [HI-5, Figure 4].

The actual base flow reduction is likely to be less than 1.0 mgd, and could possibly be minor, but it can not be determined without long-term flow measurements. In order to determine the potential for impacts on base stream flow, the BWS will contract with the U.S. Geological Survey to reactivate a gaging station on Haiku Stream at an elevation of about 270 feet and take supplemental stream flow measurements at lower elevations. It will be necessary to monitor stream flow below the juncton of Haiku and Iolekaa Streams to determine the extent to which the BWS Haiku and Iolekaa Wells have affected the base flow of Haiku Stream.

In order to prevent long-term adverse impacts on stream flow, pumpage from the BWS Iolekaa and/or Haiku Wells will be reduced as necessary to implement minimum stream flow standards when such standards are adopted by the State. In the absence of specific guidelines, the BWS will consult with the U.S. Fish and Wildlife Service to determine times when pumpage should be curtailed to protect stream habitat. Another possible approach would be to restore stream flow by releasing water from the bulkhead at Haiku Tunnel or by pumping a little water from Haiku or Iolekaa Well back into the stream. This kind of engineering solution would have an immediate effect on stream flow whereas there could be a substantial lag between a reduction in well pumpage and an increase in spring-fed stream flow. From the standpoint of temperature, water quality, and dissolved oxygen, it makes little difference whether ground water enters Haiku Stream from a water tunnel, well, or natural spring.

In theory, preservation of sufficient base flow can help to keep native stream ecosystems intact. However, it should be kept in mind that Heeia Stream and its tributaries already provide poor habitat for native stream macrofauna.

C. HEEIA MEADOWLANDS

Planned BWS wells may cause a minor reduction in the amount of ground water reaching a long section of the Kaneohe Bay coastline including the Heeia Meadowlands. Implementation of minimum stream flow standards could help to preserve waterbird habitat in the Heeia Meadowlands, since the stream is an important source of water during periods of dry weather. Nonetheless, even with minimum stream flow standards, unless silt and vegetation are removed from the wetlands, the amount of open water will continue to decline to the point where there is very little habitat left for endemic waterbirds.

D. GROWTH AND LAND USE

Production of groundwater for domestic use by Iolekaa Well 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 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 Iolekaa Well will be to meet the need of windward Oahu, any excess water can be exported to Honolulu. Water from the Pearl Harbor aquifer not needed in Honolulu could then be used in the Pearl Harbor District.

E. UNAVOIDABLE ADVERSE IMPACTS

No significant unavoidable adverse impacts would result from putting Iolekaa Well into production. BWS measures to avoid impacts to stream base flow are believed to be sufficient to protect stream macrofauna and waterbird habitat.

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

Once production facilities are installed at Iolekaa Well, the BWS will be committed to using them. High level ground water in the Koolau Range is a renewable resource. Water withdrawal will not exceed sustainable yield and will be controlled to maintain any minimum stream flow standards established by the State.

The only non-renewable resources that will be committed to the project include relatively minor amounts of materials and labor.

G. GOVERNMENTAL 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 implementation of the Oahu General Plan and the Hawaii State Plan.

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

Proposed production facilities at Iolekaa Well 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)
>
> 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, Iolekaa Well will provide a portion of the water needed to accommodate population growth indicated in the 1977 Oahu General Plan. Also, appropriate mitigation measures will be used to ensure that the project will not significantly affect rare or endangered species, natural or historic resources, wildlife habitats, perennial streams, or scenic resources. A full discussion of impacts is contained in Chapter III.

State land use controls are designated in Section 226-52, Hawaii Revised Statutes. 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). The LUC has four classes of land use: Urban, Rural, Agricultural, and Conservation. The BLNR regulates use of lands which the LUC has classified within the Conservation District, while the counties regulate land use in the other districts. The Iolekaa Well site, the Heeia Meadowlands, and most of Heeia Stream and its tributaries are currently classified within the Urban District. LUC Land Use District Regulations indicate that the purpose of the Urban District is to accommodate "city-like" concentrations of people, structures, streets, and related land uses. The proposed use of the project site is compatible with the purposes of this district.

B. STATE COASTAL ZONE MANAGEMENT PROGRAM

The State Coastal Zone Management (CZM) Program explicitly requires public agencies to protect the habitat of waterbirds and diadromous stream macrofauna. (Ref. 27, pp. 61-63) The 1978 State CZM Program document also calls for the State Department of Health (DOH) to adopt minimum stream flow regulations to protect coastal ecosystems. (Ref. 27, pp. 210-11) Because the DOH has not adopted minimum flow

regulations, Act 185, SLH 1982 (Chapter 176D, HRS), assigned responsibility to the State Department of Land and Natural Resources (DLNR) to promulgate instream flow standards for windward Oahu streams.

At this time, the DLNR has not made a specific proposal concerning appropriate flow standards for any perennial stream in Hawaii. Regardless, the BWS intends to monitor stream flow and reduce pumpage from wells as necessary to meet any minimum flow standards that the DLNR may establish for Heeia Stream and its tributaries. Thus the BWS will achieve compliance with the Hawaii CZM Program by mitigating possible adverse impacts to coastal ecosystems.

C. COUNTY GENERAL PLAN AND ZONING

As discussed in Chapter III, Iolekaa Well will develop water to accommodate growth and development proposed in the 1982 Oahu General Plan. However, the project will not in itself induce new development or direct 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.

The well site is zoned R-1. Proposed facilities are a permitted use 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. Trapping Storm Runoff
   5. Taking Stream Water
   6. Taking Agricultural Water
   7. Increasing Water Prices

A. NO PROJECT

Over the next several decades, total Oahu water demand is projected to increase to the point where the BWS will have to seriously explore al 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 undoubtably 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 an extensive investigation for new sources pursuant to BWS long-range island-wide water development plans. [Ref. 4] However, other well sites will not serve as alternatives to Iolekaa Well 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 leeward Oahu well sites, many of the possible 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 feasibly serve as an alternative to Iolekaa Well 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 atter 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 bored 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 behind the dike compartment. 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. 20, p. 105] The potential additional water supply from bulkheading has been estimated to be as much as 30 mgd. [Ref. 31, p. 56] However, based on past performance, the actual amount might be much less than this.

In fiscal year 1980-81, approximately 12% 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 beeen 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 1977, construction of a 20

mgd reverse osmosis demineralization plant to treat water from the Pearl Harbor Springs would cost approximately $11 million. (Ref. 30, p. 22) The total annual cost of potable water from this plant would have been approximately $412 per million gallons. However, 2/3 of this cost is for electric power. (Ref. 29, p. 40) The major disadvantage with demineralization is the large amount of electric power required which, on Oahu, is 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 Oahu. Because of high salinity, 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. 34] 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. 17, p. 239] 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 leached out as the water percolates through soil. Since it is not possible to prevent return irrigation water from degrading basal water relative to chlorides and total dissolved salts, it would be counterproductive to use brackish irrigation water above parts of the basal lens which are a source of drinking water. 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.

Initial studies using secondary treated sewage effluent from Mililani Wastewater Treatment Plant indicates that problems with cane productivity and soil retention of salts can be resolved. (Ref. 29, p. 54) However, it would be necessary to upgrade the County Honouliuli Wastewater Treatment Plant to provide secondary treatment before sizable amounts of wastewater would be available for exchange with high quality irrigation water. For that reason, at this time, the most feasible option would be to exchange brackish water for high quality water used to irrigate sugar cane growing above caprock on the Ewa Plain.

4. 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.

5. 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.

6. 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 the high quality irrigation water used to irrigate these fields be provided to the BWS. For example, replacement of 1,000 acres of sugar cane on the Ewa Plain with houses could free over 6 mgd for use by the BWS.

7. 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, 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. 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. 28, 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 Mayor of the City and County of Honolulu.

2. County permits (e.g. erosion control and building) to construct proposed facilities.

3. DOH approval of domestic use of water from Iolekaa Well pursuant to Title 11, Chapter 20, DOH Administrative Rules.

VII. SUMMARY OF UNRESOLVED ISSUES

1. At this time, the DLNR has not established minimum stream flow standards for Heeia Stream and its tributaries.

2. It will be necessary to monitor stream flow in order to determine if there are any cumulative impacts from long-term pumping of the BWS Haiku and Iolekaa Wells. Such monitoring will take place and the BWS will implement any minimum flow requirements which may be established.

VIII. ORGANIZATIONS AND PARTIES CONSULTED

[Comments and Responses Are Reproduced in Appendix A]

A. Federal Government

U.S. Army Corps of Engineers, (A-1, A-23)
U.S. Fish and Wildlife Service (A-2, A-23)
U.S. Geological Survey (A-3, A-24)
U.S. Soil Conservation Service (A-4, A-25)
U.S. Coast Guard, Fourteenth Coast Guard District (A-5, A-26)
* U.S. Army Support Command (A-26)
* U.S. Navy, Naval Base Pearl Harbor (A-27)

B. STATE OF HAWAII

Department of Health (A-6, A-27)
Department of Land and Natural Resources (A-7, A-28)
Department of Planning and Economic Development (A-8, A-30)
Department of Transportation (A-9, A-31)
University of Hawaii
    Water Resources Research Center (A-10, A-32)
* Environmental Center (A-32)
* Department of Agriculture (A-36)
* Department of Defense (A-37)
* Department of Accounting and General Services (A-37)
* Office of Environmental Quality Control (A-38)

C. CITY AND COUNTY OF HONOLULU

Department of General Planning (A-11, A-39)
Department of Housing and Community Development (A-13, A-39)
Department of Land Utilization (A-14, A-40)
Department of Public Works (A-15, A-41)
\# Department of Transportation Services (A-16)
* Department of Parks and Recreation ((A-42)

D. COMMUNITY

\# Hui Malama Aina O Ko'olau (A-18)

* # Kaneohe Neighborhood Board

Kahaluu Neighborhood Board (A-20, A-42)

* Haiku Plantations Association (A-47)

* # Life of the Land

* Sierra Club (A-48)

* # Audubon Society

* Pualani Rivero & Mr. & Mrs. Alvin Le Porte (A-50)

* Mrs. R.T. McCabe (A-52)

* No response to the EIS Prepartion Notice

\# No response to the Draft EIS

REFERENCES

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APPENDIX A

COMMENTS AND RESPONSES

81-2164

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

RECEIVED
BD OF WATER SUPPLY
AUG 10 11 25 AM '81

PODED-PV

4 August 1981

Arl
P/E

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

Dear Mr. Hayashida:

Thank you for the opportunity to review the Environmental Impact Statement (EIS) Preparation Notice for Iolekaa Well, Oahu, Hawaii, sent to us on 24 July 1981. Based upon our review, we provide the following comments.

a. A Department of the Army permit is not required for this project.

b. The proposed well site is not located in any known flood-prone area but in an area of undetermined, but possible, flood hazards (Zone D designation) according to the Flood Insurance Study for the island of Oahu prepared by the Federal Insurance Administration.

We welcome the opportunity to review the draft EIS when it becomes available.

Sincerely,

CLARENCE S. FUJII
Acting Chief, Engineering Division

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU

COPY

August 18, 1981

Mr. Clarence S. Fujii
Acting Chief, Engineering Division
U.S. Army Engineer District, Honolulu
Department of the Army
Fort Shafter, Hawaii 96858

Dear Mr. Fujii:

Subject: Your Letter of August 4, 1981, on the Environmental Impact Statement (EIS) Preparation Notice for Iolekaa Well, Oahu

Thank you for reviewing the EIS Preparation Notice for our proposed water development project. Your letter will be appended and your comments will be incorporated into the revised draft environmental document.

If you have any questions, please contact Lawrence Whang at 548-5221.

Very truly yours,

KAZU HAYASHIDA
Manager and Chief Engineer

cc: WTN Pacific

81-2237

United States Department of the Interior

FISH AND WILDLIFE SERVICE
300 ALA MOANA BOULEVARD
P O BOX 50167
HONOLULU, HAWAII 96850

RECEIVED
BOARD OF WATER SUPPLY
AUG 17 1 01 PM '81
ROOM 6307

AUG 14 1981

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

AM MR
P/E

Re: EIS Preparation Notice -
Iolekaa Well

Dear Mr. Hayashida:

We have reviewed the EIS Preparation Notice for the Iolekaa Well, dated July 14, 1981. Since you have stated the well will not reduce the flow in Heeia, Iolekaa, or Haiku Streams, we do not believe the well will have an adverse impact on fish and wildlife resources.

If after further study of the hydrology involved you believe the flow in Heeia Stream might be reduced, we urge you to contact us so that we may determine the impact on the endangered Hawaiian waterbirds inhabiting Heeia Marsh.

We appreciate this opportunity to comment.

Sincerely yours,

Ernest Kosaka
Project Leader
Office of Environmental Services

cc: NMFS
HDF&G
EPA, San Francisco

A-12

CONSERVE AMERICA'S ENERGY

Save Energy and You Serve America!

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU

COPY

August 26, 1981

RECEIVED
AUG 28 1981
VTN PACIFIC

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

Dear Mr. Kosaka:

Subject: Your Letter of August 14, 1981, on the Environmental Impact Statement (EIS) Preparation Notice for Iolekaa Well, Koolaupoko, Oahu

Thank you for reviewing the EIS Preparation Notice for our proposed project. Your letter will be appended to the draft environmental document.

If our streamflow monitoring indicates a possible reduction in flow, we will contact you for an impact determination on the endangered Hawaiian waterbirds inhabiting Heeia Marsh.

If you have any questions, please contact Lawrence Whang at 548-5221.

Very truly yours,

KAZU HAYASHIDA
Manager and Chief Engineer

cc: VTN Pacific

81-3281
81-2781

United States Department of the Interior

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

August 20, 1981

RECEIVED
BD OF WATER SUPPLY
Aug 24 2 49 PM '81

RECEIVED
SEP 15 1981
VIN PACIFIC

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

Dear Kazu:

Subject: Environmental Impact Statement Preparation
Notice for Iolekaa Well
THK: 4-6-27:11

In response to your letter of July 24, 1981, the staff of the U.S. Geological Survey has reviewed the subject Environmental Impact Statement Preparation Notice.

A-13

The following comments address only the hydrologic aspects of the Preparation Notice.

Chapter	Heading and No.	
II	A-9 Hydrology	After "small dike compartment" add "or rocks of low permeability".
		Change "1000 feet" to read "700 feet"; otherwise the statement will not be in accord with that of B-2.
	B-1 Ueela Stream	Change "Figure 2" on page 10 to read "Figure 3". Flow units for stream measurement in figure 3 should be specified. They are in million gallons per day.
	B-2 Impacts	Change "BWS tunnel drilled" to read "tunnel dug or excavated".
		Change "few USGS measurements of Ueela Stream" to read "few streamflow measurements of Ueela Stream below the confluence of Iolekaa and Haiku Streams".
		Invert of II-3 tunnel is much lower than the reported water level of altitude 1000 feet cited in "A-9".
	B-2 Table 1	Identify Haiku Well also as well 2450-02. Identify

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SEP 11 1981
VIN PACIFIC

Iolekaa well also as well 2549-01. Identify Kahaluu well also as well 2651-03. Show above wells in either figures 1 or 3.

Change "(See Figure 2)" to read "(See Figure 3)".

III B. Ueela Stream — Paragraph is an oversimplification of a complex hydrologic system. Short-term (how short?) test pumping results of the Iolekaa well cannot be used as criteria to indicate that the pumping has no effect of the baseflow of Iolekaa Stream and probably no effect on Haiku and Ueela Streams.

