JOHN WAIHEE
GOVERNOR

JOSEPH K. CONANT
EXECUTIVE DIRECTOR

STATE OF HAWAII
DEPARTMENT OF BUDGET AND FINANCE
HOUSING FINANCE AND DEVELOPMENT CORPORATION
677 QUEEN STREET, SUITE 300
HONOLULU, HAWAII 96813
FAX (808) 587-0600

'94 SEP 12 P3:17

IN REPLY REFER TO:
94:DEV/4716

September 8, 1994

Bruce S. Anderson, Ph.D., Interim Director
Office of Environmental Quality Control
220 S. King Street, 4th Floor
Honolulu, Hawaii 96813

Dear Dr. Anderson:

Subject: Negative Declaration for the Drilling and Testing Keopu-HFDC Exploratory Well No. 1, TMK: 7-5-13:22, Keopu, North Kona, Hawaii

The Housing Finance and Development Corporation has reviewed the comments received during the 30-day public comment period which began on April 8, 1994. The agency had determined that this project will not have significant environmental effect and has issued a negative declaration. Please publish this notice in the September 23, 1994, OEQC Bulletin.

We have enclosed a completed OEQC Publication Form and four (4) copies of the final Environmental Assessment. Please contact Cirvalina Longboy, Project Coordinator, at 587-0546 if you have any questions.

Sincerely,

JOSEPH K. CONANT
Executive Director

Encs.

HFDC

127

1994-09-23- HI- FEA - Keopu - HFDC Exploratory Well I SEP 23 1994

Chapter 343, Hawaii Revised Statutes (HRS)

Final

Environmental Assessment

for the

Drilling and Testing
Keopu-HFDC Exploratory Well No. 1

TMK: 7-5-13:22
Keopu, North Kona, Hawaii

Proposing Agency:

Housing Finance and Development Corporation
Department of Budget and Finance
State of Hawaii
677 Queen Street, Suite 300
Honolulu, Hawaii 96813
Telephone: (808) 587-0598

Prepared by:

Fukunaga & Associates, Inc.
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Telephone: (808) 944-1821

August 1994

Chapter 343, Hawaii Revised Statutes (HRS)

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677 Queen Street, Suite 300
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Telephone: (808) 587-0598

Responsible Official: _____ Date: 9-9-94

Joseph Conant
Director

Prepared by:

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August 1994

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I. PROJECT DESCRIPTION

A. Purpose

The existing water system serving North Kona is being taxed from growth in the area. This is hindering the State from developing projects that are contingent upon water availability. Accordingly, the State is exploring new water sources in North Kona in order to implement State projects planned for the area. As part of this program, the State Housing Finance and Development Corporation (HFDC), in coordination with the Department of Land and Natural Resources (DLNR), Division of Water and Land Development (DOWALD), proposes to drill and test an exploratory well (Keopu-HFDC Exploratory Well No. 1, State Well No. 3957-03) to determine the feasibility of developing a new water source (See Figures 1 and 2).

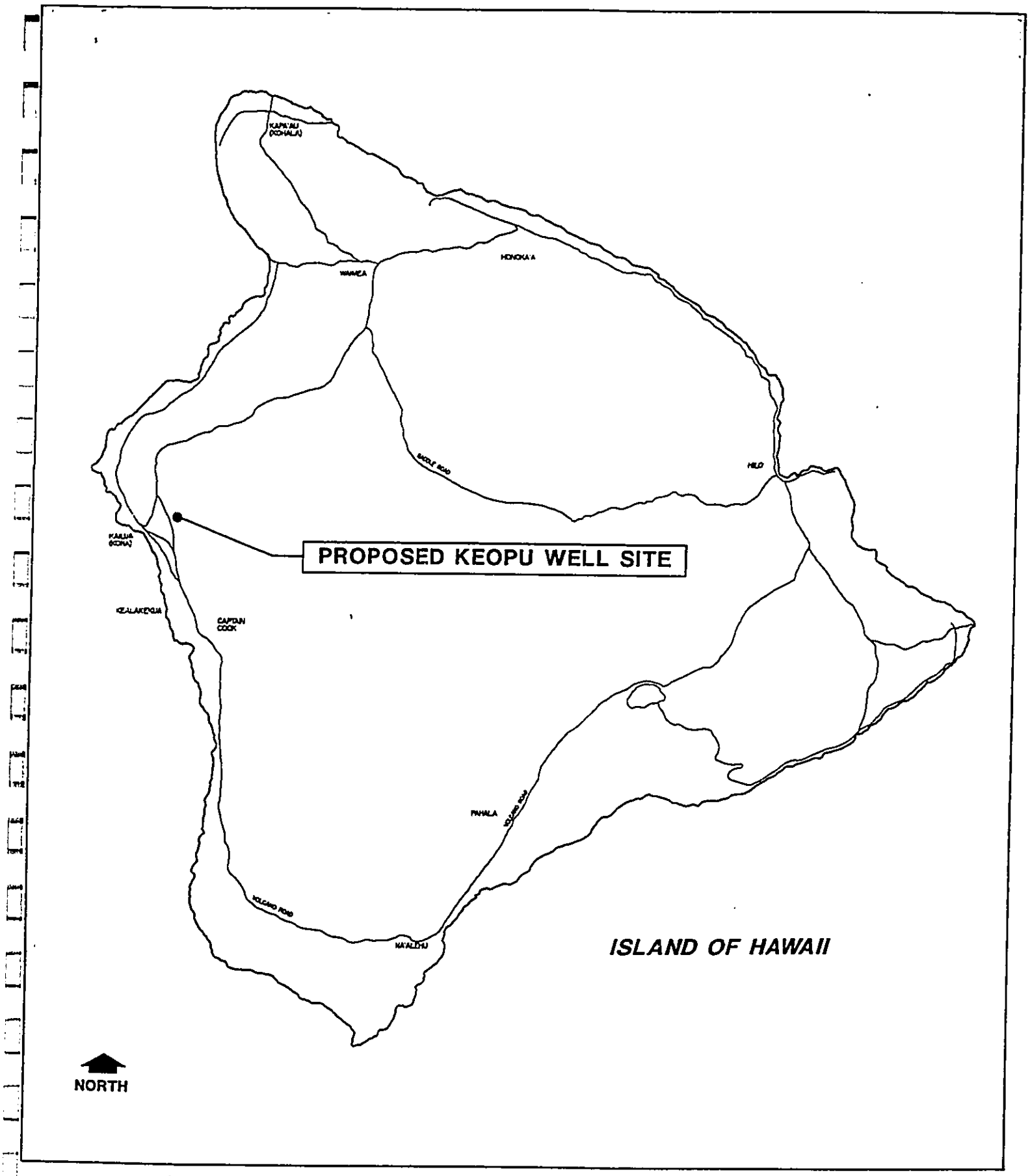
B. Background Information

The municipal water system in North Kona is operated and maintained by the County of Hawaii, Department of Water Supply. The water system extends from Keahole-Kona International Airport to towns near the North Kona-South Kona border. The system serves Keahole-Kona International Airport, Honokohau Small Boat Harbor, Kailua Town and the surrounding residential communities, and resort areas in Keauhou (south of Kailua).

Due to an expanding visitor industry, the population in the North Kona area has grown rapidly: about 48% between 1970 to 1980 and about 23% between 1980 to 1990; this growth is expected to continue, but at a lesser pace. To keep up with this growth, the State has ongoing projects in North Kona that include the Villages of La'i'opua (formerly Kealakehe affordable housing communities), Kealakehe High and Elementary Schools, Honokohau Harbor Reservoir, Hawaii Ocean Science Technology (HOST) Park, Keahole Agriculture Park, Natural Energy Laboratory of Hawaii (NELH), Keahole-Kona International Airport facilities and the West Hawaii Campus of University of Hawaii.

These projects are supported by a well drilling exploratory program coordinated by DOWALD. Included in this program are constructing water supply facilities to store and transport water to the various State projects and assisting the County of Hawaii in developing an adequate water system.

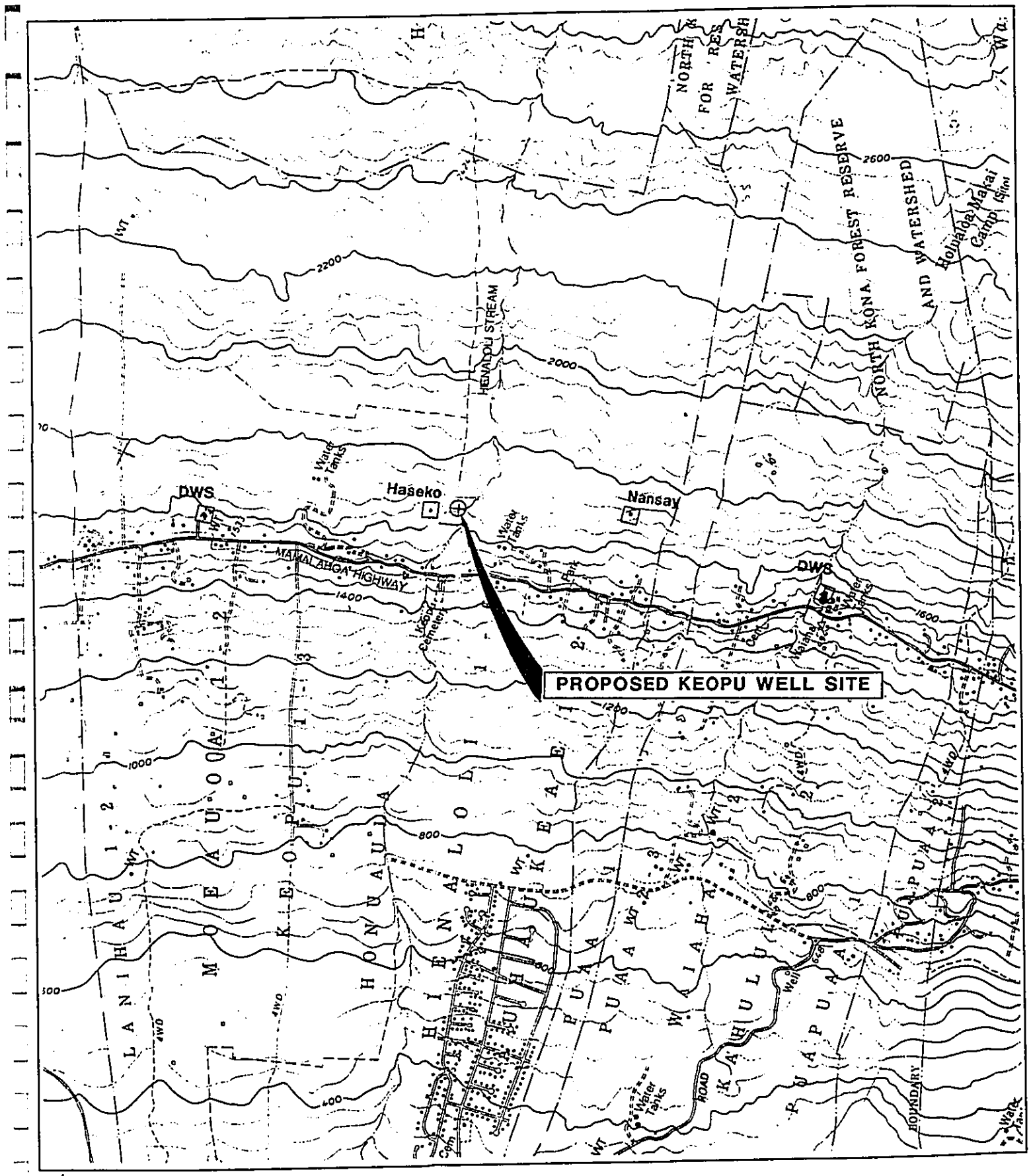
The proposed exploratory well site is within a well field that stretches for approximately 21 miles from Kalaoa to Keei mauka of Mamalahoa Highway (See Figure 3). Generally located between the 1500 feet (457 m) to 1800 feet (549 m) elevation, the deep wells tap into high level ground water that lies mauka of the coastal basal aquifer.