The Iolekaa well taps ground water in rocks of very low permeability in the "dike complex". Drawdown during a pumping test will be excessive in the well bore and in the immediate vicinity of the well. Drawdown will be small and slow in spreading away from the well. Thus, unless the channels intersect ground water in close proximity to the well, it's flow will not be noticeably affected, especially in the short term. In the long term, dewatering and subsequent drawdown of the water level will spread and lower water levels away from the pumped well. The streams then, that are fed by ground water should indicate some decline in base flow unless the source of the water being pumped is other than intercepted ground water. If streamflow is not affected by long-term pumping, a change in the hydrologic cycle whereby some runoff heretofore rejected to sea is infiltrated or net evapotranspiration is reduced, could provide the water being pumped without reducing base flow. This would be a highly desirable situation.

The effect on the base flows of ground-water fed stream by pumping of BWS wells in Haiku and Kahaluu Valleys is more apparent because these wells tap more permeable rocks of the "marginal dike zone".

Sincerely,

Benjamin L. Jones
District Chief

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU

COPY

September 10, 1981

RECEIVED
SEP 15 1981
VTN PACIFIC

Mr. Benjamin L. Jones
District Chief
U. S. Geological Survey
P. O. Box 50166
Honolulu, Hawaii 96850

Dear Mr. Jones:

Subject: Your Letter of August 20, 1981 on the Environmental Impact Statement (EIS) Preparation Notice for Iolekaa Well
TMK: 4-6-27: 11

Thank you for reviewing the EIS for our proposed project. Your letter will be appended to the draft environmental document.

We will incorporate your comments into the draft EIS except your statement that "Invert of H-3 tunnel is much lower than the reported water level of altitude 1000 feet cited in 'A-9'."

The tunnel inverts in the EIS were incorrectly stated. However, in Volume VII of the Final Supplement to the Interstate Route H-3 EIS, the tunnel inverts are at the 1040-foot elevation on the leeward side and at the 765-foot elevation on the windward side. These are the correct tunnel inverts and would now place the inverts above the anticipated water levels.

If you have any questions, please contact Lawrence Whang at 548-5221.

Very truly yours,

For KAZU HAYASHIDA
Manager and Chief Engineer

cc: VTN Pacific

A-4

Planning ((81-2415

United States Department of Agriculture
Soil Conservation Service
P. O. Box 50006
Honolulu, Hawaii
96850

RECEIVED
BD OF WATER SUPPLY
SEP 14 10 13 AM '81

September 9, 1981

Kazu Hayashida
Manager and Chief Engineer
Board of Water Supply
630 South Beretania St.
Honolulu, HI 96843

AM
P/E

Dear Kazu:

Subject: EIS Preparation Notice for Iolekaa Well
TMK: 4-6-27: 11

Thank you for the opportunity to review subject notice. We have no comments to make.

Please direct future requests for comments to me instead of Jack P. Kanalz, State Conservationist.

Thank you.

Sincerely,

STRATFORD L. WHITING
District Conservationist

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

SCS-AS-1
10-79

September 24, 1981

Mr. Stratford L. Whiting
District Conservationist
Soil Conservation Service
U. S. Department of Agriculture
Box 50006
Honolulu, Hawaii 96850

Dear Mr. Whiting:

Subject: Your Letter of September 9, 1981, on the Environmental Impact Statement Preparation Notice for Iolekaa Well, TMK: 4-6-27: 11

A-5

Thank you for reviewing the environmental impact statement preparation notice for our proposed project. Your letter will be appended to the draft environmental document.

If you have any questions, please contact Lawrence Whang at 548-5231.

Very truly yours,

KAZU HAYASHIDA
Manager and Chief Engineer

HHS:am
cc: K. Hayashida
L. Whang
81-2415

81-2284

RECEIVED
DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD
1981 SEP 21 2 46 PM

COMMANDER (dpl)
Fourteenth Coast Guard District
Prince Kalanianaole Federal Bldg.
300 Ala Moana Blvd
Honolulu, Hawaii 96850
11000
20 AUG 1981

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SEP 14 1981
VIN PACIFIC

AM ACER
P/E

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:

The Fourteenth Coast Guard District has reviewed the Environmental Assessment for the Iolekaa Well and has no objection or constructive comments to offer at the present time.

It is requested that future environmental correspondence be submitted to:

Commander(dpl)
14th Coast Guard District
300 Ala Moana Blvd.
Honolulu, Hawaii 96850

Thank you for your cooperation.

Sincerely,

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

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96843

September 9, 1981

RECEIVED
SEP 14 1981
VTN PACIFIC

Commander J. E. Schwartz
District Planning Officer
Fourteenth Coast Guard District
300 Ala Moana Boulevard
Honolulu, Hawaii 96850

Dear Commander Schwartz:

Subject: Your Letter of August 20, 1981, on the Environmental Impact Statement (EIS) Preparation Notice for Iolekaa Well

Thank you for reviewing the EIS Preparation Notice for our proposed project. Your letter will be appended to the draft EIS.

If you have any questions, please call Lawrence Whang at 548-5221.

Very truly yours,

Kazu Hayashida

KAZU HAYASHIDA
Manager and Chief Engineer

cc: VTN Pacific

A-6

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

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

81-2216

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

RECEIVED
BD OF WATER SUPPLY
Aug 13 3 20 PM '81

August 11, 1981

In reply, please refer to:
File: EPHB-SS

NGR
AM
P/E

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

Dear Mr. Hayashida:

Subject: Request for Comments on Proposed Environmental Impact Statement (EIS) for Iolekaa Well, Kaneohe, Oahu

Thank you for allowing us to review and comment on the subject proposed EIS. It is our understanding that the Iolekaa Well was drilled in 1966 and that it was capped at that time. Additionally, the well has not been used to serve potable water; however, the well is now intended to supply water to the Windward Oahu area.

Please be advised that the Iolekaa Well will be subject to the requirements of Section 29, Chapter 49, Public Health Regulations (PHR), Potable Water Systems. Although the well was drilled prior to the promulgation of Chapter 49, PHR, "grandfather" considerations are not applicable because domestic use was not established prior to August 26, 1977. The well, therefore, will be subject to approval by the Director of Health prior to its use to serve potable water to a public water system. As you are aware, such approval is based upon the submission of an engineering report which adequately addresses all concerns as set down in Section 29, Chapter 49, PHR.

If you should have any questions concerning the requirements of Chapter 49, please contact the Drinking Water Program at 548-2235.

Sincerely,

Brian Y. Y. Choy

For HELVIN K. KOIZUMI
Deputy Director for
Environmental Health

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU

COPY

August 20, 1981

RECEIVED
AUG 28 1981
VTN PACIFIC

Mr. George A. L. Yuen, Director
State Department of Health
P. O. Box 3378
Honolulu, Hawaii 96801

Attention: Mr. Melvin K. Koizumi

Dear Mr. Yuen:

Subject: Your Letter of August 11, 1981 on the Environmental Impact Statement (EIS) Preparation Notice for Iolekaa Well Koolaupoko

Thank you for reviewing the EIS Preparation Notice for our proposed project. Your letter will be appended to the draft environmental document.

An engineering report will be submitted for your approval in compliance with Section 29, Chapter 49, PHR, before the well is used as a domestic water source.

If you have any questions, please contact Lawrence Whang at 548-5221.

Very truly yours,

For KAZU HAYASHIDA
Manager and Chief Engineer

cc: VTN Pacific

A-7

81-2359

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

RECEIVED
SEP 24 1981
VTN PACIFIC

RECEIVED
WATER SUPPLY
J 1 28 PM '81

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

SUSUMU ONO, CHAIRMAN
BOARD OF LAND & NATURAL RESOURCES

EDGAR A. HAMASU
DEPUTY TO THE CHAIRMAN

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

Mgr.
AM
P/E

September 1, 1981

Honorable Kazu Hayashida
Board of Water Supply
630 So. Beretania Street
Honolulu, Hawaii 96813

Dear Mr. Hayashida:

We have reviewed the EIS preparation notice for Iolekaa Well.

The question of whether pumping of the Iolekaa Well will adversely affect streamflows has not been satisfactorily discussed in the document. The EIS should address means by which a determination will be made as to whether pumping of the well will affect adjacent streamflows. This would require gaging of streams over a period of time, and in particular, during low flows.

Our records indicate that this project does not occur on historic properties listed on the Hawaii Register or the National Register of Historic Places, or determined eligible for inclusion on the National Register of Historic Places.

Due to the lack of archaeological surveys in the vicinity, we are not aware that significant resources exist in the project area. This does not confirm the absence of historical, cultural, architectural and/or archaeological resources on the property. In the event that any previously unidentified sites or remains (such as artifacts, shell, bone, or charcoal deposits; human burials; rock or coral alignments, pavings, or walls) are encountered, please stop work and contact our historic sites office at 548-7460 immediately.

Yours very truly,

SUSUMU ONO, Chairman
Board of Land and Natural Resources
and
State Historic Preservation Officer

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU

COPY

RECEIVED
SEP 24 1981
VTN PACIFIC

September 22, 1981

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

Dear Mr. Ono:

Subject: Your Letter of September 1, 1981, on the Environmental Impact Statement (EIS) Preparation Notice for Iolekaa Well

A-8

Thank you for reviewing the environmental assessment for our proposed project. Your letter will be appended to the draft EIS.

We have the following response to your comments:

1. Streamflows in Haiku, Heeia, and Iolekaa Streams will be monitored to determine the long-term effects of pumpage from Iolekaa Well. We are working with the U. S. Geological Survey to establish permanent gaging stations on the streams.

2. In the event any archaeological site or remains are encountered, we will stop all work and immediately contact your office.

If you have any questions, please contact Lawrence Whang at 548-5221.

Very truly yours,

Kazu Hayashida

KAZU HAYASHIDA
Manager and Chief Engineer

cc: VTN Pacific

81-2313

RECEIVED
BD OF WATER SUPPLY
SEP 8 10 39 AM '81

DEPARTMENT OF PLANNING AND ECONOMIC DEVELOPMENT

KAMAMALU H. ARIYOSHI, Governor
HIDETO KONO, Director
FRANK SKRIVANEK, Deputy Director

Kamamalu Building 250 South King St. Honolulu Hawaii • Mailing Address: P.O. Box 2359 Honolulu Hawaii 96804

August 25, 1981

AM
P/E

Ref. No. 3522

RECEIVED
SEP 21 1981
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: Environmental Impact Statement Preparation Notice for Iolekaa Well, Kaneohe, Oahu, Hawaii, TMK 4-6-27:11

Thank you for giving us an opportunity to review the subject EIS Preparation Notice.

Since the Hawaii Coastal Zone Management (CZM) Program's statutory concerns address water quality and quantity practices and wildlife habitats, we recommend that the EIS include a discussion of relevant CZM objectives and policies. This will assist decision-making agencies, since the CZM policies are binding on their actions within the State's coastal zone.

We have no other comments to offer at this time, but would appreciate the opportunity to review the Draft EIS on this project when it is completed.

Sincerely,

Frank Skrivanek

for Hideto Kono

cc: Office of Environmental Quality Control

gn

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU

COPY

September 14, 1981

RECEIVED
SEP 21 1981
VTN PACIFIC

Mr. Hideto Kono, Director
Department of Planning and
Economic Development
State of Hawaii
P. O. Box 2359
Honolulu, Hawaii 96804

Dear Mr. Kono:

Subject: Your Letter of August 25, 1981, on the Environmental Impact Statement (EIS) Preparation Notice for Iolekaa Well, TMK: 4-6-27: 11

A-9

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

We will include a discussion of relevant coastal zone management (CZM) objectives and policies in the draft EIS.

If you have any questions, please contact Lawrence Whang at 548-5221.

Very truly yours,

For KAZU HAYASHIDA
Manager and Chief Engineer

cc: VTN Pacific

81-2105

GEORGE R. ARIYOSHI
GOVERNOR

RECEIVED
BD OF WATER SUPPLY
Aug 4 3 00 PM '81

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

RYOKICHI HIGASHIONNA, Ph.D.
DIRECTOR

DEPUTY DIRECTORS
JACK K. SUWA
JAMES R. CAHILL
JAMES B. McCORMICK
JONATHAN K. SHIMADA, Ph.D.

IN REPLY REFER TO
STP 8.7501

August 4, 1981

AM
P/E

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:

Environmental Impact Statement
Preparation Notice for Iolekaa Well

Thank you for the opportunity to comment on the subject EIS preparation notice.

We have no substance comments to offer to assist you in the environmental assessment process.

Very truly yours,

Ryokichi Higashionna
Director of Transportation

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU

COPY

August 7, 1981

Dr. Ryokichi Higashionna
Director of Transportation
Department of Transportation
State of Hawaii
869 Punchbowl Street
Honolulu, Hawaii 96813

Dear Dr. Higashionna:

Subject: Your Letter of August 4, 1981, on the Environmental Impact Statement (EIS) Preparation Notice for Iolekaa Well

Thank you for reviewing the EIS Preparation Notice for our proposed project. Your letter will be appended to the draft environmental document.

If you have any questions, please contact Lawrence Whang at 548-5221.

Very truly yours,

Kazu Hayashida

KAZU HAYASHIDA
Manager and Chief Engineer

cc: VTN Pacific

A-10

81-2325

RECEIVED
BD. OF WATER SUPPLY
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RECEIVED DPE
SEP 22 1981
VTN PACIFIC

University of Hawaii at Manoa

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

26 August 1981

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

Dear Mr. Hayashida:

Subject: EIS Preparation Notice for Iolekaa Well, TMK: 4-6-27: 11

We have reviewed the subject EIS Preparation Notice and offer the following comment.

On page 14, paragraph C, it is stated that withdrawal of 0.3 mgd directly from Ileia Stream would not significantly affect the wetlands because of the high average (emphasis added) flow. Care should be exercised in using averages because the stress period is during the summer when streamflow is low. Withdrawing 0.3 mgd directly from the stream in the summer may completely dry it up, which then could have significant effects on the wetlands. What needs to be addressed is the mitigative measure to be taken if pumpage adversely affects streamflow during dry periods.

Similarly, pumping tests during the wet part of the year (in this case January 1966) may not show adverse effects on streamflow as well as those done during the dry summer period.

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

Sincerely,

Edwin T. Murabayashi
WRRC EIS Coordinator

ETH:jmn

cc: Y.S. Fok
H. Gee

AN EQUAL OPPORTUNITY EMPLOYER

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU

COPY

September 16, 1981

RECEIVED
SEP 22 1981
VTN PACIFIC

Dr. L. Stephen Lau, Director
Water Resources Research Center
Holmes Hall 283
2540 Dole Street
Honolulu, Hawaii 96822

Attention: Mr. Edwin T. Murabayashi

Dear Dr. Lau:

Subject: Your Letter of August 26, 1981 on the Environmental Impact Statement (EIS) Preparation Notice for Iolekaa Well, TMK: 4-6-27: 11

A-11

Thank you for reviewing the EIS Preparation Notice for our proposed project. Your letter will be appended to the draft environmental document.

We will indicate in the text of the draft EIS that we will reduce or cease pumpage from our wells if streamflow is adversely affected. We are also working with the U. S. Geological Survey to establish gaging stations to monitor the long term effects on streamflow.

If you have any questions, please contact Lawrence Whang at 548-5221.

Very truly yours,

Kazu Hayashida

KAZU HAYASHIDA
Manager and Chief Engineer

cc: VTN Pacific

81-2291

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

EILEEN R. ANDERSON
MAYOR

RECEIVED
BOARD OF WATER SUPPLY
AUG 25 1 19 PM '81

WILLARD T. CHOW
CHIEF PLANNING OFFICER

DGP7/81-2557

August 24, 1981

AM
PIE

MEMORANDUM

TO: Mr. Kazu Hayashida, Manager and Chief Engineer
Board of Water Supply

SUBJECT: Environmental Impact Statement Preparation Notice for Iolekaa Well, TMK: 4-6-27: 11

We have reviewed the EIS Preparation Notice and feel that discussion on the following topics should be included in your EIS.

Impact on Air Quality

Air quality will be affected by the short-term impact caused by the construction of improvements. It is anticipated that during construction, fugitive dust will create a nuisance. An air quality discussion needs to be prepared to determine the impact of the proposed action on nearby residents and the possible mitigation measures.

Impact on Noise

Noise will be generated during construction along the road corridor and at the project site. Discussion should be included regarding steps to curtail noise emissions.

Long-Term Effect on Stream Flows

If operation of Iolekaa Well significantly decreases nearby stream flows, there could be adverse effects at the water-dependent taro farm and Heeia Meadowlands. Although short-term test pumping of Iolekaa Well on January 27, 1966 did not affect the flow of Haiku Stream, and continuous pumping of Haiku Well for five days in February 1981 did not

9

adversely affect the flow of either Haiku or Iolekaa Stream, it has not been determined that the simultaneous pumping of both wells will produce similar results. These points are important to discuss in your EIS.

Ralph Kawamoto

RALPH KAWAMOTO
Planner.

APPROVED:

Willard T. Chow
WILLARD T. CHOW

October 9, 1981

TO : DR. WILLARD T. CHOW
CHIEF PLANNING OFFICER
DEPARTMENT OF GENERAL PLANNING

FROM : KAZU HAYASHIDA
BOARD OF WATER SUPPLY

SUBJECT: YOUR MEMORANDUM OF AUGUST 24, 1981, ON THE ENVIRONMENTAL IMPACT STATEMENT (EIS) PREPARATION NOTICE FOR IOLEKAA WELL, TMK: 4-6-27: 11

Thank you for reviewing the EIS Preparation Notice for our proposed project. Your letter will be appended to the draft EIS.

We will include a discussion of the impacts on air quality and noise in the EIS. Any impacts on streamflow from the simultaneous pumping of Haiku and Iolekaa wells can only be determined when the wells are placed in operation. Our short-term pumpage tests indicated no reduction in streamflow. However, to mitigate any adverse short-term and long-term impacts to streamflow when we install the pumps, we will monitor streamflows and will control the pumping to maintain streamflows in Haiku, Iolekaa, and Waiia streams.

If you have any questions, please contact Lawrence Whang at 548-5221.

Kazu Hayashida

KAZU HAYASHIDA
Manager and Chief Engineer

MHS/HHM:am
cc: K. Hayashida
G. Hiu
C. Lao
L. Whang

81-2291

P- 1317/81

DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813
PHONE 523-4165

EILEEN R. ANDERSON
MAYOR

JOSEPH K. CONANT
DIRECTOR

RECEIVED
BD OF WATER SUPPLY
AUG 12 11 13 AM '81

AM
P/E

August 7, 1981

MEMORANDUM

TO: Kazu Hayashida, Manager & Chief Engineer
Board of Water Supply

FROM: Joseph K. Conant

SUBJECT: Environmental Impact Statement
Preparation Notice for Iolekaa Well
THK: 4-6-27: 11

We have reviewed the subject preparation notice and have no comment.

Thank you for forwarding the notice for our review.

for JOSEPH K. CONANT

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU

COPY

August 19, 1981

TO : MR. JOSEPH K. CONANT
DIRECTOR
DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT

FROM : KAZU HAYASHIDA
BOARD OF WATER SUPPLY

SUBJECT: YOUR LETTER OF AUGUST 7, 1981 ON THE ENVIRONMENTAL IMPACT STATEMENT (EIS) PREPARATION NOTICE FOR IOLEKAA WELL, KOOLAUPOKO, THK: 4-6-27: 11

Thank you for reviewing the EIS Preparation Notice for our proposed project. Your letter will be appended to the draft environmental document.

If you have any questions, please contact Lawrence Whang at 548-5221.

KAZU HAYASHIDA
Manager and Chief Engineer

cc: VTN Pacific

81-2160

RECEIVED
BD. OF WATER SUPPLY
AUG 10 11 25 AM '81

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

EILEEN R. ANDERSON
MAYOR

MICHAEL M. McELROY
DIRECTOR

LU7/81-4183(JH)

August 7, 1981

MEMORANDUM

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

FROM : MICHAEL M. McELROY, DIRECTOR

SUBJECT : ENVIRONMENTAL IMPACT STATEMENT (EIS) PREPARATION
NOTICE FOR IOLEKAA WELL, TAX MAP KEY: 4-6-27: 11

A-14

We have reviewed the EIS Preparation Notice and have only one question at the present time:

What is the depth of the Iolekaa Well that was drilled in 1966. Other than the installation of a pump, will the well be enlarged or improved in any way?

We appreciate the opportunity to review the Preparation Notice. If you have any comments or questions, please contact John Machol of our staff at 523-4077.

for MICHAEL M. McELROY
Director of Land Utilization

MMM:sl

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU

COPY

August 18, 1981

TO : MR. MICHAEL M. McELROY
DIRECTOR
DEPARTMENT OF LAND UTILIZATION

FROM : KAZU HAYASHIDA
BOARD OF WATER SUPPLY

SUBJECT: YOUR LETTER OF AUGUST 7, 1981, ON THE ENVIRONMENTAL IMPACT STATEMENT (EIS) PREPARATION NOTICE FOR IOLEKAA WELL, KOOLAUPOKO, OAHU

Thank you for reviewing the EIS Preparation Notice for our water development project. Your letter will be appended to the draft environmental document.

In answer to your questions, the well is 421 feet deep and will not be enlarged or deepened. A cross-section of the well will be incorporated in the EIS.

If you have any questions, please contact Lawrence Whang at 548-5221.

KAZU HAYASHIDA
Manager and Chief Engineer

cc: VTN Pacific

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU

COPY

January 14, 1983

RECEIVED
JAN 21 1983
VTN PACIFIC

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

Dear Mr. Clark:

Subject: Your Letter of January 5, 1983, on the Environmental Impact Statement (EIS) for Iolekaa, Kaneohe

A-28

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

Final plans for the project will be submitted to you for review.

If you have any questions, please contact Lawrence Whang at 548-5221.

Very truly yours,

Kazu Hayashida

KAZU HAYASHIDA
Manager and Chief Engineer

cc: VTN Pacific

RECEIVED
JAN 19 1983
VTN PACIFIC

JAN 14 1983

Honorable Eileen Anderson
Mayor, City & County of Honolulu
630 South King Street
Honolulu, Hawaii 96813

Dear Mayor Anderson:

We appreciate the opportunity to review the environmental impact statement for Iolekaa Well.

Our records indicate that this project does not occur on historic properties listed on the Hawaii Register or the National Register of Historic Places, or eligible for inclusion on the National Register of Historic Places.

Due to the lack of archaeological surveys in the vicinity, we are unaware of significant resources in the project area. However, this does not confirm the absence of historical, cultural, architectural and/or archaeological resources on the property. If any previously unidentified sites or remains (such as artifacts, shell, bone, or charcoal deposits; human burials; rock or coral alignments, pavings, or walls) are encountered, please inform the contractor to stop work and contact our historic sites office at 548-7460 immediately.

We would like to emphasize our concerns in protecting the instream flow requirements of the nearby streams as impacted by development of this well. As the State's instream flow program is presently in the formulation stage, we encourage interim instream flow management such as monitoring stream flow before, during, and after test pumping and development of the well. Groundwater development could have far-reaching effects not immediately evident due to unavailability of data required to make adequate assessment of the impacts of groundwater withdrawal on streamflow. Accordingly, monitoring of stream flow conditions impacted by nearby well development is an essential element of this overall data base required for proper management of the stream environment and the ultimate protection of instream values.

We urge that long term pumping tests and monitoring of adjacent stream flows be conducted before, not after, the development of production facilities. The degree of impact of the pumping tests on stream flows should be the basis

HEADQUARTERS
NAVAL BASE PEARL HARBOR
BOX 110
PEARL HARBOR, HAWAII 96860

IN REPLY REFER TO:
002B:UKL:jal
Ser 2972
4 JAN 1983

The Honorable Eileen Anderson
Mayor, City and County of Honolulu
630 South King Street
Honolulu, Hawaii 96813

Dear Mayor Anderson:

Environmental Impact Statement
Iolekaa Well

The EIS for the Iolekaa Well 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 to the Environmental Quality Commission, by copy of this letter.

Thank you for the opportunity to review the EIS.

Sincerely,

Q. I. BRUHN
LIEUTENANT, CEC, U. S. NAVY
Deputy Facilities Engineer
By direction of the Commander

A-27

Enclosure

Copy to:
VTN Pacific
Board of Water Supply
Environmental Quality Commission

RECEIVED
JAN 5 1983
VTN PACIFIC

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

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

January 5, 1983

CHARLES G. CLARK
DIRECTOR OF HEALTH

JOHN F. CHALMERS, M.D.
DEPUTY DIRECTOR OF HEALTH

HENRY H. THOMPSON, M.A.
DEPUTY DIRECTOR OF HEALTH

MELVIN H. KOIZUMI
DEPUTY DIRECTOR OF HEALTH

ADELINA MADRID SHAW, M.A., J.D.
DEPUTY DIRECTOR OF HEALTH

In reply, please refer to:
File: EPHS-SS

MEMORANDUM

To: Honorable Mayor Eileen Anderson
City & County of Honolulu

From: Director of Health

Subject: Environmental Impact Statement (EIS) for Iolekaa Well,
Kaneohe, Oahu, Hawaii

Thank you for allowing us to review and comment on the subject EIS. On the basis that the project will comply with all applicable Public Health Regulations, please be informed that we do not have any objections to this project.

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.

Charles G. Clark
CHARLES G. CLARK

cc: OEQC
VTN Pacific ✓
Board of Water Supply

RECEIVED
JAN 10 1983
VTN PACIFIC

DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD

COMMANDER (dpl)
Fourteenth Coast Guard District
Prince Kalanianaole Federal Bldg.
300 Ala Moana Blvd.
Honolulu, Hawaii 96850

(808) 546-2861
11000
Serial 572
27 December 1982

VTN Pacific
1164 Bishop Street
Suite 906
Honolulu, Hawaii 96813

Dear Sir:

The Fourteenth Coast Guard District has reviewed the Environmental Impact Statement for Iolekaa Well 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 noast Guard District

Copy: Board of Water Supply
City and County of Honolulu

A-26

APZV-EHV

JAN

Honorable Eileen Anderson
Mayor of City and County of Honolulu
630 South King Street
Honolulu, Hawaii 96813

RECEIVED
JAN 10 1983
VTN PACIFIC

Dear Mayor Anderson:

The Environmental Impact Statement (EIS) for Iolekaa Well, Kaneohe, Oahu, Hawaii has been reviewed and we have no comments to offer. There are no Army installations or activities in the vicinity of the proposed project.

Thank you for the opportunity to comment on the EIS.

Sincerely,

RONALD A. BORRELLO
COL, EN
Director of Engineering and Housing

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

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

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU

COPY

February 2, 1983

RECEIVED
FEB 8 1983
VTN PACIFIC

Mr. Benjamin L. Jones
District Chief
Water Resources Division
Geological Survey
U. S. Department of the Interior
P. O. Box 50166
Honolulu, Hawaii 96850

Dear Mr. Jones:

Subject: Your Letter of January 21, 1983 on the Draft Environmental Impact Statement for Iolokaa Well

Thank you for reviewing the draft Environmental Impact Statement (EIS) for the proposed water development project. Your letter to the Mayor, which will be appended to the revised environmental document, has been referred to us for direct reply.

We offer the following response to your comments:

1. The use of the word "implement" on page 1, paragraph 4 will be retained. The intent for the word is "to ensure an action" and not imply a "state of urgency."

2. The 1966 pump test data will be summarized in the revised EIS.

If you have any questions, please contact Lawrence Whang at 548-5221.

Very truly yours,

KAZU HAYASHIDA
Manager and Chief Engineer

cc: VTN Pacific

A-25

United States Department of Agriculture
Soil Conservation Service
P.O. Box 50004
Honolulu, Hawaii
96850

January 14, 1983

RECEIVED
JAN 17 1983
VTN PACIFIC

Honorable Eileen Anderson
Mayor, City and County of Honolulu
630 South King Street
Honolulu, HI 96813

Dear Mayor Anderson:

Subject: EIS for Iolekaa Well, Kaneohe, Oahu, Hawaii

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

Thank you for the opportunity to review the EIS.

Very truly yours,

ACTING
FRANCIS C.H. LUM
State Conservationist

cc:
VTN Pacific
1164 Bishop St., Suite 906
Honolulu, HI 96813

Board of Water Supply
City and County of Honolulu
630 South Beretania St.
Honolulu, HI 96843

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

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU

COPY

February 3, 1983

RECEIVED
FEB 8 1983
VTN PACIFIC

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

Dear Mr. Kosaka:

Subject: Your Letter of January 26, 1983, On The Draft Environmental Impact Statement (EIS) for Iolekaa Well, Kaneohe

Thank you for reviewing the draft EIS for the proposed water development project. Your letter to the Mayor, which will be appended to the revised environmental document, has been referred to us for direct reply.

We offer the following in response to your comments:

1. Pumping from the Iolekaa Well will be initiated after a streamflow monitoring system, as approved by the Department of Land and Natural Resources, becomes operational and a mechanism for coordinating streamflow is established between your agency and the Board.

2. We are currently pursuing the development of low quality water for landscape irrigation use, which should temporarily relieve the heavy demand for high quality groundwater.

If you have any questions, please contact Lawrence Whang at 548-5221.

Very truly yours,

Kazu Hayashida

KAZU HAYASHIDA
Manager and Chief Engineer

cc: VTN Pacific

A-24

United States Department of the Interior
GEOLOGICAL SURVEY
Water Resources Division
P.O. Box 50166
Honolulu, Hawaii 96850

January 21, 1983

RECEIVED
JAN 24 1983
VTN PACIFIC

The Honorable Eileen Anderson
City and County of Honolulu
630 South King Street
Honolulu, Hawaii 96813

RE: Iolekaa Well
Environmental Impact Statement

Dear Mayor Anderson:

Below are comments by my staff on the subject EIS for the Iolekaa Well. Principal reviewers were Paul Eyre and Kiyoshi J. Takasaki.

Page	Paragraph	Line	Comments
1	4	4	Change "to implement" to read "in order to". Decrease in streamflow from pumpage or increase in streamflow from reduced pumpage will not likely be instantaneous. The word "implement" suggests instant reaction.
9	3	1	Specify the pumping rate and the resulting drawdown in January 1966.

Thank you for giving us an opportunity to comment on this document.