ISLAND MAP

NO SCALE

FIGURE 1

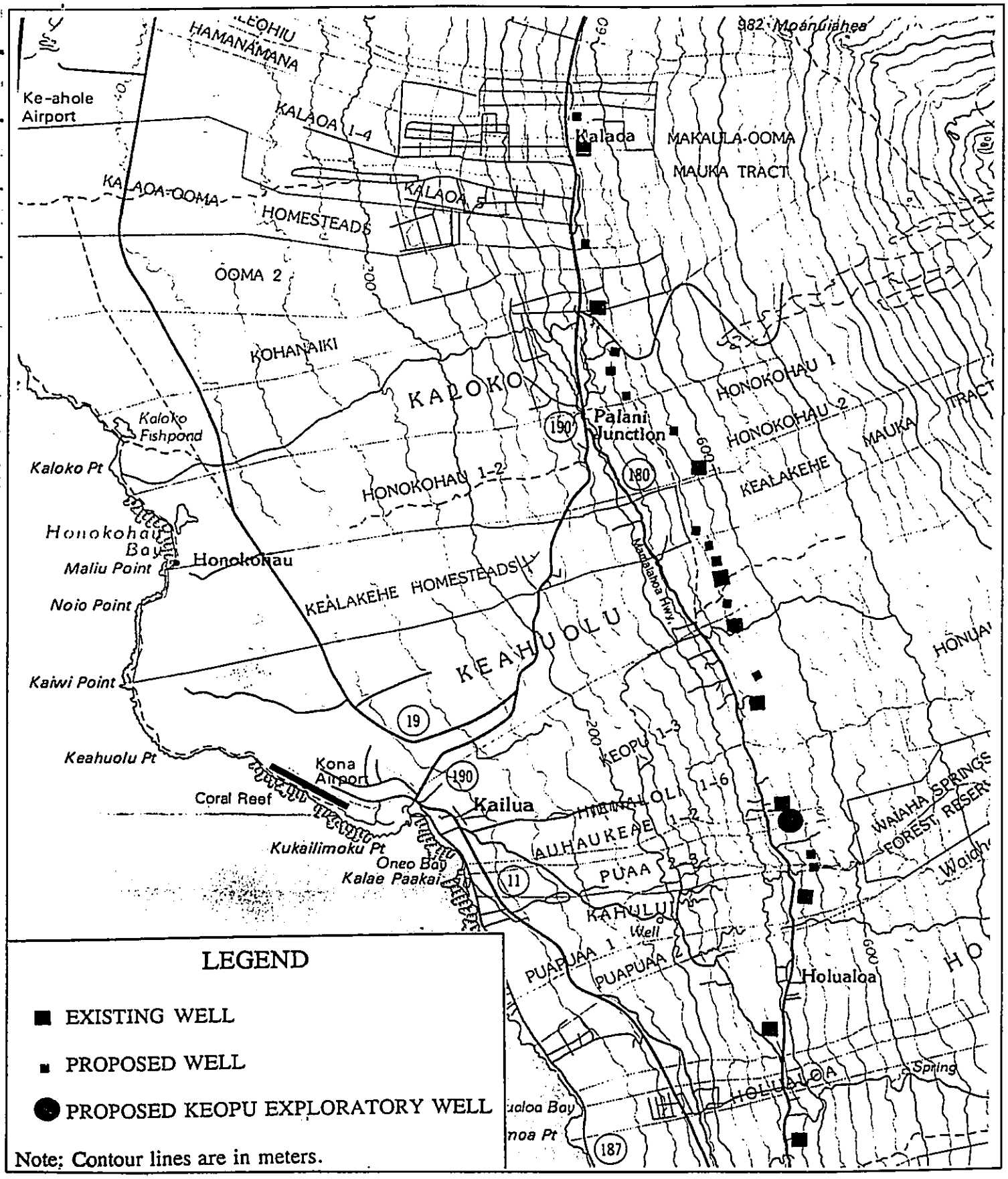


NORTH

SCALE: 1"=2000'

LOCATION MAP

FIGURE 2



LEGEND

- EXISTING WELL
- PROPOSED WELL
- PROPOSED KEOPU EXPLORATORY WELL

Note: Contour lines are in meters.

NORTH

NO SCALE

WELL FIELD MAUKA OF MAMALAHOA HWY.

FIGURE 3

If the exploratory well proves successful, it is expected to ultimately provide water to the Villages of La'i'opua and Kealakehe school projects which are being developed by HFDC.

C. Proposed Project

The proposed exploratory drilling and testing project will determine if the selected site would be a feasible water source. Based on preliminary investigations, the basic scope of work proposed for this project includes the following:

1. Constructing a temporary access road approximately 1,400 lineal feet from Mamalahoa Highway to the exploratory well site at the *1660 feet elevation.*

2. Drilling an 18-inch diameter cased well to a depth of approximately 1700 feet below ground elevation of 1660 feet (maximum depth of 1800 feet, depending on field conditions).

3. Install approximately 1700 feet of 18-inch I.D. steel casing (bottom 80 feet perforated). Grouting the annular space surrounding the casing from ground surface to a depth of approximately 1610 feet.

4. Pump test the aquifer from a range of 500 to 2100 gpm.

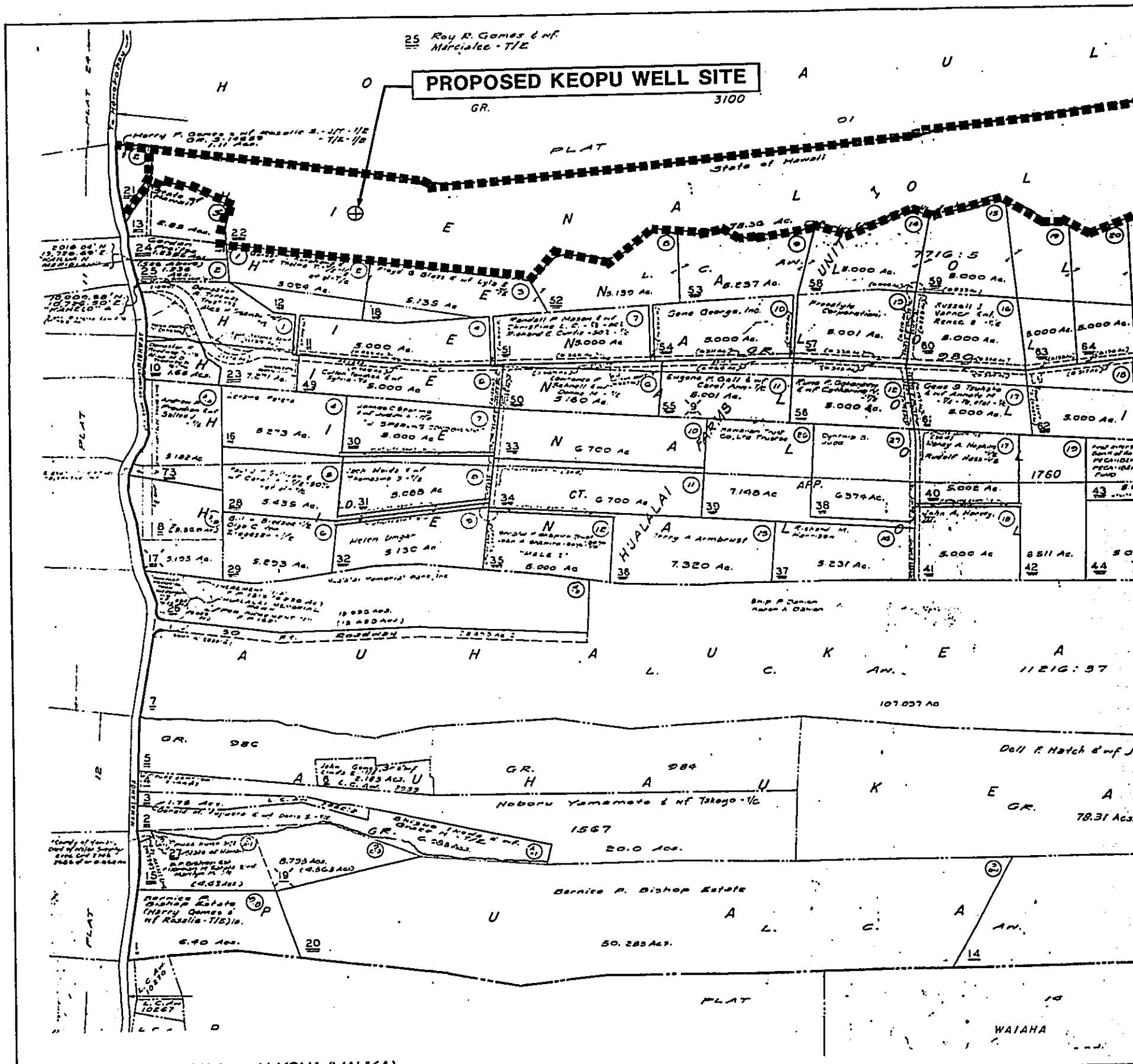
II. DESCRIPTION OF THE ENVIRONMENT

A. Project Location

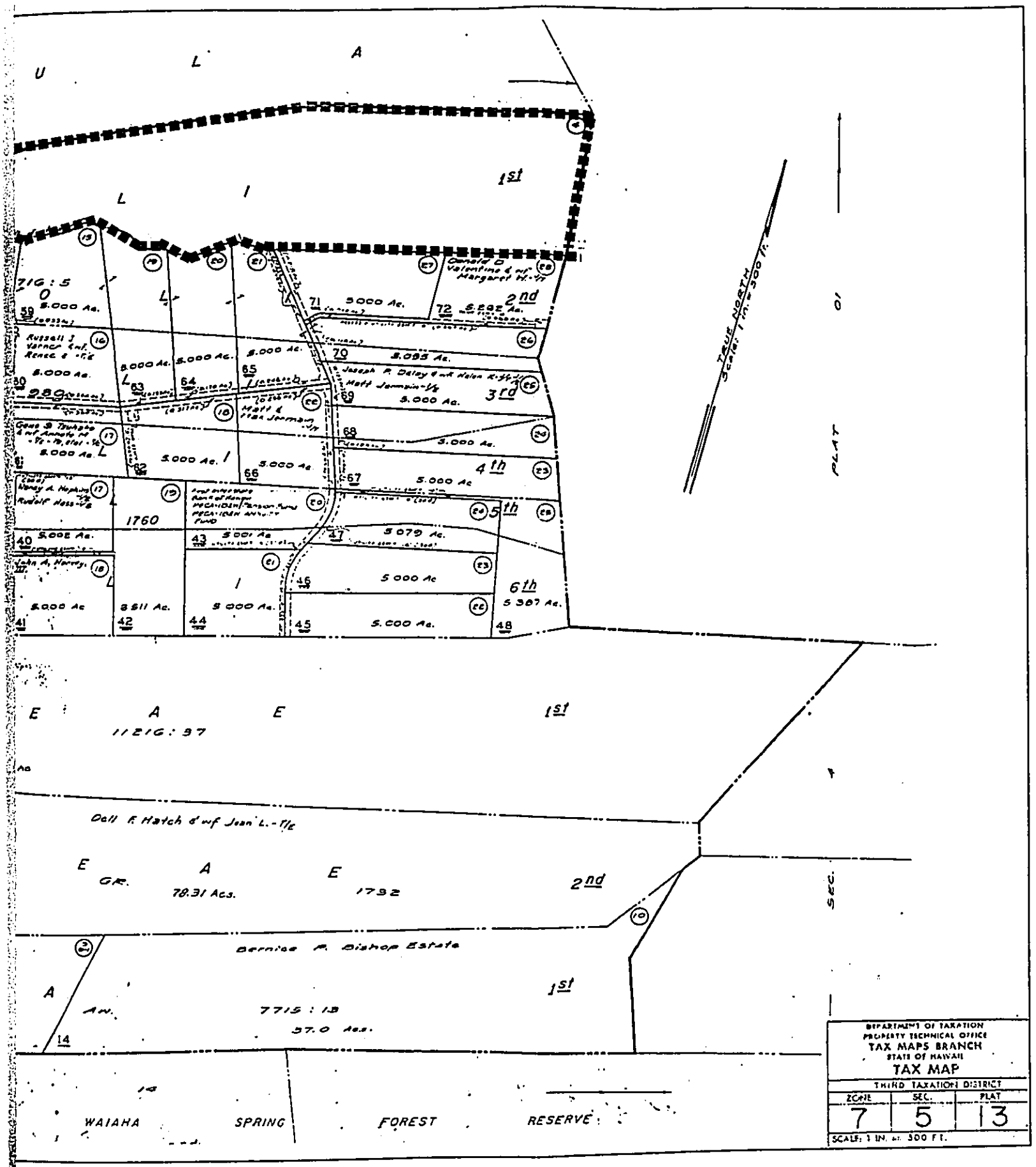
The proposed exploratory well site is located approximately three miles south of Palani Junction along Mamalahoa Highway, in the North Kona District of the Island of Hawaii. Mauka of Mamalahoa Highway, at approximate elevation of 1660 feet above MSL, the well site lies about 400 feet south of an existing well owned by Haseko (Hawaii), Inc., and approximately 2400 feet north of Nansay's proposed well site (See Figure 2).

B. Land Ownership

The project site is located in a State owned parcel designated as tax map key (TMK) 7-5-13:22 shown in Figure 4. The land was previously used for grazing cattle; today, the site is unencumbered and heavily vegetated.



LAND OWNERSHIP MAP



NERSHIP MAP

FIGURE 4

The project site is situated on land designated for Agricultural use by the State Land Use Commission, as well as the County of Hawaii General Plan and Zoning Maps (See Figure 5).

D. Physical Features

1. Topography

The elevation of the exploratory well site is at approximately 1660 feet MSL, and the land slopes down towards the west at approximately 6-20 percent. An intermittent stream, known as Hienaloli stream, runs the length of the property. The stream is dry most of the year; however, during heavy rainfall, a stream develops and flows makai into Kailua town and then into Oneo Bay (See Figure 2).

2. Soils

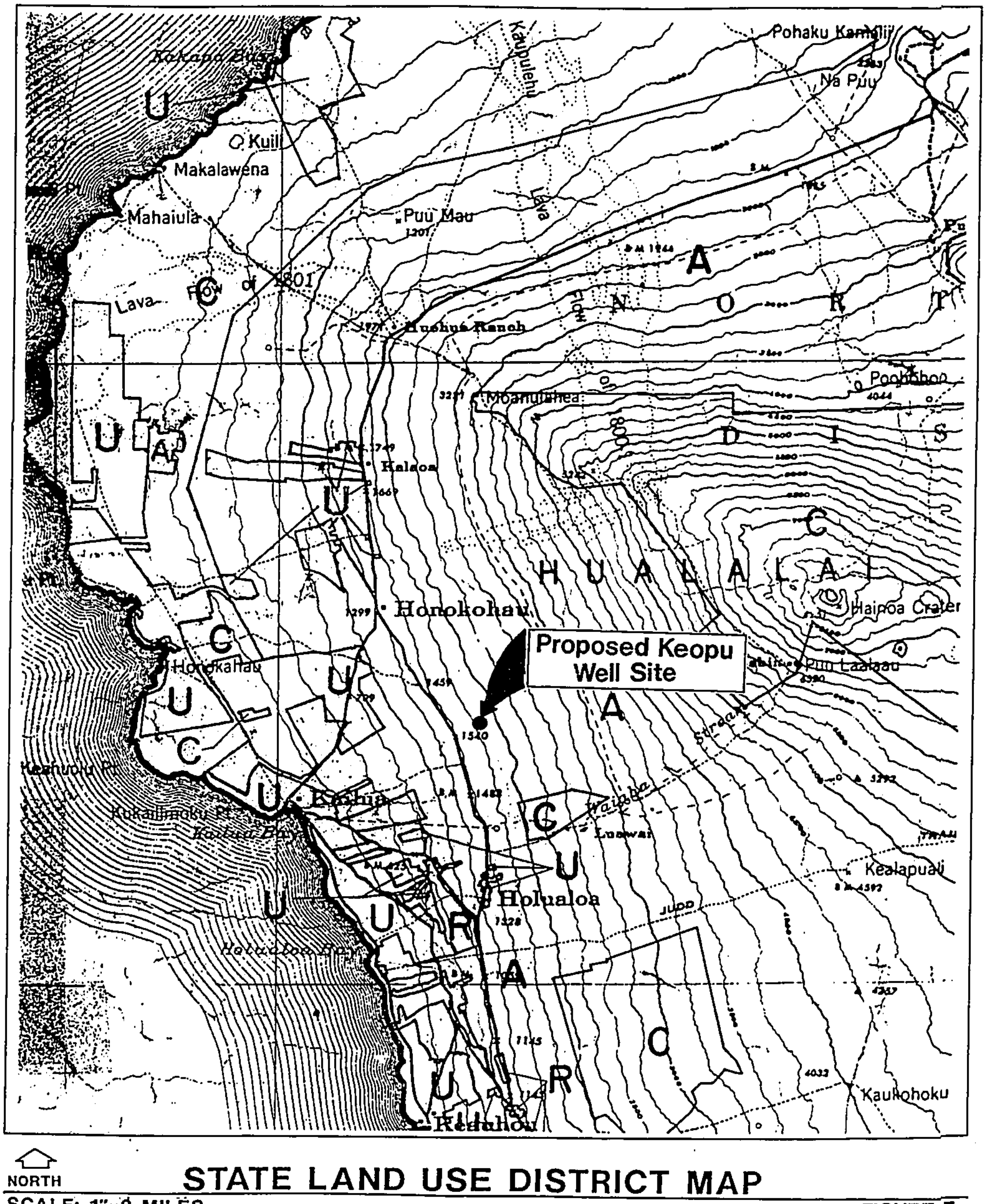
The soil in the project area generally consists of Honaunau silty loam, which sits atop a Pahoehoe lava bedrock. Small portions of the Pahoehoe bedrock protrude through the silty loam and exist as subangular basalt boulders and cobbles scattered throughout the site.