Aloha,

Benjamin L. Jones
District Chief

cc: VTN Pacific, 1164 Bishop Street, Honolulu, HI
Board of Water Supply, City and County of Honolulu, HI

DEPARTMENT OF THE ARMY
PACIFIC OCEAN DIVISION, CORPS OF ENGINEERS
FT SHAFTER, HAWAII 96858

January 11, 1983

RECEIVED
JAN 13 1983
VTN PACIFIC

Honorable Eileen M. Anderson
Mayor of the City & County of Honolulu
630 South King Street
Honolulu, Hawaii 96813

Dear Mayor Anderson:

Thank you for the opportunity to review the Environmental Impact Statement for the proposed Iolekaa Well, Kaneohe, Oahu, Hawaii. Based on our review, we offer no comments additional to those provided in our letter of August 4, 1981.

Sincerely,

Kisuk Cheung
Chief, Engineering Division

A-23

Copy Furnished:
VTN Pacific
1164 Bishop Street, Suite 906
Honolulu, Hawaii 96813

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

United States Department of the Interior

FISH AND WILDLIFE SERVICE
300 ALA MOANA BOULEVARD
P. O. BOX 50167
HONOLULU, HAWAII 96850

IN REPLY REFER TO:
ES
Room 6307

RECEIVED
JAN 28 1983
VTN PACIFIC

JAN 26 1983

Mayor Eileen Anderson
City and County of Honolulu
630 South King Street
Honolulu, Hawaii 96813

Re: EIS, Iolekaa Well
Kaneohe, Oahu, Hawaii

Dear Mayor Anderson:

We have reviewed the Environmental Impact Statement (EIS) for Iolekaa Well, Kaneohe, Oahu. The Service is pleased at the level of effort that has been devoted to the analysis of potential drawdown impacts upon instream flow. Although some test pumping has been conducted for brief periods of time with no apparent reduction in stream flow, it appears that the relationship of aquifers to basal flows is not well understood. There is still a possibility that full-scale pumping at Iolekaa may affect low flows in Iolekaa and Heeia streams.

The Service is currently providing technical assistance to the State Department of Land and Natural Resources concerning methodologies for analysis of instream flows to maintain fishery resources. However, we do not intend to implement incremental flow methods in Hawaii until adequate hydraulic simulations have been developed and refined, and until the necessary ecological data on species' habitat preferenda are collected and tested. In the interim, we recommend that full-scale pumping of Iolekaa and all other Board of Water Supply well developments be held in abeyance. In the case of Iolekaa, pumping should provide for low flows of sufficient volume to prevent an increase in the salinity of the Heeia meadowlands.

We were pleased with the discussion of island-wide approaches (pp. 28-33 of the EIS). As population growth places greater demands on our island's finite water supplies, water-use conflicts will surely become more frequent. The Service supports efforts to seriously evaluate alternatives for future water supplies in Hawaii. Please contact me if we can provide assistance in the area of Hawaiian stream ecology and flow requirements.

Sincerely yours,

Ernest Konaka
Project Leader
Office of Environmental Services

CONSERVE AMERICA'S ENERGY

cc: VTN Pacific
Board of Water Supply

Save Energy and You Serve America!

The State Department of Agriculture with the support of the State Department of Land and Natural Resources and the Board of Water Supply is preparing an inventory of the present agricultural water users in the windward area. Water for these users will be maintained. We are also working together with the two State agencies to accommodate future agricultural developments such as the Waimanalo, Waiahole-Waikane and Kahuku Agricultural Parks.

We recognize the need to satisfy the water requirements of the entire community and will work toward that end.

If you have any questions, please contact Lawrence Whang at 548-5221.

Very truly yours,

KAZU HAYASHIDA
For Manager and Chief Engineer

cc: VTN Pacific

A-2

Copies: Councilman Toraki Matsumoto
Councilman Andrew Poepoe
Department of Land and Natural Resources
Kane'ohe N.B. #30
Kahalu'u N.B. #29 - Chairman
- Water Resources
- Rusource Center
Neighborhood Commission

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU

COPY

September 9, 1981

Mr. Edwin B. Stevens, Chairman
Kahaluu Neighborhood Board No. 29
c/o Kahaluu Community Center
47-232 Waihee Road
Kaneohe, Hawaii 96744

Dear Mr. Stevens:

Subject: Your Letter of August 18, 1981, on the Environmental Impact Statement (EIS) Preparation Notice for Iolekaa Well

Thank you for your letter informing us of the concerns of your Neighborhood Board regarding the proposed Iolekaa Well project.

Although the State has yet to establish minimum stream flow standards, we plan to proceed with our Iolekaa Well project and other windward well development projects. We will be sensitive about the maintenance of existing stream flows and will have the U. S. Geological Survey conduct stream flow tests before, during and after the testing of exploratory wells. We will also commission the U. S. Geological Survey to install permanent stream gages to monitor the effects of long-term pumpages of our new wells. We feel that we can control the pumpage to minimize its effect on the stream and will be able to comply with any minimum stream flow standards adopted by the State.

The development of the windward sources is required to meet the long-range requirements of the windward area and the Honolulu area. The export of water from an area of adequate water supply to areas in need of additional water supply is essential to accommodate the growth shown in the City's Development Plans.

81-2402
81-2311

KAHALUU NEIGHBORHOOD BOARD NO. 29
c/o KAHALUU COMMUNITY CENTER
47 232 WAIHEE ROAD
KANEOHE, HAWAII 96744
AREA AREA KAHALU'U, WAIHE'E, WAIAHOLE, WAIKANE, HAKIPUU AND KUALOA

"Let us not ever have an unhappy minority"

MGR
AM ASST
P/E

August 18, 1981

Lawrence H.Y. Whang
Board of Water Supply
City and County of Honolulu
630 South Beretania Street
Honolulu, Hawaii 96843

Environmental Impact Statement
Ioleka'a Production Well, He'eia, Ko'olaupoko, O'ahu

Dear Mr. Whang:

A-120

This letter expresses the Kahalu'u Neighborhood Board No. 29 concerns regarding the proposed conversion of the Ioleka'a Exploratory Well into a Production Well. The Board's positions on Windward water development are detailed in its Water Resources Position Statement (see Exhibit I) and its letter to the Department of Land and Natural Resources titled Monitoring Stream Flows and that department's response (see Exhibit II).

Our concerns regarding the Ioleka'a Well are very much the same as those for the Haiku Well as expressed in our letter of July 28, 1981. The two wells are located near adjacent streams, both of which are the major tributaries to He'eia Stream. Thus production from both wells will compound the problems which might arise with production from either one.

Specific comments relating to the Ioleka'a Well are as follows:

1) No production from Ioleka'a Well until interim Windward Water District stream flow standards are adopted and a Windward Water District stream flow monitoring system is in place. The Environmental Assessment states: "The only foreseeable new developments which conceivably might affect the flow of He'eia Stream would be BWS wells. In addition to the proposed Ioleka'a, the BWS plans to develop production wells in Haiku and Kahalu'u Valleys during the early 1980s." Excerpts from our Board's Water Resources Position Statement:

> "The Department of Land and Natural Resources immediately establish interim stream flow standards on all Windward Streams." and "The Department of Land and Natural Resources immediately commence monitoring in-stream flows of all Windward Streams - gauging stations to be installed at strategic locations along each stream."

Reaffirm previous reply. GN

GN

2) No production from Ioleka'a Well until more extensive test pumping is performed to determine long term effects not only on Ioleka'a & He'eia stream flows, in stream & stream dependent uses, He'eia Meadowlands marsh, and Kane'ohe Bay reef ecology, but on other Windward Watershed District watersheds as well. Test pumping, to date, has been limited to one day, January 27, 1966, and the data obtained must thus be considered fraudulent. A satisfactory test pumping period should be not less than one year. Excerpts from our Board's Water Resources Position Statement:

> "The Department of Land and Natural Resources initiate a comprehensive study of all Windward water resources encompassing the sources and amounts of impounded high level dike water, underlying basal water, ground water, in-stream water, surface run-off and ground recharge and the hydrologic relationships with watersheds, shorelines and Kane'ohe Bay."

3) No production from Ioleka'a Well for diversion outside the Windward Water District. The Environmental Assessment states: "In order to meet increasing demand for water on leeward O'ahu, water development projects in Windward O'ahu have been accelerated." The Board of Water Supply has previously stated that it estimates that, by the year 2000, it will produce Windward Water at the rate of 43 mgd of which it intends to transport 21 mgd to urban Honolulu. Excerpts from our Board's Water Resources Position Statement:

> "Development of any additional Windward Water resources be limited by interim or permanent stream flow standards and be reserved first for Windward agricultural use and next for Windward Suburban use." and "A moratorium be established on any additional diversion of Windward Water outside Ko'olaupoko and Ko'olauloa until establishment of permanent stream flow standards that will assure fulfillment of the policy of the State of Hawai'i to achieve ever increasing agricultural self-sufficiency," and "Water for urban growth be developed from conservation measures, re-use and desalinization."

We trust that you will give our concerns your serious attention.

Very truly yours,

Edwin B. Stevens

Edwin B. Stevens, Chairman
Kahalu'u Neighborhood Board No. 29

Exhibit I - N.B. #29 Water Resources Position Statement (3-11-81)
Exhibit II - N.B. #29 Letter to DLNR Monitoring Stream Flows (11-3-80) and DLNR Response (3-31-81)

that existing Board of Water Supply projects already take more water than is consistent with the concept of minimum stream flow. Before any additional water projects are undertaken which could have any further adverse effects on the stream, a complete and thorough study should be done on the minimum stream flow requirements of the Heeia Stream to maintain the ecological balance of the Heeia wetlands.

Your conclusion at page 14 of the effect on Heeia Stream and its tributaries is totally unwarranted given the small amount of available information and the very short period of the test pumping that was done. Similarly, your conclusion that because of the high average flow of the Heeia Stream, impacts on the Heeia wetlands would not be significant even if the Iolekaa Well withdrew .3 MGD directly from the stream cannot be supported without more extensive studies. Again, given that no minimum stream flow has been established for the maintenance of the Heeia Meadowlands, this conclusion is completely unsupportable.

A-19

Your conclusion regarding growth and land use on page 14 is also incorrect. You have completely failed to evaluate whether or not there are any potential agricultural uses on land adjacent to the Iolekaa Stream. If this water development project further reduces stream flow, or stream flow is so low that additional stream water use for agriculture would be incompatible with the water needs of the wetlands, then this project would favor development on Oahu over the promotion and enhancement of diversified agriculture.

At page 15, noticeably absent from the alternatives to the proposed project is a program of water conservation.

Thank you for the opportunity for the comment on this draft Environmental Impact Statement. We hope that the issues which we have addressed in this letter will be fully researched and reported on in the final EIS.

Sincerely,

Melvin D. Kalahiki, President
HUI MALAMA AINA O KO'OLAU
45-422 Koa Kahileo Street
Kaneohe, Hawaii 96744

cc: Mayor Eileen Anderson,
Accepting Authority

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU

COPY

October 28, 1981

Mr. Melvin D. Kalahiki, President
Hui Malama Aina O Ko'olau
45-422 Koa Kahileo Street
Kaneohe, Hawaii 96744

Dear Mr. Kalahiki:

Subject: Your Letter of September 28, 1981, on the Environmental Impact Statement (EIS) Preparation Notice for Iolekaa Well

Thank you for reviewing and commenting on the environmental assessment. Your letter will be appended to the draft environmental document.

We will address your concerns in the draft EIS. A copy of the draft EIS will then be sent to you when it becomes available.

If you find that the draft EIS has not fully answered your concerns, please write to us again and we will be glad to comment on them in more detail at that time.

If you have any questions, please contact Lawrence Whang at 548-5221.

Very truly yours,

Kazu Hayashida
KAZU HAYASHIDA
Manager and Chief Engineer

cc: 4TH Pacific

Planning

HUI MALAMA AINA O 'KOOLAU

RECEIVED
BOARD OF WATER SUPPLY
SEP 30 10 00 AM '81

Mgr. KH
AM KH
P/E

September 28, 1981

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

Subject: Comments on Environmental Assessment for Iolekaa Well

Dear Mr. Hayashida:

HUI MALAMA AINA O KO'OLAU has reviewed the document you sent to us entitled Environmental Impact Statement for Iolekaa Well. There are several deficiencies in this EIS which should be corrected.

At page 4 under Objectives, your discussion of the population served by the Board of Water Supply refers to island-wide municipal water demand. When considering the water needs of the island of Oahu for the year 2000, you should be considering not only the municipal water needs of Oahu's people, but also the agricultural water needs and environmental needs from instream uses without any diversion. Thus, you refer to a 65.2 MGD twenty year increase in water demand. However, that does not take into account the additional water demand which small farmers may have for stream waters on the windward side. Their need must also be quantified if we are to look at total water demand for the year 2000.

Also at page 4, your figures for the increase in water demand between 1980 and the year 2000 suggest that per capita water consumption will increase by over 10%. No explanation is offered as to why per capita consumption will increase by over 10%. No explanation is offered as to why per capita consumption of water should increase in these times of water shortages and the need for conservation. We, therefore, question whether planning should be based upon increasing per capita consumption.

At page 8, you state that since the source of Iolekaa stream flow is at a higher elevation than groundwater being developed by the Iolekaa Well, it is unlikely to be influenced by pumping of the well. Apparently, this conclusion is also based on your statement on page 8 that short term test pumping of the well in 1966 did not affect the flow of Haiku stream at the USGS gage. Just because the wells are at a lower elevation than the source of the stream does not mean that there will be no affects on stream flow from pumping. For example, if the source of stream flow is dike confined water and the wells dewatered the dike compartments which feed the stream,

9

A-18

it is more than likely over the long term that the two will be interrelated.

Your statements about the relative location of the source of the Iolekaa stream flow, the gage, and the well are somewhat confused on page 8. On page 1, you indicated that the well is located at an elevation of 485 feet. At page 8, you say that the only long term USGS gage for Iolekaa Stream is located at an elevation of 320 feet, so that it must be downstream of the proposed well project. It is difficult to understand how you reach the conclusion that "the source of Iolekaa stream flow at the gage is at a higher elevation than the ground water being developed by Iolekaa Well." Secondly, without doing extensive measurement of stream flow, it is impossible to tell whether or not pumping of the well will cause seepage of water from Iolekaa Stream into the ground to replenish any draw down by the pumping of the well.

Similarly, your conclusion on page 11 that "since most of Iolekaa Stream's base flow originates above an elevation of 390 feet, none of these wells will have a significant adverse impact on Iolekaa Stream." As already noted, what is important is the inner connection between the source of the water being pumped and the source of the stream flow. The mere fact that the source of the stream flow is at a higher elevation does not mean that the source and well are not hydrologically interconnected and that the stream would not be adversely affected by long-term pumping. Similarly, your reference at page 11 to a five day pumping test cannot be considered conclusive about the long term effects on stream flow. The test pumping could merely have been dewatering a compartment and the effects might not be felt for some length of time after the wells are put into operation.

At page 12, you indicate that the only known agricultural water use of Heeia Stream and its tributaries is a small taro patch. The EIS should be supplemented to include the basis upon which that conclusion was reached and should describe all efforts made by the BWS to determine uses of stream water.