3. Hydrogeology

Geologic formations found in the area are prehistoric lava from the Hualalai Volcanic Series (Qhl). The proposed well is expected to tap into a high-level, thick, semi-confined basal aquifer source that was first discovered in 1990 by DOWALD, when a 1850 feet deep exploratory well was drilled. The existence of this high-level source was confirmed when other wells were drilled at similar elevations. The extent of this high-level water body and the nature of the confining hydrogeologic structure that separates it from the basal aquifer and salt water intrusion are not completely known. Based on existing well data, the dam-like structure roughly follows Mamalahoa Highway (See Figure 3).

4. Climate

The average annual rainfall in the project area is approximately 60 inches per year. The average temperature ranges from a low of 60 degrees to a high of 85 degrees Fahrenheit. Land and sea breezes prevail in the area while the northeasterly tradewinds are blocked by the masses of Mauna Kea, Mauna Loa, and Hualalai.



STATE LAND USE DISTRICT MAP

SCALE: 1"=2 MILES

FIGURE 5

5. Flood/Tsunami Hazards

The Federal Emergency Management Agency's September 16, 1988 Flood Insurance Rate Map (FIRM) for Hawaii County designates the well site within Zone X, areas determined to be outside the 500-year flood plain.

Tsunami inundation areas are located in low-lying areas along the shore-line. This does not affect the exploratory well site which is on high ground and about 2.5 miles inland.

E. Water Quality

Based on water samples analyzed from neighboring Haseko Well (State Well No. 3957-01), the water from the proposed Keopu-HFDC Exploratory Well No. 1 is expected to be of pristine quality. The Haseko Well had a low chloride content (a measure of freshness of ground water in Hawaii) of 10 to 12 mg/l.

Since the exploratory well may be a potential source of potable water, the well water will need to comply with "Hawaii Administrative Rules, Title 11, Chapter 20, "Rules Relating to Potable Water Systems" prior to its use.

F. Archaeological Features

A report titled, "Archaeological Reconnaissance Survey: Hienaloli 1st, North Kona, Island of Hawaii (TMK: 7-5-13:13 and 22)", prepared by Martha Yent from the DLNR dated May 1991, identified and evaluated the existence of historic agricultural related sites in the 78-acre property. The reconnaissance, conducted for another State project, grouped the findings by elevation which ranged from the 1500 foot to 2400 foot elevation.

A follow-up archaeological survey was conducted for the proposed project in December 1993. The survey was limited to the area from Mamalahoa Highway up to the 1660 feet elevation by DLNR State Historic Preservation Division. The results of the ground survey indicated that this project will have no adverse impacts on the existing historic sites since the area surrounding the proposed access road and well site have been previously disturbed. Accordingly, there probably will be no need for on-site monitoring during construction. However, if sub-surface archaeological remains are uncovered during construction, the contractor will immediately stop work in the area, and the DLNR State Historic Preservation Division will be promptly notified.

The Preliminary Report, dated February 9, 1994, and Archaeological Survey Report, dated August 1994, for the project are presented in Appendix A and Appendix B, respectively.

G. Flora

The archaeological reconnaissance study also identified three different types of plant communities in the area. The first plant community is a strawberry guava (*Psidium cattleyanum Sabina*) forest. This dense forest contains christmas berry (*Schinus terebinthifolius Raddi*), scattered ohia lehua (*Metrosideros polymorpha gaud.*), and a ground cover of young guava (*Psidium guajava L.*), ferns and various grasses. The second plant community contains scattered bushes of yellow quava, christmas berry (*Schinus terebinthifolius raddi*), uluhe (*Dicranopteris linearis*), wa'wae'iole (*Lycopodium cernuum*), and sword fern (*Nephrolepis exaltata*). The third plant community includes the ohia lehua (*Metrosideros polymorpha Gaud.*), Koa (*Acacia Koa*) and tree ferns which exhibit the indigenous forest that once populated the area.

H. Fauna

Based on the "Atlas of Hawaii, Second Edition", dated 1983, mammals common to the island of Hawaii are the cattle (*Bos taurus*), dog (*Canis familiaris*), donkey (*Equus asinus*), goat (*Capra Hircus*), mongoose (*Herpestes auropunctatus*), pig (*Sus scrota*) and, sheep (*Ovis aries*). Birds in the vicinity of the project area include the cardinal (*Cardinalis cardinalis*), barred dove (*Geopelia striata*), spotted dove (*Streptopelia chinensis*), mockingbird (*Mimus polyglottos*), golden plover (*Pluvialis dominica fulva*), Pueo (*Aseo flammeus sandwichensis*), and White Eye (*Zosterop japonicus*).

According to the U. S. Fish and Wildlife Service, the project site is within a habitat for two federally endangered species, the Hawaiian Hawk (*Buteo solitarius*) and the Hawaiian Hoary Bat (*Lasiurus cinereus semotus*).

Based on the Hawaii Auduborn Society's book entitled "Hawaii's Bird", the Hawaiian Hawk is found on the island of Hawaii. Although the population of the Hawaiian Hawk is small, they can be observed throughout the island of Hawaii below the 8500 feet elevation; specifically at Hawaii's Volcano's National Park, near Hilo, and in Valleys along the Hamakua Coast.

A recently published article entitled "Distribution and Abundance of the Endangered Hawaiian Hoary Bat" by David S. Jacobs, which observed and documented the foraging habits of the Hoary Bat at night from 1990 to 1991, included a map that indicated bat sightings approximately two

miles from the project site. The map also indicated other bat sightings at various locations around the island of Hawaii. This occurrence denotes how widespread their habitat is.

III. PROBABLE IMPACTS AND MITIGATIVE MEASURES

A. Short Term Impacts

1. Construction Related

Major short term impacts which can be anticipated as a result of this project are all associated with the construction activity required to drill and test the proposed well. Increased traffic, construction noise, dust and vehicular and equipment emissions can be expected. These impacts will be minimized through conscientious efforts by the contractor and strict enforcement of specified environmental protection provisions by the inspection and construction management team under the direction of HFDC, in conjunction with DOWALD. The construction-related impacts will be temporary, and will be confined to the immediate vicinity of the project site.

To reduce sediment and debris from entering Hienaloli stream, erosion and sediment control measures will be maintained and closely monitored throughout the construction period. Strict adherence to erosion control procedures will be followed to avoid contributing to the flooding problems downstream of the project site. According to a report titled "Reconnaissance Report for Flood Damage Reduction, Keopu-Hienaloli Streams, North Kona, Island of Hawaii", dated February 1988 and prepared by the U S Army Corps of Engineers, flooding problems have occurred downstream (along Hienaloli stream) of Mamalahoa Highway which were attributed to undefined channels, buildup of debris and vegetation, steep slopes, and insufficient channel and culvert capacities.

2. Hydrogeology

Possible impacts of the well testing effort may include initial fluctuations of the groundwater table in the immediate vicinity of the well site; however, these fluctuations should be temporary. According to records filed with the Commission on Water Resource Management (CWRM), the neighboring Haseko Well was pumped tested on January 23, 1993 for 95 hours at a constant rate of 1.0 mgd with a drawdown of 6.4 feet, indicating the occurrence of high permeability and recharge in the vicinity of the proposed well site.

3. Fauna

The drilling and testing of the exploratory well will disturb a small portion of the habitat for two endangered species, the Hawaiian Hawk and Hawaiian Hoary Bat. This, however, will be temporary. Once the well is drilled and tested, the well will be capped, and all construction equipment and excess construction materials will be removed from the site.

To minimize any disturbances to their habitat, the construction will be restricted to a limited area. Construction will be done during the day to avoid interference with the Hoary Bat's mostly nocturnal foraging habits, and if during construction, a bat or a hawk is observed, a biologist will be consulted to recommend precautionary measures.

B. Long Term Impacts

Depending upon the results of the exploratory well testing, the State may decide to proceed with the development of the well into a municipal water supply source.

1. Lands

If the source development proceeds, there will the loss of lands surrounding the well site for necessary pumping and storage facilities associated with the well development and improved access to the site.

2. Fauna

The well development is expected to use approximately one acre of land which is a tiny portion of the vast amounts of lands that make-up the habitat for the Hawaiian Hawk and Hawaiian Hoary Bat. To minimize disturbance to their habitat, the well development will incorporate existing vegetation into the landscape. Accordingly, no adverse impacts are expected to the Hawaiian Hawk or the Hawaiian Hoary Bat.

3. Quality of Groundwater Flow

Development of the well is not expected to affect the quality of groundwater flows near the coastline to anchialine ponds or offshore upwelling down gradient of the project site. The proposed withdrawal of approximately 1.0 mgd would represent a small fraction of the estimated sustainable yield of approximately 10 mgd per coastal mile.

4. Haseko Well (State Well No. 3957-01)

The long-term affect of the proposed project upon neighboring Haseko Well will be determined from the exploratory well test results. If the test results indicate that Haseko Well will be adversely affected from the development of the Keopu-HFDC Exploratory Well No. 1, the proposed exploratory well will be used only as an observation well. However, preliminary indications are that the development of both the Haseko Well and Keopu-HFDC Exploratory Well No. 1 is feasible, based on data from the Haseko Well.

5. Public Funds, Energy and Construction Materials

The exploratory well project will involve the irretrievable commitment of public funds, electrical energy, and well construction materials.

IV. ALTERNATIVES TO THE PROPOSED PROJECT

A. No Project Alternative

One alternative to the proposed project would be the "no project" option. With no dependable source of water in the foreseeable future, State planned projects in the North Kona area would eventually be delayed. Accordingly, potential job opportunities and economic growth in the North Kona area will be adversely affected.

B. Alternate Site Selection

The proposed well site was selected as the most favorable location in terms of land ownership and water source production based on prior investigations and evaluation. However, additional sites may need to be reconsidered if the proposed site proves to be unsatisfactory.

V. AGENCIES AND ORGANIZATIONS CONSULTED

Table 1 lists the twenty agencies and organizations that were consulted in the review of the Draft Environmental Assessment (DEA). A total of six agencies provided written comments on the DEA. The written comments and responses are presented in Appendix B.

TABLE 1
LIST OF AGENCIES AND ORGANIZATIONS CONSULTED

	AGENCY OR ORGANIZATION CONSULTED	DATE	
		COMMENTS RECEIVED	RESPONSE
Federal Government			
1	U.S. Army Corps of Engineers, Pacific Division, Honolulu District Engineer	None	Not req'd
2	U.S. Department of Agriculture, Soil Conservation Service	None	Not req'd
3	U.S. Department of the Interior, Fish and Wildlife Service	4/26/94 and 5/31/94	8/15/94
4	U.S. Geological Survey	None	Not req'd
State Government			
5	Department of Agriculture	None	Not req'd
6	Department of Business, Economic Development and Tourism	None	Not req'd
7	Department of Hawaiian Homes Lands	None	Not req'd
8	Department of Land and Natural Resources	None	Not req'd
9	Department of Land and Natural Resources State Historic Preservation Division	5/3/94	Not req'd
10	Department of Health	5/20/94	8/18/94
11	Department of Health, Environmental Management Division	None	Not req'd
12	Office of State Planning	None	Not req'd
13	Office of Hawaiian Affairs	None	Not req'd
14	University of Hawaii, Water Resources Research Center	None	Not req'd
15	University of Hawaii, Environmental Center	5/10/94	8/15/94
County Government			
16	Department of Public Works	4/21/94	8/15/94
17	Department of Parks and Recreation	None	Not req'd
18	Department of Water Supply	None	Not req'd
19	Planning Department	None	Not req'd
Private			
20	Haseko Hawaii, Inc.	5/9/94	8/15/94

VI. DETERMINATION

After completing an assessment of the potential environmental affects of the proposed project, it is believed that an Environmental Impact Statement is not required. Accordingly, this document constitutes a Negative Declaration.

VII. FINDINGS AND REASONS SUPPORTING THE DETERMINATION

Findings and reasons supporting the Negative Declaration determination are as follows, using the criteria, policies, guidelines and provision of Title 11, Chapter 200, Environmental Impact Statement Rules and Chapter 343, HRS. The proposed project will not:

A. Involve an irrevocable commitment to loss or destruction of any natural or cultural resource;

B. Curtail the range of beneficial uses of the environment;

C. Conflict with the State's long-term environmental policies or goals and guidelines as expressed in Chapter 344, Hawaii Revised Statutes, and revisions thereof and amendments thereto, court decisions or executive orders;

D. Substantially affect the economic or social welfare of the community or State;

E. Substantially affect public health;

F. Involve a substantial secondary impact, such as population changes or effects on public facilities;

G. Involve substantial degradation of environmental quality;

H. Cumulatively have considerable effect upon the environment or involve a commitment for larger actions;

I. Substantially affect a rare threatened or endangered species, or its habitat;

J. Detrimentally affect air or water quality or ambient noise levels; or

K. Detrimentally affect an environmentally sensitive area, such as a flood plain tsunami zone, erosion-prone area, geologically hazardous land, estuary, fresh water, or coastal water. [Eff. Dec. 06, 1985](Auth: HRS Sec. 343-6)(Imp. HRS Sec. 343, 343-6).