At page 13, you note that the U.S. Fish and Wildlife Service believes that the lowering of the water table in the Heeia wetlands due to the reduction in Heeia stream flow from BWS tunnel projects has caused significant adverse impacts on the water bird habitat. This fact raises a very critical problem. That is that there has been no determination of the minimum stream flow requirements for the Heeia Stream to determine the minimum amount of water necessary to maintain the stream environment and ecology. It may well be

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BD OF WATER SUPPLY

HUI MALAMA AINA O 'KOOLAU SEP 8 9 05 AM '81

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September 2, 1981

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SEP 21 1981
VTN PACIFIC

Mr. Lawrence Whang
Board of Water Supply
City and County of Honolulu
630 South Beretania Street
Honolulu, Hawaii 96813

Re: Iolekaa Well, Kaneohe, Oahu

Dear Mr. Whang:

Hui Malama Aina O 'Koolau is an association of windward residents concerned with maintaining and enhancing the lifestyle and rural character of windward Oahu. By this letter, we ask that we be a consulted party in the preparation of the Environmental Impact Statement for the above-referenced project.

Sincerely,

Melvin D. Kalahiki
President

A-17

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU

COPY

September 14, 1981

RECEIVED
SEP 21 1981
VTN PACIFIC

Mr. Melvin D. Kalahiki
President
Hui Malama Aina O 'Koolau
45-422 Koa Kahiko Street
Kaneohe, Hawaii 96744

Dear Mr. Kalahiki:

Subject: Your Letter of September 2, 1981, on the Environmental Impact Statement Preparation Notice for Iolekaa Well

Thank you for your interest in our proposed project. We have added your organization's name to our consulted parties list. Enclosed is a copy of the environmental assessment for your review. If you have any comments, we would appreciate receiving them by September 30, 1981.

If you have any questions, please contact Lawrence Whang at 548-5221.

Very truly yours,

KAZU HAYASHIDA
Manager and Chief Engineer

Enc.

cc: VTN Pacific

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

EILEEN R. ANDERSON
MAYOR

ROY A. PARKER
DIRECTOR

TE7/81-2296

RECEIVED
SEP 14 1981
VTN PACIFIC

RECEIVED
BOARD OF WATER SUPPLY
AUG 28 1 26 PM '81

August 27, 1981

A M
P/E

MEMORANDUM

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

FROM: ROY A. PARKER, DIRECTOR

SUBJECT: IOLEKAA WELL
TMK: 4-6-27: 11
ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE

We have reviewed your submittal and have no comments to offer.

for ROY A. PARKER

A-16

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU

COPY

September 4, 1981

RECEIVED
SEP 14 1981
VTN PACIFIC

TO : MR. ROY A. PARKER
DIRECTOR
DEPARTMENT OF TRANSPORTATION SERVICES

FROM : KAZU HAYASHIDA
BOARD OF WATER SUPPLY

SUBJECT: YOUR LETTER OF AUGUST 27, 1981, ON THE ENVIRONMENTAL IMPACT STATEMENT (EIS) PREPARATION NOTICE FOR IOLEKAA WELL, KOOLAUPOKO, OAHU

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

If you have any questions, please contact Lawrence Whang at 548-5221.

Kazu Hayashida

KAZU HAYASHIDA
Manager and Chief Engineer

cc: VTN Pacific

81-2094

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

EILEEN R. ANDERSON
MAYOR

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

RECEIVED
BD OF WATER SUPPLY
AUG 3 3 12 PM '81

ENV 81-234

August 3, 1981

AM
P/E

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

A-15

Dear Mr. Hayashida:

Re: EIS Preparation Notice for Iolekaa Well, Kaneohe, Hawaii

We have reviewed the subject Preparation Notice and have the following comments.

We do not have any municipal facility in the project area as stated. We have no objection to the proposed project.

He ke aloha pumehana,

MICHAEL J. CHUN
Director and Chief Engineer

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU

COPY

August 10, 1981

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

FROM : KAZU HAYASHIDA
BOARD OF WATER SUPPLY

SUBJECT: YOUR LETTER OF AUGUST 3, 1981, ON THE ENVIRONMENTAL IMPACT STATEMENT (EIS) PREPARATION NOTICE FOR IOLEKAA WELL, KANEOHE

Thank you for reviewing the EIS Preparation Notice for our project. Your letter will be appended to the draft environmental document.

If you have any questions, please contact Lawrence Whang at 548-5221.

KAZU HAYASHIDA
Manager and Chief Engineer

cc: VTN Pacific

for determining whether or not to proceed with production facilities. This is significant in view of the Board of Water Supply position that "once production facilities are installed at Iolekaa Well, the BWS will be committed to using them."

If this is not possible, then we recommend implementing the proposal in the EIS whereby pumpage from Iolekaa and Haiku Wells will be reduced as necessary to satisfy instream flow requirements when they are identified by the State.

Sincerely,

Susumu Ono

SUSUMU ONO
Chairman of the Board
and
State Historic Preservation Officer

A-29

cc: VTN Pacific
Board of Water Supply

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU

COPY

January 26, 1983

RECEIVED
FEB 2 1983
VTN PACIFIC

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

Dear Mr. Ono:

Subject: Your Letter of January 14, 1983, On The Draft Environmental Impact Statement (EIS) for Iolekaa Well, Kaneohe

Thank you for reviewing the Draft EIS of our proposed water development project. Your letter to the Mayor, which will be appended to the revised environmental document, has been referred to us for direct reply.

We offer the following in response to your comments:

1. Should any previously unidentified historical/cultural/archaeological sites or remains be found, the contractor will be informed to stop all work and your historic sites office will be contacted.

2. We agree that the available data is inadequate in making an assessment of the groundwater withdrawal impacts on streamflow. To assure present streamflows are maintained, we will be coordinating our streamflow monitoring program with your department, the U. S. Geological Survey, and the U. S. Fish and Wildlife Service. Monitoring will be performed before and after the production facilities are completed.

3. When instream flow requirements are identified by the State, we will adjust the pumpage from our Iolekaa and Haiku Wells if necessary.

If you have any questions, please contact Lawrence Whang at 548-5221.

Very truly yours,

Kazu Hayashida

KAZU HAYASHIDA
Manager and Chief Engineer

cc: VTN Pacific

A-30

STATE OF HAWAII

DEPARTMENT OF PLANNING AND ECONOMIC DEVELOPMENT

January 27, 1983

GEORGE R. ARIYOSHI
Governor
HIDETO KONO
Director
FRANK SKRIVANEK
Deputy Director
Kamamalu Building 250 South King St. Honolulu, Hawaii Mailing Address P O Box 2359 Honolulu Hawaii 96804

COPY

Ref. No. 7021

RECEIVED
FEB 3 1983
VTN PACIFIC

The Honorable Eileen R. Anderson
Mayor
City and County of Honolulu
Honolulu, Hawaii 96813

Dear Mayor Anderson:

Subject: Iolekaa Well EIS, Kaneohe, Oahu, Hawaii

We have reviewed the environmental impact statement for the Iolekaa Well and found that it addressed the Hawaii Coastal Zone Management Program's concerns on water quality and quantity practices and wildlife habitats.

Thank you for the opportunity to review this document.

Sincerely,

Hideto Kono

cc: VTN Pacific
Board of Water Supply
City and County of Honolulu

GEORGE R. ARIYOSHI
GOVERNOR

ROY R. TAKEMOTO

STATE OF HAWAII
ENVIRONMENTAL QUALITY COMMISSION
550 HALEKAUWILA ST.
ROOM 301
HONOLULU, HAWAII 96813

TELEPHONE NO.

December 21, 1982

RECEIVED
JAN 7 1983
VTN PACIFIC

Dear Reviewer:

Attached for your review is an Environmental Impact Statement (EIS) that was prepared pursuant to Chapter 343, Hawaii Revised Statutes and the Rules and Regulations of the Environmental Quality Commission:

Title: Iolekaa Well

Location: Kaneohe, Oahu, Hawaii

Classification: Agency Action

Your comments or acknowledgement of no comments on the EIS are welcomed. Please submit your reply to the accepting authority or approving agency:

Mayor Eileen Anderson
City and County of Honolulu
630 South King Street
Honolulu, HI 96813

Please send a copy of your reply to the proposing party:

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

and

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

Your comments must be received or postmarked by: January 22, 1983

If you have no further use for this EIS, please return it to the Commission.

Thank you for your participation in the EIS process.

82:929

State Energy Division has no comments.

Takeshi Yoshihara
Division Head

RYOKICHI HIGASHIONNA, Ph.D.
DIRECTOR

DEPUTY DIRECTORS
WAYNE J. YAMASAKI
JAMES B. McCORMICK
JONATHAN K. SHIMADA, Ph.D.

IN REPLY REFER TO:

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

January 13, 1983

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JAN 17 1983
VTN PACIFIC

The Honorable Eileen Anderson
Mayor
City and County of Honolulu
630 South King Street
Honolulu, Hawaii 96813

Dear Mayor Anderson:

Environmental Impact Statement for
Iolekaa Well, Kaneohe, Oahu

Thank you for the opportunity to comment on the subject document.

Our transportation program is not affected by your proposal. Therefore, we have no substantive comments to offer which could improve the EIS.

Very truly yours,

Ryokichi Higashionna
Director of Transportation

cc: Board of Water Supply
VTN Pacific

University of Hawaii at Manoa

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

27 January 1983

Mayor Eileen Anderson
City and County of Honolulu
630 South King Street
Honolulu, Hawaii 96813

Dear Mayor Anderson:

Subject: EIS for Iolekaa Well, Kaneohe, Oahu, Hawaii,
TMK 4-6-27:11, December 1983

We have reviewed the subject EIS and have no comment to offer at this time. Thank you for the opportunity to comment.

This material was reviewed by WRRC personnel.

Sincerely,

Edwin T. Murabayashi

Edwin T. Murabayashi
EIS Coordinator

ETM:ja

cc: BWS
VTN Pacific

A-32

University of Hawaii at Manoa

Environmental Center
Crawford 317 • 2550 Campus Road
Honolulu, Hawaii 96822
Telephone (808) 948-7361

January 21, 1983

RE:0364

Mayor Eileen Anderson
City and County of Honolulu
630 South King Street
Honolulu, Hawaii 96813

Draft Environmental Impact Statement
Iolekaa Well
Kaneohe, Oahu, Hawaii

Dear Mayor Anderson:

Thank you for the opportunity to review the above cited plan. Our Environmental Center review has been prepared with the assistance of Frank Peterson, Geology and Geophysics; James Parrish, Hawaii Cooperative Fishery Research Unit; and Mark Ingoglia and Jacquelin Miller, Environmental Center. In general our reviewers have found the document to address most of the potential environmental impacts associated with the project. The following comments are offered for your consideration:

Page i Effects of Well Draft on Streamflow

The major environmental concerns with the project relate to the effect that draft from the well may have on streamflows in the vicinity. The summary of the EIS (p. i) states that:

> "During dry periods, Iolekaa Stream gains most of its base flow above an elevation of 390 feet, and Haiku stream gains most of its base flow below an elevation of 320 feet. Because the static head of ground water being tapped by Iolekaa Well is 321 feet, the well is unlikely to significantly affect the low flow of Iolekaa Stream. However, over the long term, it is possible that the planned BWS Haiku and Iolekaa wells may slightly reduce the base flow of Haiku and Heeia Streams." (paragraph 3)

> "In order to prevent adverse impacts, the BWS will contract with the U.S. Geological Survey to reactivate a gaging station on Haiku Stream at an elevation of about 270 feet. Pumpage from the BWS Iolekaa and/or Haiku wells will be reduced whenever necessary to implement any minimum stream flow standards established by the State." (paragraph 4)

Reactivation of the gaging station mentioned in the paragraph 4 quotation will, of course, not in itself prevent adverse impacts. What is clearly intended is that the BWS will reduce its draft from the wells if and when the gage indicated that the flow of the stream is reduced to an unacceptable level. Limitations to the extent to which this intent which can be realized will be discussed below.

As recognized in the EIS, both the Iolekaa well and the Haiku well tap dike aquifers. If a mean draft of 0.3 mgd can be developed from the Iolekaa well, the recharge of the dike compartment tapped by the well and other tributary or potential tributaries to the compartment must be equal to or greater than 0.3 mgd. and these compartments must also have an equal or greater discharge under present conditions. Only if it is assumed that this discharge does not contribute to the flow of the streams in the vicinity can it be concluded that the draft from the well will result in no decrease in stream flow. The density of distribution of dikes in the vicinity of the well and makai make it seem quite unlikely that there is substantial flow from the well vicinity through the dike complex to Kaneohe Bay. The possibility of significant discharge to the Bay by way of overlying alluvial aquifers cannot be wholly discounted. However, no evidence is presented in the EIS that indicates that the discharge is not significant to the streams. Evidence presented on page 1 paragraph 3 of the "Summary" does make it seem unlikely that a significant part emerges in Iolekaa Stream, but it does not seem at all unlikely that the gains in Haiku Stream represent, to a substantial extent, discharges from the dike compartments in the vicinity of the well.

The USGS gage whose reactivation is proposed in the second quoted paragraph is at about 270 feet elevation. Figure 4 indicates that the major gain in Haiku Stream is between that gage (H-3; flow 0.4 mgd, 8/11/61) and a gage at 145 feet elevation (H-4; flow 1.47 mgd, 8/11/61). The text indicates that at H-3 a minimum flow of only 0.13 mgd. has been recorded (p. 12, date not indicated). If a significant part of the discharge from the dike compartments in the vicinity of the well were to Haiku Stream above H-3, the minimum flow cited would raise a question as to the sustainability of a draft rate of 0.3 mgd from the well. If a significant part of the discharge is to the stream below H-3, the record of flow at H-3 may be of little or no use as a basis for controlling the well discharge, and continuous recording or intermittent measurement of the streamflow at H-4 is likely to be much more significant in this respect.

A-33

Page 11 - 12

BWS Haiku Tunnel water production decreased significantly over the 5,000 gallons pumped to the Coast Guard Haiku Omega Station every three to four weeks. Since all other unused water from the Haiku Tunnel now flows directly into Haiku Stream a table illustrating before and after changes in flow would help to show the effect of the Coast Guard usage on stream flows, the possible effect of future use of this water on stream flow, and provide some insight into predicting the effects of the draft on the Heeia Wetlands.

Page 14 Stream Fauna

A species list should be provided for the stream fauna. This list would give a better indication of the stream ecology and how it might be protected as well as affected.

Page 15, Paragraph 1

Mention is made of a faunal survey of Haiku stream by VTN Pacific personnel in February 1981. A more specific reference to the documentation of this survey should be provided, or if unpublished, a brief summary of the methods and results should be included in the revised EIS.

Page 15 Agricultural Water Use

The effect of stream flow reduction on agricultural uses should be investigated and "relatively minor" use of stream water quantified.

Page 15 Hydrology

The effect of stream flow reduction could be significant to the 85 acre fish pond located at the mouth of Heeia Stream. Fish ponds need fresh water stream flow to help reduce salinity within the ponds. Is the fish pond currently under management and if so how dependent is it on the Heeia Stream for salinity reduction and pond flushing?

Pages 19 - 20 Streamflow

The EIS discusses four ways in which the draft from the Iolekaa well might affect stream flows. The first, through reduction of flow of springs fed by the same dike compartment as that tapped by the well, seems from the pump test results (p. 20) to be insignificant. The fourth, through indirect reduction of flow of springs fed by upstream dike compartments, induced by increased rates of leakage from those compartments to the compartment tapped by the well, also seems unlikely to be significant. The second and third ways, by reducing the recharge to and discharge to the Stream from, dike compartments and alluvial aquifers downstream from the tapped compartment, seem likely to be the important ones. With both of these ways there is likely to be a significant lag between changes in the rate of draft from the wells and resulting decreases in stream flow. A reduction in draft rate that is initiated at the time the streamflow at either H-3 or H-4 is reduced, to whatever minimum standard is set, is unlikely to prevent further reduction in stream flow, or to result in the restoration of the streamflow to the minimum for some time. Not until a model of the temporal aspects of the well draft-streamflow relationship can be derived from actual experience can the desired draft-control be achieved.

Page 20, Paragraph 3

The three hour pumping tests that was done on Iolekaa well on January 27, 1966 and Haiku Well in February of 1981 for 5 days were both performed during Hawaii's winter rainy season. Is there any data for test pumping these wells during dry periods of the year and if not, are the given test data enough to assure that these wells will not have a direct and immediate effect on stream flow?

Page 21 Minimum Stream Standards

The EIS recognizes that, even if all of the draft from the combination of the Iolekaa wells were derived by diversions from springs feeding Haiku Stream, the low-water streamflow below the 90-foot elevation (HH-5) would be reduced only 50 percent. The actual reduction will probably be significantly less, but the claim that it is certain to be much less (p. 21) seems unsupported by the evidence.

If the draft from the Iolekaa well will probably have a significant effect on streamflow, and if the BWS is to regulate the draft in compliance with minimum streamflow standards to be adopted by the State as proposed (p. 21), the actual flow rates specified in the standards will clearly be of considerable importance.

Information presented in the EIS on the biota dependent on the Haiku streamflow should be of assistance to the State Department of Land and Natural Resources in setting the standards. We are drawing to the attention of the DLNR, in a letter accompanied by a copy of this review, the desirability of the expeditious establishment of the minimum streamflow standards for Haiku Stream and it tributaries.

Page 21, Paragraph 2

Untill minimum stream flow standards are adopted by the State, it would seem essential to establish the mechanism by which the BWS will coordinate with the U. S. Fish and Wildlife Service to determine when pumpage should be stopped. Has such a coordinating procedure been set forth? The proposed mitigation procedure to restore stream flow by pumping must be contingent on demonstrating that the well water is of sufficiently good quality to support the stream biota. Well water may be deficient in oxygen and thus not optimal for stream replenishment. The economics of stream augmentation would appear to preclude its feasibility as a viable mitigating measure.

Page 21 - 22

The hydrology of the Iolekaa wells is quite possibly too complex to pre determine the drafts effect on Haiku Stream and Heeia Marsh. It seems essential, however, to set up a systematic monitoring (gaging) station to provide baseline data that would show what data is needed to adequately measure the effects of pumping on Haiku Stream and Heeia Marsh.

An island wide, overall water resources plan is needed in order to adequately assess the impact of the development of water wells on Oahu's water supply. Monitoring stations such as is suggested for Haiku Stream, provide pertinent background data for informed management of this important resource.

Page 29, Top Paragraph

It would be of great value to study the savings to be achieved by "retrofitting" old fixtures with water saving devices. Development of more wells might be complemented with greater development in conservation measures.

We appreciate the opportunity to comment on the DEIS and look forward to your response.

Yours very truly,

Doak C. Cox
Director

cc: VTN Pacific✓
Board of Water Supply
Susumu Ono
OEQC
Frank Peterson
James Parrish
Jacquelin Miller
Mark Ingoglia

A-134

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA
HONOLULU, HAWAII 96843

February 3, 1983

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

Dear Dr. Cox:

Subject: Your Letter of January 21, 1982, On the Draft Environmental Impact Statement (EIS) for Iolekaa Well

Thank you for reviewing the Draft EIS for the proposed water development project. Your letter to the Mayor, which will be appended to the revised environmental document, has been referred to us for direct reply.

In response to your comments, we offer the following:

1. Effects of Well Draft on Streamflow (pg. i): We agree with your statement that the Iolekaa Well will not decrease streamflow if the dike discharge does not contribute to stream flows.

   The revised document will indicate that the alluvial aquifer discharges most of its flow directly into Kaneohe Bay while some may seep into the streams below the 200-foot elevation.

   Streamflow measurements taken during the testing of the Haiku Well showed that flow in Haiku Stream was from another aquifer. The increased flow at the measuring stations matched the amount of water discharged from the well.

   The location of streamflow monitoring stations will be coordinated with the U. S. Geological Survey and the Department of Land and Natural Resources. The data to be obtained from these future monitoring stations will be used as the basis for operating the well.

2. Coast Guard's Haiku Omega Station (pg. 11-12): A table or graph will be incorporated into the revised document to show the effects of the Coast Guard's usage of water on Haiku Stream.

3. Stream Fauna (pg. 14): A species list of stream fauna will be included in the revised document.

4. Faunal Survey (pg. 15): A summary of the methods and results of VTN Pacific's survey in February 1981 will be included in the revised document.

5. Agricultural Water Use (pg. 15): The attached comments from the State Department of Agriculture note that there are 29 farmers in the Heeia-Kaneohe watershed area. We provide irrigation water for 27 of those farmers while two farmers use stream water. Total irrigation use in 1981 was 26,000 gallons per day with about half of that amount supplied from surface sources. Future increases are estimated at less than 5 percent.

6. Hydrology (pg. 15): The status of Heeia Fishpond is unknown. However, a search will be made to determine if it is currently managed and, if so, its dependency on Heeia Stream for pond fishing.

7. Streamflow (pg. 19-20): Although there will be a lag time involved in detecting streamflow reduction and restoration of flow, we are committed to take whatever mitigative measures are necessary to meet minimum streamflow standards when they are adopted.

8. Test Pumping (pg. 20): There are no data on test pumping the wells during the "dry season". Although the Haiku Well test was performed during a "wet" month, rainfall records show precipitation was far below normal. The five-month moving rainfall average was 97 percent below the 30-year average and the monthly average was 56 percent below normal.

9. Minimum Streamflow Standards (pg. 21): We concur that the establishment of minimum streamflow standards may have considerable impact on the draft from our proposed wells in the area.

10. Stream Biota (pg. 21): A mechanism for coordination between the U. S. Fish and Wildlife Service and the Board has not yet been established, but will be in effect before any of the wells are placed into service.

    The Draft EIS did mention "another possible approach" or alternative to restore streamflow by pumping a little water from Haiku or Iolekaa Well back into the stream. This approach is just another alternative which is not practical and would be contrary to our conservation efforts. If required by adopted streamflow standards, we would reduce pumpage.

11. Heeia Marsh (pg. 21-22): We agree that the hydrology is too complex to predetermine the impacts that draft will have on Haiku Stream and Heeia Marsh. For this reason, we will be monitoring flows in order to obtain baseline data and determine if there are any long term effects on streamflow in the area.

12. Conservation (pg. 29): As indicated in the Draft EIS there is no reliable data on the savings to be achieved by "retrofitting" existing plumbing. A possible study may be considered in the future.

If you have any questions, please contact Lawrence Whang at 548-5221.

Very truly yours,

Kazu Hayashida

KAZU HAYASHIDA
Manager and Chief Engineer

cc: VTN Pacific

GEORGE R. ARIYOSHI
GOVERNOR

JACK K. SUWA
CHAIRMAN, BOARD OF AGRICULTURE

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 So. King Street
P. O. Box 22159
Honolulu, Hawaii 96822

January 14, 1983

RECEIVED
JAN 18 1983
VTN PACIFIC

MEMORANDUM

To: Honorable Eileen R. Anderson
Mayor, City and County of Honolulu

Subject: Environmental Impact Statement (EIS)
for Iolekaa Well
TMK: 4-6-27: 11 Kaneohe, Oahu

The Department of Agriculture has reviewed the subject Environmental Impact Statement and offers the following comments.

The subject EIS identifies four agricultural enterprises which utilize water from Heeia Stream and its tributaries, including Iolekaa Stream. These uses are a small taro patch, truck farm and two cattle ranches. A recent survey entitled "Agricultural Water Use, A Special Survey of Selected Windward Oahu Water Districts" (Department of Agriculture, Hawaii Agricultural Reporting Service, May 1982) identifies 29 farmers in the Heeia-Kaneohe watershed area, of which 27 irrigate their fields with water from the City and County system and two who use surface (stream water). In 1981, combined irrigation water use totaled about 26,000 gallons per day with approximately half of the water supplied from surface sources. User-estimated future water use indicates a very small increase in demand (less than 5 percent) for stream water usage. The specific location of those farms are not given to avoid disclosure of individual operations.

The withdrawal of water from the Heeia Stream and its tributaries by existing agricultural water users is probably very small compared to the base flow of the stream and tributaries (EIS Figure 4, page 13). It appears from the information provided that even with the potential reduction attributable to the water intake by the Haiku and proposed Iolekaa wells, current and projected stream water irrigation needs could be met.

Thank you for the opportunity to comment.

JACK K. SUWA
Chairman, Board of Agriculture

cc: VTN Pacific
Board of Water Supply

"Support Hawaiian Agricultural Products"

A-36

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU

COPY

January 26, 1983

RECEIVED
FEB 2 1983
VTN PACIFIC

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

Dear Mr. Suwa:

Subject: Your Letter of January 14, 1983,
On The Draft Environmental Impact
Statement (EIS) for Iolekaa Well,
Kaneohe

Thank you for reviewing the Draft EIS of our proposed water development project. Your letter to the Mayor, which will be appended to the revised environmental document, has been referred to us for direct reply.

We will note in the revised document a brief summary of your findings in the recent survey entitled "Agricultural Water Use, A Special Survey of Selected Windward Oahu Water Districts" (Department of Agriculture, May 1982).

If you have any questions, please contact Lawrence Whang at 548-5221.

Very truly yours,

Kazu Hayashida

KAZU HAYASHIDA
Manager and Chief Engineer

cc: VTN Pacific

State of Hawaii
DEPARTMENT OF DEFENSE
OFFICE OF THE ADJUTANT GENERAL
3949 Diamond Head Road
Honolulu, Hawaii 96816

RECEIVED
FEB 2 1983
VTN PACIFIC

HIENG

1 FEB 1983

Mayor Kileen Anderson
City and County of Honolulu
630 South King Street
Honolulu, Hawaii 96813

Dear Mayor Anderson:

Iolekaa Well

A-37

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

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

Youre truly,

HENRY H. MATSUDA
Captain, HANG
Contr & Engr Officer

cc: VTN Pacific
Board of Water Supply
Env. Quality Comm w/EIS

(P)2110.2

DEC 28 1982

RECEIVED
DEC 30 1982
VTN PACIFIC

Honorable Kileen Anderson
Mayor
City and County of Honolulu
Honolulu, Hawaii

Dear Mayor Anderson:

Subject: Iolekaa Well
Environmental Impact Statement

We have reviewed the subject EIS and have no comments to offer. Thank you for the opportunity to review the subject EIS.

Very truly yours,

MIDEO MURAKAMI
State Comptroller

MI:jl

cc: VTN Pacific
Board of Water Supply

30

GEORGE R. ARIYOSHI
GOVERNOR

STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
550 HALEKAUWILA ST.
ROOM 301
HONOLULU, HAWAII 96813

Jacqueline Parnel
DIRECTOR
TELEPHONE NO.
548-6915

RECEIVED
BD OF WATER SUPPLY
JAN 27 3 17 PM '83

830246

Mgr. KW
AM
P/E

January 25, 1983

RECEIVED
FEB 10 1983
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 Environmental Impact Statement for Iolekaa Well
Kaneohe, Oahu, Hawaii

A-38

Our primary concern regarding this project is that affected streams maintain a minimum stream flow to preserve existing stream fauna. We trust that a minimum stream flow standard will ultimately be adopted for these streams.

Sincerely,

Jacqueline Parnell
Director

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU

COPY

February 4, 1983

RECEIVED
FEB 10 1983
VTN PACIFIC

Ms. Jacquuline Parnell, Director
Office of Environmental Quality Control
State of Hawaii
550 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

Dear Ms. Parnell:

Subject: Your Letter of January 25, 1983
on the Draft Environmental Impact
Statement for Iolekaa Well, Kaneohe

Thank you for reviewing the draft Environmental Impact Statement for the proposed water development project. Your letter will be appended to the revised environmental document.

We shall be monitoring stream flows in the area. When minimum streamflow standards are established, we shall take mitigative measures to comply with the adopted standards.

If you have any questions, please contact Lawrence Whang at 548-5221.

Very truly yours,

KAZU HAYASHIDA
Manager and Chief Engineer

cc: VTN Pacific

9

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

EILEEN R. ANDERSON
MAYOR

WILLARD T. CHOW
CHIEF PLANNING OFFICER

RALPH PORTMORE
DEPUTY CHIEF PLANNING OFFICER

DGP12/82-4398

January 26, 1983

RECEIVED
JAN 27 1983
VTN PACIFIC

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

Gentlemen:

A-39

Environmental Impact Statement for Iolekaa Well

We have reviewed the impact statement and have no comments.

Thank you for affording us the opportunity of reviewing the statement.

Sincerely,

CLARENCE TOH
Planner

APPROVED:

WILLARD T. CHOW

cc: Board of Water Supply

DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813
PHONE 523-4185

EILEEN R. ANDERSON
MAYOR

JOSEPH K. CONANT
DIRECTOR

CHARLES K. TORIGOE
DEPUTY DIRECTOR

January 11, 1983

RECEIVED
JAN 13 1983
VTN PACIFIC

Honorable Eileen R. Anderson, Mayor
City and County of Honolulu
630 South King Street
Honolulu, Hawaii 96813

Dear Mayor Anderson:

Subject: Environmental Impact Statement
Iolekaa Well
Kaneohe, Oahu, Hawaii

Thank you for forwarding the subject EIS for our review and comment.

Your proposed development of additional water resources to meet future needs, especially in the Kaneohe area, will ensure the continuance of adequate health standards and induce development in the Windward district.

We are retaining the copy of the EIS for our files.

Sincerely,

JOSEPH K. CONANT
Original Signed
JOSEPH K. CONANT

cc: VTN Pacific
Board of Water Supply

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

EILEEN R. ANDERSON
MAYOR

MICHAEL M. McELROY
DIRECTOR

ROBERT B. JONES
DEPUTY DIRECTOR

January 14, 1983

LU12/82-6583(LH)

MEMORANDUM

RECEIVED
JAN 17 1983
VTN PACIFIC

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

FROM : MICHAEL M. McELROY, DIRECTOR

SUBJECT : ENVIRONMENTAL IMPACT STATEMENT (EIS) FOR IOLEKAA WELL--KANEOHE, OAHU
TAX MAP KEY: 4-6-27: 11

A-40

This is in response to your request for comments on the above EIS.

1. Reference: Section III, Environmental Impacts and Mitigation Measures; B. Heeia Stream and Tributaries, Page 21, Paragraph 2.

   Comment: If these mitigation measures are implemented, would they be used to increase stream flow at critical dry periods, such as the summer when the flow is reduced?

2. Reference: Section V., Alternatives to the Proposed Project; Demineralization of Brackish Water, C. 2. Page 29-30

   Comment: The demineralization alternative should consider utilizing the renewable forms of energy to produce the required electrical power.

Thank you for the opportunity to review this EIS. Should you have any comments or questions, please contact Lorene Maki of our staff at 523-4077.

for MICHAEL M. McELROY
Director of Land Utilization

MMM:sl
cc: VTN Pacific

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU

COPY

January 24, 1983

RECEIVED
JAN 31 1983
VTN PACIFIC

TO: MICHAEL M. McELROY, DIRECTOR
DEPARTMENT OF LAND UTILIZATION

FROM: KAZU HAYASHIDA
BOARD OF WATER SUPPLY

SUBJECT: YOUR MEMORANDUM OF JANUARY 14, 1983, ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT (EIS) FOR IOLEKAA WELL, KANEOHE, OAHU

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

We offer the following in response to your comments:

1. "Reference: Section III, Environmental Impacts and Mitigation Measures; B. Heeia Stream and Tributaries, Page 21, Paragraph 2.