REFERENCES

1. Department of Geography, University of Hawaii, Atlas of Hawaii, Second Edition, University of Hawaii Press, 1983.

2. Hawaiian Audubon Society, Hawaii's Birds, 1993.

3. Jacobs, David S., Distribution and Abundance of the Endangered Hawaiian Hoary Bat (Lasiurus cinereus semotus) on the Island of Hawai' i, Pacific Science, v. 48, No. 2, p. 193-200.

4. R. M. Towill Corporation, Keahole to Kailua Development Plan, November, 1990.

5. State Land Use District Map, Island of Hawaii.

6. State of Hawaii, Department of Business, Economic Development and Tourism, The State of Hawaii Data Book 1991 - A Statistical Abstract, November 1991.

7. State of Hawaii, Department of Land and Natural Resources, Commission on Water Resource Management, Hawaii Water Plan, Hawaii County Water Use and Development Plan, February 1992

8. Stearns, Harold T., Geology of the Hawaiian Islands, Bulletin 8, Division of Hydrography, 1967.

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

10. U. S. Army Corps of Engineers, Reconnaissance Report for Flood Damage Reduction, Keopu-Hienaloli Streams, North Kona, Island of Hawaii, February 1988.

11. Water Resource Associates, Status of Groundwater Development, North Kona, Hawaii, February 1992.

12. Yent, Martha, Division of State Parks, Department of Land and Natural Resources, Archaeological Reconnaissance Survey: Hienaloli 1st, North Kona, Island of Hawaii (TMK: 7-15-13: 13 and 22), May 1991.

APPENDIX A

Preliminary Report for the Proposed Keopu-HFDC Exploratory Well No. 1 Project
Hienaloli, North Kona, Hawaii

JOHN WAIHEE
GOVERNOR OF HAWAII

RECEIVED
94 FEB 11 P1:58
DIV. OF WATER & LAND DEVELOPMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
STATE HISTORIC PRESERVATION DIVISION
33 SOUTH KING STREET, 6TH FLOOR
HONOLULU, HAWAII 96813

KEITH AHUE, CHAIRPERSON
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FORESTRY AND WILDLIFE
HISTORIC PRESERVATION DIVISION
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

February 9, 1994

LOG NO: 10796
DOC NO: 9402CK01

MEMORANDUM

TO: Manabu Tagomori, Manager and Chief Engineer
Division of Water and Land Development

FROM: Don Hibbard, Administrator
State Historic Preservation Division

SUBJECT: **Preliminary Report for the Proposed Keopu-HFDC Exploratory Well No: 1 Project Hienaloli, North Kona, Hawai`i TMK: 7-5-13:22**

This is in response to a request from Valerie Suzuki of Fukunaga & Associates, Inc.

An archaeological inventory survey on December 13, 1993, by Carol Kawachi and Marc Smith of our office, did not find any new significant historic sites. A previously recorded site is located on the south side of the stream bed (Yent 1991). Most of the parcel appeared to have been graded in the past.

The proposed well site at the 1660 foot elevation and the road leading up to it, will be located between the stream bed and the northern boundary wall. At the lower end, a road already exists through a bamboo forest. Upslope, most of the area has already been graded. There will be no effect to any historic sites.

There probably will be no need for archaeological monitoring. If, however, contrary to our expectations, historic remains such as artifacts and burials are found during construction, your contractor must stop work in the immediate area and contact our Division. The contact person is our Assistant Archaeologist for Hawai`i Island, Marc Smith, who is based in Hilo and can be reached at 933-4346.

CK:amk

APPENDIX B

An Archaeological Survey for the Proposed Keopu-Exploratory Well No. 1
Hienaloli, North Kona, Hawaii Island
TMK: 7-8-13: por 22

AN ARCHAEOLOGICAL SURVEY

FOR THE PROPOSED

KEOPU-HFDC EXPLORATORY WELL NO. 1

HIENALOLI 1, NORTH KONA, HAWAI'I ISLAND

TMK: 7-5-13: por 22

for the

Department of Land and Natural Resources
Division of Water and Land Development

Department of Budget and Finance
Housing Finance and Development Corporation

by

Carol T. Kawachi, M.A.
Archaeologist, Inter-Agency Section
State Historic Preservation Division
Honolulu, Hawaii

August 1994

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FIGURES

TABLES

ABSTRACT

In preparation for the proposed Keopu-HFDC well, SHPD staff members, Carol Kawachi, Inter-Agency archaeologist and Marc Smith, Assistant Hawai'i island archaeologist, surveyed approximately 15 acres of the project area. East-west transects paralleling the unnamed stream were done in December, 1993. A reconnaissance by Yent (1991) of the entire parcel found much of the parcel previously bulldozed but several sites were recorded in untouched areas. No new significant historic sites were found during this survey.

INTRODUCTION

Background

The State Historic Preservation Division (SHPD) was contacted by the Department of Water and Land Development (DOWALD) in October 1993 requesting an archaeological survey of their proposed Keopu-HFDC Exploratory Well No. 1 site in North Kona, Hawai`i island. The well will be at the 1660 foot (506m) elevation just north of an intermittent stream bed in Hienaloli 1st *ahupua`a* (Figure 1). The surveyed area was only an approximate 15-acre (6.0ha) portion of the total 78.4 acre (32ha) tax map designation TMK 7-5-13:parcel 22.

To the north of the proposed well site, approximately 400 ft (122m) away, Haseko (Hawaii), Inc. has an existing well.

Site Location and Environment

Hienaloli *ahupua`a* is located in Kailua-Kona, on the leeward coast of Hawai`i island, in the district of North Kona, south of Honua`ula *ahupua`a* and north of `Auhaukea`e *ahupua`a*. Extending 3.8 miles (6.1km) inland to the 2440 feet (743.7m) elevation, Hienaloli is made up of six very narrow sections (Figure 2). The third section does not extend to the coast but begins from the 640 foot (195m) elevation. Hienaloli *ahupua`a* is approximately 0.2 miles (0.3km) on the coast and is 0.5 miles (0.8km) at its widest at the eastern end.

The coastline extends north from Kapohonau Bay, which fronts the present Kona Inn and extends south to Oneo Bay. Once a sandy canoe landing (Allen 1986:6), Oneo Bay is now rocky coast.

The soils in the project area are Honuaula extremely stony silty clay loam where stones cover from up to 15 percent of the surface and are used mostly for coffee and pasture (Sato et al 1973:20).

Annual rainfall in the project area is 60 to 80 inches (1524mm to 24384mm), mostly in the summer (Sato et al 1973:19). The proposed well will be just north of an intermittent, unnamed stream which runs from the 2920 foot (890m) elevation and disappears at the 1000 foot (305m) level. At the time of the survey, the stream was dry but its pahoehoe lava bed, approximately 20 feet (6m) wide and 5 feet (1.5m) deep, suggest considerable water flow.