   Comment: If these mitigation measures are implemented, would they be used to increase stream flow at critical dry periods, such as the summer when the flow is reduced?"

   Response: The mitigative measures will be implemented to meet any minimum streamflow standards. However, until any minimum streamflow standards are established, we shall be consulting with the U. S. Fish and Wildlife Service on measures to protect stream habitats during critical dry periods.

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU

COPY

Mr. Michael McElroy
Page 2

January 24, 1983

2. "Reference: Section V., Alternatives to the Proposed Project; Demineralization of Brackish Water, C. 2. Page 29-30.

Comment: The demineralization alternative should consider utilizing the renewable forms of energy to produce the required electrical power."

Response: When we undertake the demineralization alternative, we shall consider all forms of renewable energy resources.

If you have any questions, please contact Lawrence Whang at 548-5221.

Kazu Hayashida

KAZU HAYASHIDA
Manager and Chief Engineer

cc: VTN Pacific

A-41

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

EILEEN R. ANDERSON
MAYOR

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

WILLIAM A. BONNET
DEPUTY DIRECTOR

ENV 82-459

December 29, 1982

MEMORANDUM

TO: HONORABLE EILEEN R. ANDERSON, MAYOR

VIA: MR. ANDREW I. T. CHANG, MANAGING DIRECTOR

FROM: MICHAEL J. CHUN, DIRECTOR AND CHIEF ENGINEER

SUBJECT: EIS FOR IOLEKAA WELL, KANEOHE, HAWAII

We have reviewed the subject EIS and do not have any additional comments.

Wm. C. Bonnet

FOR MICHAEL J. CHUN
Director and Chief Engineer

cc: VTN Pacific
BWS

RECEIVED
DEC 30 1982
VTN PACIFIC

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

VTN Pacific

EILEEN R. ANDERSON
MAYOR

EMIKO I. KUDO
DIRECTOR

SAM L. CARL
DEPUTY DIRECTOR

OSCAR R. ABAMINA
EXECUTIVE ASSISTANT

January 14, 1983

RECEIVED
JAN 19 1983
VTN PACIFIC

TO: HONORABLE EILEEN R. ANDERSON, MAYOR

VIA: ANDREW I. T. CHANG, MANAGING DIRECTOR

FROM: EMIKO I. KUDO

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT (EIS) FOR IOLEKAA WELL

42

The proposed conversion of the exploratory Iolekaa Well into a production well will not have any adverse impacts on recreation facilities in proximity to the project site.

(Hrs.) EMIKO I. KUDO, Director

CONCUR:

ANDREW I. T. CHANG
Managing Director

EIK:vc

cc: VTN Pacific
BWS

KAHALUU NEIGHBORHOOD BOARD NO. 29
c/o KAHALUU COMMUNITY CENTER
47-237 WAIHEE ROAD
KANEOHE, HAWAII 96744
WEEIA KEA KAHALU'U WAINE'E WAIAHOLE, WAIKANE, HAKIPUU AND KUALOA

"Let us not ever have an unhappy minority"

January 22, 1983

RECEIVED
JAN 25 1983
VTN PACIFIC

Mayor Eileen Anderson
City and County of Honolulu
530 South King Street
Honolulu, Hawai'i 96813

Comments on Final Environmental Impact Statement
'Ioleka'a Production Well
He'eia, Ko'olaupoko, O'ahu, Hawai'i

Dear Mayor Anderson:

This letter expresses the concerns of the Kahalu'u Neighborhood Board regarding the proposed conversion of the 'Ioleka'a Test Well into a .3 mgd Production Well and the combined effect of this well and the proposed 1 mgd Ha'iku Production Well on He'eia Stream.

Because stream flow monitoring systems have not yet been put in place and because minimum stream flow standards have not yet been established we must again put forward our positions on Windward water resource development and diversion.

Although the Department of Land and Natural Resources has been conducting studies on Instream Uses and on Stream Flow Standards, no findings have yet been published and , of course, no standards have yet been implemented.

Furthermore, the recent December 20, 1982 Hawai'i Supreme Court decision regarding Board of Water Supply groundwater diversions and landowners' riparian and appurtenant rights to the flowing and running waters of Waihe'e Stream may have ramifications which will apply to streams islandwide. The summary of this court decision is attached.

Therefore, it is appropriate that we now repeat several of the pertinent Water Policy Statements from our Water Resources Position Statement of March 11, 1981.

"2. the Department of Land and Natural Resources immediately establish interim stream flow standards for all windward streams."

"3. development of any additional windward water resources be limited by interim or permanent stream flow standards and be reserved first for windward agricultural use and next for windward suburban use."

"4. a moritorium be established on any additional diversion of windward water outside Ko'olaupoko & Ko'olauloa until establishment of permanent stream flow standards that will assure fulfillment of the policy of the State of Hawai'i to achieve ever increasing agricultural sof-sufficiency."

Mayor Eileen Anderson
Comments on Final Environmental Impact Statement
'Ioleka'a Production Well
He'eia, Ko'olaupoko, O'ahu, Hawai'i

"5. no water be taken from present auricultural users and that the appurtenant and riparian rights of water users be protected and defended to the fullest extent."

We trust that, in your decision on whether or not to accept the 'Ioleka'a Well Environmental Impact Statement, you will give our concerns your serious attention.

Sincerely,

Edwin B. Stevens

EDWIN B. STEVENS, CHAIRMAN
KAHALU'U NEIGHBORHOOD BOARD NO. 29

Letter & Comments Authorized by Motion 9-0-0.
N.B.#29 Regular Meeting 1-12-83

Attachment: Summary of Hawai'i Supreme Court Decision dtd 12-20-82 re: Groundwater Diversions and Riparian & Appurtenant Rights to Flowing & Running Water.

References: N.B.#29 ltr. to BWS dtd. 8-18-81 re: 'Ioleka'a Production Well E.I.S. and BWS response dtd. 9-9-81.
N.B.#29 Water Resources Position Statement dtd. 3-11-81.

A-43

cc: Board of Water Supply
VTN Pacific
Councilman David Kahanu
Senator Charles Toguchi
Representative Robert Nakata
Department of Land & Natural Resources
Hui Malama Aina O Ko'olau
Kane'ohe N.B.#30
Kahalu'u N.B.#29 - Chairman
- Water & Agricultural Committee
Kahalu'u Community Resource Center
Neighborhood Commission

IN THE SUPREME COURT OF THE STATE OF HAWAII

OCTOBER TERM 1982

---o0o---

CHARLES F. REPPUN, PAUL REPPUN, ROBERT S. NAKATA, and SEIYU NAKATA, Plaintiffs-Appellees, Cross-Appellants, and CLIFFORD HONG and RACHEL HALL, Plaintiffs-Intervenors-Appellees, Cross-Appellants, v. BOARD OF WATER SUPPLY, City and County of Honolulu, Defendant-Appellant, Cross-Appellee

NO. 7738

APPEAL FROM FIRST CIRCUIT COURT

HONORABLE ARTHUR S. K. FONG, JUDGE

CIVIL NO. 50121

DECEMBER 20, 1982

RICHARDSON, C.J., LUM, NAKAMURA, JJ., AND RETIRED JUSTICES OGATA AND MENOR, ASSIGNED TEMPORARILY

FILED
1982 DEC 20 PM 1:52
CLERK SUPREME COURT

RECEIVED
JAN 25 1983
VTN PACIFIC

Summary

Our holdings as summarized are reiterated below:

1. Riparian rights.
   a. Water rights attaching to riparian lands by virtue of HRS § 7-1 cannot be severed or extinguished by a riparian landowner's grantor. The riparian rights of each plaintiff taro farmer were therefore unaffected by language in their deeds that purported to reserve such water rights.
   b. Riparian landowners are entitled to make reasonable use of the quantity and flow of a natural watercourse and may prevent diversions that interfere with such use.
      i. The agricultural activities of the plaintiffs taro farmers constitute a reasonable use of the waters of the Waihee Stream as their mode of irrigation approximates that which has been historically utilized for the cultivation of taro. Plaintiffs are therefore entitled to the use of the waters of the Waihee Stream for the cultivation of their riparian lands with the quantity and flow that existed prior to the reduction of the flow that contributed to the damaging of their crops.
2. Appurtenant rights.
   a. Appurtenant water rights are incidents of the ownership of land which, by virtue of their appurtenant nature, may not be transferred or applied to lands other than those to which the rights appertain. They may, however, be extinguished by the grantor of such lands.
   b. When the same parcels of land are being utilized to cultivate traditional products by means approximating those utilized at the time of the Mahele, there is sufficient evidence to establish a presumption that the amount of water diverted for such cultivation adequately approximates the quantity of the appurtenant water rights to which that land is entitled.
   c. Plaintiffs' lands possessing appurtenant water rights that were not extinguished by their grantors are therefore entitled to the quantity and flow of water which was utilized to irrigate crops prior to the diminution of the stream that damaged the crops.

3. Enjoining of groundwater diversions that interfere with established streamflow rights.

   a. Where surface and groundwater can be demonstrated to be interrelated as parts of a single system, established surface water rights may be protected against diversions that injure those rights whether the diversion is of surface water or groundwater. BWS diversions that interfered with plaintiffs' established rights were therefore properly the subject of an injunction.

4. The propriety of injunctive relief against a "public use."

   a. As a general rule, where water has been improperly diverted by a public entity for actual public use, a complainant may not obtain injunctive relief against the diversion of water to which a public use has attached at the time the suit is filed, unless the court finds that a public interest of substantially the same magnitude will be advanced by injunctive relief.

      1) Where, however, there is a gradually increasing diversion, the critical point at which the doctrine becomes operational is when the diversion causes actual harm to the plaintiffs.

Reversed and remanded for further proceedings in accordance with this opinion.

Samuel P. King, Jr., Special Deputy Corporation Counsel, (Richard D. Wurdeman, Corporation Counsel, with him on the briefs) for Defendant-Appellant, Cross-Appellee Board of Water Supply.

William A Richardson

J Lum

Ronald Albu (Legal Aid Society of Hawaii) for Plaintiffs-Appellees, Cross-Appellants Reppuns.

Edward H. Nakamura

E. Cooper Brown for Plaintiffs-Appellees, Cross-Appellants Nakatas and Plaintiffs-Intervenors-Appellees, Cross-Appellants Wong and Hall.

Thomas S. Ogata

Benjamin Menor

January 28, 1983

Mr. Edwin B. Stevens, Chairman
Kahaluu Neighborhood Board No. 29
c/o Kahaluu Neighborhood Center
47-232 Waihee Road
Kaneohe, Hawaii 96744

Dear Mr. Stevens:

Subject: Your Letter of January 22, 1983, On The Draft Environmental Impact Statement (DEIS) for Iolekaa Well, Koolaupoko

Thank you for reviewing the DEIS of our proposed water development project. Your letter to the Mayor, which will be appended to the revised environmental document, has been referred to us for direct reply.

We acknowledge your concerns on the combined impacts the Haiku and proposed Iolekaa Wells may have on streamflow.

The DEIS discusses the impacts our water production facilities may have on streamflow and its secondary impacts on aquafauna and agriculture. We are committed to maintaining present flows in Hecia, Haiku, and Iolekaa Streams and have indicated that we would reduce pumpage, if needed, to meet future minimum streamflow standards. Streamflow monitoring will be conducted before and after the wells become operational.

On the basis of our commitment, the establishment of a moratorium will serve no useful purpose. For your information, we are also involved in developing water supply with the State Department of Agriculture for the Waimanalo and Waiahole agricultural parks. The new windward sources will first be allocated to agricultural and urban developments in that area and only the surplus water is planned to be exported to Honolulu.

In a special study of agricultural water use in Windward Oahu by the Department of Agriculture (DOA), there were nineteen farms using water supplied by the City and two farms using surface water in the Heeia-Kaneohe watershed. The locations of the farms were not included in the DOA study for confidentiality. A survey was made of the area downstream of the proposed wells and no streamflow users were found.

If you have any questions, please contact Lawrence Whang at 548-5221.

Very truly yours,

Kazu Hayashida

KAZU HAYASHIDA
Manager and Chief Engineer

bcc: E. Anderson, Mayor
A. Chang, Managing Director

MHS/HHM:dsf
cc: K. Hayashida
L. Whang
83-0203

A-47

HAIKU PLANTATIONS ASSOCIATION/KANEOHE, HAWAII 96744

January 17, 1983

RECEIVED
JAN 18 1983
VTN PACIFIC

The Honorable Eileen Anderson
Mayor of the City and County of Honolulu
630 South King Street
Honolulu, Hawaii 96813

Dear Madam:

It is with considerable concern that the Haiku Plantations Association views the uncapping of Iolekaa Well. The current use of base flow statistics which were recorded in 1962 is of particular consternation and it is urged that more recent data be compiled before proceeding with this project.

The quality and pressure of the water in those streams which will be effected by the opening of the well also requires close study. This community, which must bear the consequences of any changes, request that the utmost care be exercised and a thorough examination given to all possible ramifications before this plan is undertaken.

Very truly yours,

Juanita Marvin

Mrs. Stephen Marvin, Secretary

copy: VTN Pacific
Board of Water Supply

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU

COPY

January 26, 1983

RECEIVED
FEB 2 1983
VTN PACIFIC

Mrs. Stephen Marvin, Secretary
Haiku Plantations Association
c/o 46-366 Holokaa Place
Kaneohe, Hawaii 96744

Dear Mrs. Marvin:

Subject: Your Letter of January 17, 1983, on the Draft Environmental Impact Statement (EIS) for Iolekaa Well

Thank you for reviewing the Draft EIS of our proposed water development project. Your letter to the Mayor, which will be appended to the revised environmental document, has been referred to us for direct reply.

We share your concern on the impacts our project may have on streamflow. To insure present streamflow, we will be monitoring flows in Iolekaa Stream and Haiku Stream before and after the well is placed into operation. The streamflow measurements will be coordinated with the Department of Land and Natural Resources as well as the U. S. Fish and Wildlife Service.

If you have any questions, please contact Lawrence Whang at 548-5221.

Very truly yours,

KAZU HAYASHIDA
Manager and Chief Engineer

cc: VTN Pacific

A-48

SIERRA CLUB, HAWAI'I CHAPTER
P.O. BOX 22897 HONOLULU, HAWAI'I 96822
(808)946-8494

MĀLAMA I KA HONUA

January 21, 1983

RECEIVED
JAN 24 1983
VTN PACIFIC

Mayor Eileen Anderson
City and County of Honolulu
630 South King Street
Honolulu, Hawaii 96813

Iolekaa Well EIS, Kaneohe, Oahu, Hawaii

Dear Mayor Anderson:

The Conservation Committee of the Honolulu Group, Hawaii Chapter of the Sierra Club have digested the Iolekaa Well EIS and have the following comments to make since we have a vital concern for Hawaii's water:

1. We wish to congratulate the preparers of the EIS, since this document seems to be thorough, straightforward, well-organized and clear. This is not always true of EIS's.

2. We are deeply concerned with the present philosophy of water allocation. It seems to us that the Court decisions that are being made and the impact of development on water resources points to the need for a change of philosophy. Rather than responding to demand and to population projections and granting water on a "first-come, first-served" basis, we should return to the fundamental conception of property and law based upon water rights, rather than land use and possession, as was done in early Hawaiian society. Fresh water is the primary resource that can determine life and death. Western civilization has found solutions to water problems, using advanced technology, but in the process, water tables have been seriously depleted. Since Hawaii is a small and isolated place, with limited resources, it would seem only good management and common sense that water, not land, should be the determining factor in any development scheme. We should pay strict attention to the rate at which water is being renewed. We should not be developing every single water source in such a rapid fashion, responding to population projections which are not infallible. The managers of water should rather be projecting the population and development which prudent and reasonable use of our water can handle.

SIERRA CLUB, HAWAI'I CHAPTER
P.O. BOX 22897 HONOLULU, HAWAI'I 96822
(808) 946-8494

The EIS admits that there can be adverse impacts which will reduce the base flow of Haiku and Heeia Streams. In spite of channeling, Heeia stream was classified in another document as having "moderate to high quality water or natural values". Therefore, we take the position that there should be no development of new wells or increased pumping of existing wells until the work is completed on minimum stream flow and the standards have been developed and implemented. This document attests to the fact that average and base stream flow have been reduced by BWS water-development tunnels in the 1940's. The Waihee water case was proof that agricultural users can be hurt with the development of wells.

A-49 3. We have a concern that the Heeia Meadowlands continue in existence as a wet-land, as well as to serve as a natural green belt between urbanization and rural. We note that Dr. Robert Shallenberger considers the Heeia marsh to be of major significance as habitat for the Hawaiian gallunule. This document states that the planned wells may cause a reduction in the amount of ground water reaching a long section of the Kaneohe Bay coastline including the Heeia Meadowlands, as has happened in the past.

4. We support an Island-Wide approach (page 27), except for 5 & 6, "Taking Stream Water and Taking Agricultural Water". Any support of these two measures would depend upon a number of factors. We particularly would like to see dedicated conservation effort. In general, people take our fine water supply for granted and are indeed wasteful. For example, at all of Hawaii's Small Boat Harbors, copious amounts of fresh water are used for washing boats, motors and cars and leaks are common. In many parks on the mainland, there are two water sources--low-grade water for doing dirty jobs and high-grade for internal use.

In the discussion of cost of water, we feel that Hawaii can no longer afford to take the most economical route, at the expense of overwhelming the supply.

Mahalo for allowing us to comment.

Lola N. Mench
Vice. Chair. Conservation Committee

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU

COPY

February 7, 1983

RECEIVED
FEB 10 1983
VTN PACIFIC

Mrs. Lola N. Mench
Sierra Club, Hawaii Chapter
P. O. Box 22897
Honolulu, Hawaii 96822

Dear Mrs. Mench:

Subject: Your Letter of January 21, 1983 on the Draft Environmental Impact Statement for Iolekaa Well

Thank you for reviewing the draft Environmental Impact Statement (EIS) of our proposed water development project. Your letter to the Mayor, which will be appended to the revised environmental document, has been referred to us for direct reply.

We offer the following in response to your comments:

1. Our water development program is based on the preservation of our groundwater resources. Towards this end, we are working jointly with the State Department of Land and Natural Resources (DLNR) and the U. S. Geological Survey to establish the sustainable yields of our groundwater basins. Pumpage from new wells will be limited to ensure that the basins are not depleted. We will also abide with minimum streamflow standards that are to be adopted by DLNR. Our present policy of allocating water to new developments on a "first-come, first-served basis" reflects the limited water supply conditions of our existing water systems. Accordingly, we allocate water only to projects which have met all of the requirements of the City and State and are ready to proceed as evidenced by the submission of construction drawings and building permits. Our program is also based on the population projections of the State Department of Planning and Economic Development and City Development Plans.

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU

COPY

Mrs. Lola N. Manch
Page 2

February 7, 1983

2. We will monitor streamflow before and after the Haiku and Iolekoa Wells become operational. The monitoring will be coordinated with the Department of Land and Natural Resources and the U.S. Geological Survey to assure that acceptable streamflows are maintained. The Fish and Wildlife Service will also be consulted.

3. Our proposed wells will have minimal effect, if any, on the Heeia Meadowland. The Meadowland and its tidal marsh will continue to exist as wet-land and provide habitat for the Hawaiian gallunule.

4. We are continually encouraging people to conserve water and agree that most people take our water supply for granted.

Your suggestion on dual water systems is already being considered in the Ewa area and any other area where the opportunity exists. We are processing several projects for the development of low-quality water for landscape irrigation purposes.

If you have any questions, please contact Lawrence Whang at 548-5221.

Very truly yours,

Kazu Hayashida

KAZU HAYASHIDA
Manager and Chief Engineer

cc: VTN Pacific

830177

RECEIVED
BD OF WATER SUPPLY
JAN 24 9 39 AM '83

21 Jan. 1983

Mgr. VN

RECEIVED
FEB 10 1983
VTN PACIFIC

To: Kazu Hayashida
Manager and Chief Engineer
Honolulu Board of Water Supply

From: Pualani Rivero &
Mr. & Mrs. Alvin B. Le Porte
46-490 Hololio St.
Kaneohe, Hi 96744

Re: Iolekaa Well

We have learned through a Jan. 19th issue of our community newsletter that the Board of Water Supply plans to uncap Iolekaa Well and build a pumping station on the parcel neighboring ours. We have some concerns and questions relating to the project:

1. The Board of Water Supply has an easement through our property on which you have built a 12 foot wide concrete driveway. Ours is a sloping lot, and the angle of the driveway is approximately 11 degrees. We share the lower quarter of the 1/8th mile long roadway and are concerned for the safety of our family members and pets with increased traffic and heavy construction equipment driving along this steep incline. We hope that some attention will also be paid to providing turnabout space for this equipment at the construction site. Board of Water supply vehicles have on occasion and without permission used our property for this purpose.

2. This is a quiet neighborhood. We hear an occasional car driving up to the deadend on the street below us and birds in the neighboring eucalyptus forest, but little else. Although your EIS rates the project's noise level as consistent with rural surroundings, it will obviously be a higher level than we now enjoy. Noise from the pumping station will be constant and continuous, even after construction of a mechanical muffler. We request that a thick hedge or some other foliage be planted outside the fence line to

further screen pump noise.

3. New homes are not now being built in Haiku Plantations, nor have they been in the last several years. With exisiting zoning and association rules, there will be little if any new construction. Ours is, therefore, not a growing neighborhood with a concurrent growing need for additional water supply. Although we will not directly benefit from this project, we are the property owners who will be most adversely affected by it. Along with the additional traffic, the construction dust and dirt, and noise, there will be a very real drop in property value. Given these facts, we feel it would have been good public relations, if not common courtesy to have contacted us directly. Some of our concerns might have been addressed and mutually resolved.

Pualani Rivero

Alvin B. Le Porte

A-51

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA
HONOLULU, HAWAII 96843

February 4, 1983

FEB 10 1983

VTN PACIFIC

Ms. Pualani Rivero and
Mr. and Mrs. Alvin B. Le Porte
46-490 Hololio Street
Kaneohe, Hawaii 96744

Dear Ms. Rivero:

Subject: Your Letter of January 21, 1983, On The Proposed Iolekaa Well

Thank you for informing us of your concerns on our proposed water development project. Your letter will be appended to the revised environmental document.

In response to your concerns, we offer the following:

1. We concur that there will be a temporary increase in traffic and some heavy equipment utilizing the easement through your property during the construction stages of this project. The Contractor will be instructed to be vigilant of pedestrians and pets when traversing the area. A vehicle turnaround will be established at the reservoir site.

   Department employees will be reminded to refrain from using your property as a vehicle turnaround.

2. We understand your concern on the question of additional noise in a residential neighborhood. Our design will take this into consideration while meeting applicable State and County codes.

3. The environmental impacts to your property will be temporary and should not cause your property value to drop. Mitigative measures such as watering for dust control and limiting the working hours to minimize traffic and noise will be enforced by our construction inspectors during the entire construction period. Additional landscaping will also be provided to control dust and erosion from the site.

Ms. Pualani Rivero and
Mr. and Mrs. Alvin B. Le Porte
Page 2

February 4, 1983

We regret not contacting you directly, but we did provide a copy of our draft environmental document to your community association so that they could disseminate the information to residents in the area.

If you have any questions on this project, please contact Lawrence Whang at 548-5221.

Very truly yours,

Kazu Hayashida

KAZU HAYASHIDA
Manager and Chief Engineer

cc: VTN Pacific

A-52

RECEIVED
BD OF WATER SUPPLY
JAN 12 10 53 AM '83

820080

January 10, 1983
45-579 Apapane St.
Kaneohe, Hawaii 96744

RECEIVED
JAN 25 1983
VTN PACIFIC

Mgr. K.H.
AM
P/E
Comments
K.H.

Mr. Kazu Hayashida
Board of Water Supply
630 South Beretania Street
Honolulu, Hawaii 96843

Dear Sir:

I am writing with regard to the planned re-opening of the well in Waiahole. My husband, Ralph T. McCabe, and I own a share of the Waiahole Kuleana. I have written to you before on this subject.

As a result of prior communication with your office I received a copy of the EIS. This document does not guarantee that the water in our Kuleana will not be affected by your plans. In fact it admits that the impact on the water which runs through our Kuleana is uncertain at best.

I've talked to relatives and I know that the amount of water running through our Kuleana has greatly diminished over the last 40-50 years due to the lowered water table from other of your wells. Now you propose to take an action which will quite likely make the water available to us even less.

I really don't know how you can do this, but I have a feeling you will. I would like to go on record as objecting to the re-opening and new usage of the Waiahole well.

Sincerely,
Katherine L. Totto
(Mrs. R. T. McCabe)

gn

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU

COPY

January 20, 1983

RECEIVED
JAN 25 1983
WTN PACIFIC

Mrs. R. T. McCabe
45-579 Apapane Street
Kaneohe, Hawaii 96744

Dear Mrs. McCabe:

Subject: Your Letter of January 10, 1983 on the Draft Environmental Impact Statement (EIS) for Iolekaa Well

Thank you for your comments on the Draft EIS for our proposed water development project. Your letter will be appended to the revised EIS.

We will be measuring streamflow before and after the pump is installed on the well to insure present streamflows.

If you have any questions, please contact Lawrence Whang at 548-5221.

Very truly yours,

Kazu Hayashida

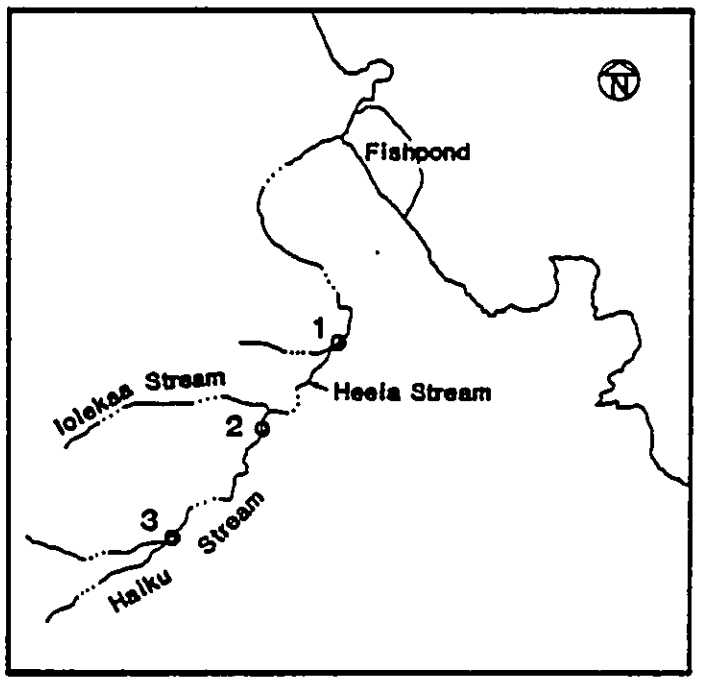
KAZU HAYASHIDA
Manager and Chief Engineer

cc: WTN Pacific

A-53

APPENDIX B

STREAM FAUNA SURVEYS

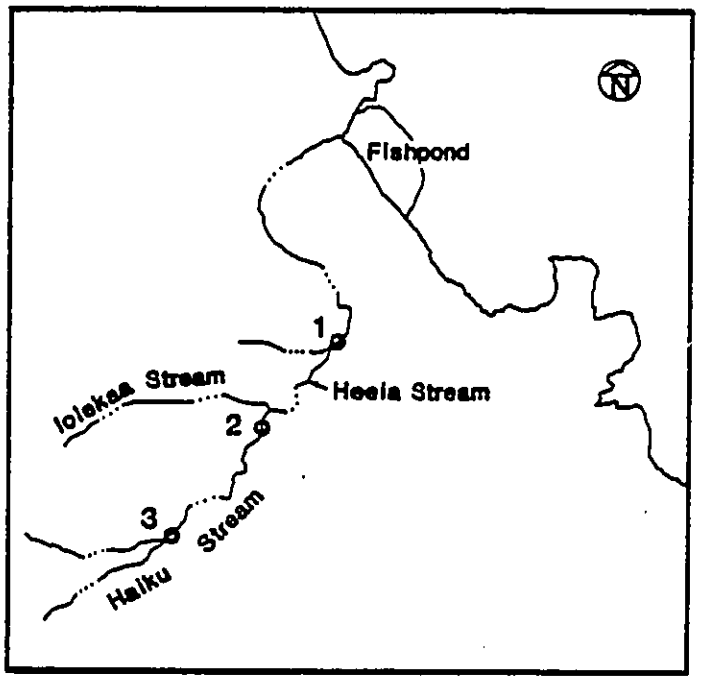


AQUATIC ORGANISMS IN HEEIA AND HAIKU STREAMS

Shrimp	Sampling Station 1	Sampling Station 3
* opae kalaole (Atya bisculçata)	None	Common
Tahitian prawn (Macrobrachium lar)	Abundant	None
crayfish (Procambarus clarkii)	Common	Abundant

Fish	Sampling Station 1	Sampling Station 3
dojo (Misgurnus anguillicaudatus)	Common	Common
Chinese catfish (Clarias fuscus)	Abundant	None
guppy (Poecilia reticulata)	Abundant	Abundant
swordtail (Xiphophorus helleri)	Abundant	Rare
molly (Poecilia mexicana)	Common	Abundant
mosquitofish (Gambusia affinis)	None	Common
* o'opu nakea (Awaous stamineus)	Rare	None
* o'opu okuhe (Eleotris sandwicensis)	Rare	None

* Denotes native species
Source: Ref. 9, pp. 86, 127



PERCENT COMPOSITION OF AQUATIC ORGANISMS COLLECTED IN HEEIA AND HAIKU STREAMS

	Shrimp	Sampling Station 1	Sampling Station 2
*	opae kalaole	-----	2.4%
	Tahitian prawn	3.7%	1.2%
	crayfish	7.4%	6.1%

	Fish	Sampling Station 1	Sampling Station 2
	dojo	1.3%	7.7%
	Chinese catfish	4.7%	0.4%
	guppy	31.2%	80.2%
	swordtail	46.0%	2.0%
	molly	4.7%	-----
*	o'opu nakea	0.3%	-----
*	o'opu okuhe	0.6%	-----

* Denotes native species
Source: Ref. 12, pp. 7, 11