Vegetation in the area was mostly grass, christmas berry, guava, ferns and ti, evidence that the area had previously been bulldozed. Near the western end of the property, north of the stream bed, the jeep road goes through a large bamboo grove. Upland of the proposed well site, some of the area appears undisturbed for the vegetation is dense and the topography quite hilly.

INTRODUCTION

Background

The State Historic Preservation Division (SHPD) was contacted by the Department of Water and Land Development (DOWALD) in October 1993 requesting an archaeological survey of their proposed Keopu-HFDC Exploratory Well No. 1 site in North Kona, Hawai`i island. The well will be at the 1660 foot (506m) elevation just north of an intermittent stream bed in Hienaloli 1st *ahupua`a* (Figure 1). The surveyed area was only an approximate 15-acre (6.0ha) portion of the total 78.4 acre (32ha) tax map designation TMK 7-5-13:parcel 22.

To the north of the proposed well site, approximately 400 ft (122m) away, Haseko (Hawaii), Inc. has an existing well.

Site Location and Environment

Hienaloli *ahupua`a* is located in Kailua-Kona, on the leeward coast of Hawai`i island, in the district of North Kona, south of Honua`ula *ahupua`a* and north of `Auhaukea`e *ahupua`a*. Extending 3.8 miles (6.1km) inland to the 2440 feet (743.7m) elevation, Hienaloli is made up of six very narrow sections (Figure 2). The third section does not extend to the coast but begins from the 640 foot (195m) elevation. Hienaloli *ahupua`a* is approximately 0.2 miles (0.3km) on the coast and is 0.5 miles (0.8km) at its widest at the eastern end.

The coastline extends north from Kapohonau Bay, which fronts the present Kona Inn and extends south to Oneo Bay. Once a sandy canoe landing (Allen 1986:6), Oneo Bay is now rocky coast.

The soils in the project area are Honuaula extremely stony silty clay loam where stones cover from up to 15 percent of the surface and are used mostly for coffee and pasture (Sato et al 1973:20).

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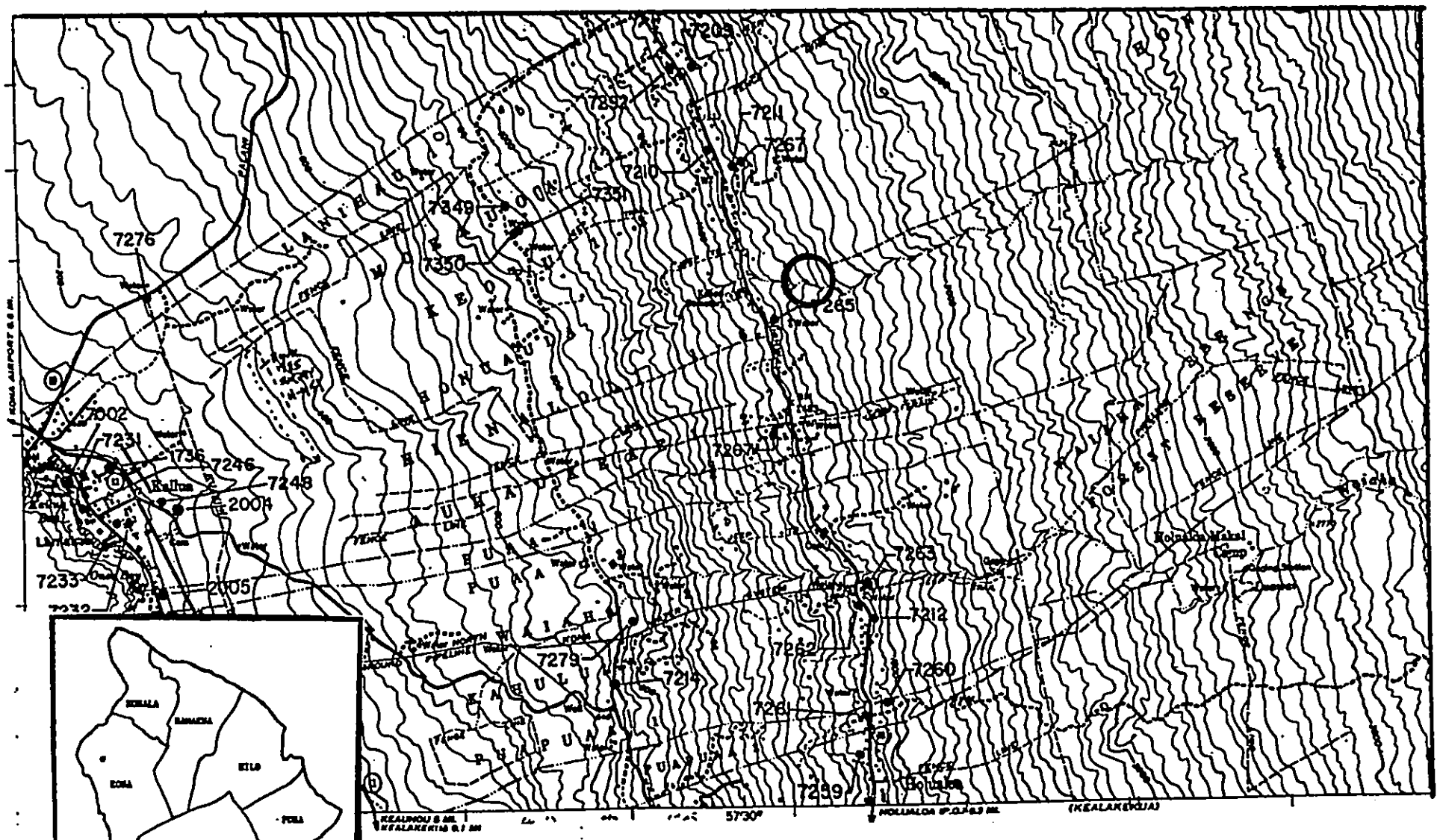
Vegetation in the area was mostly grass, christmas berry, guava, ferns and ti, evidence that the area had previously been bulldozed. Near the western end of the property, north of the stream bed, the jeep road goes through a large bamboo grove. Upland of the proposed well site, some of the area appears undisturbed for the vegetation is dense and the topography quite hilly.



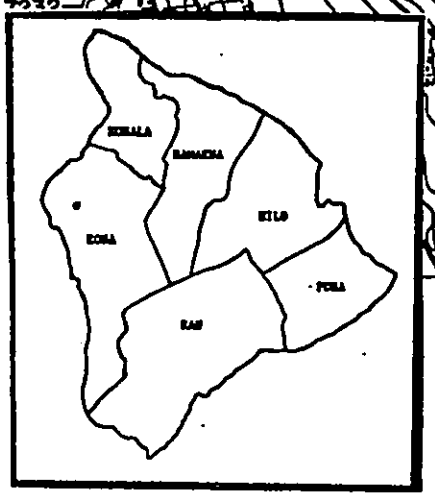


Figure 1. Site location for the proposed Keopu-HFDC Exploratory Well No.1 in Hienaloli 1.

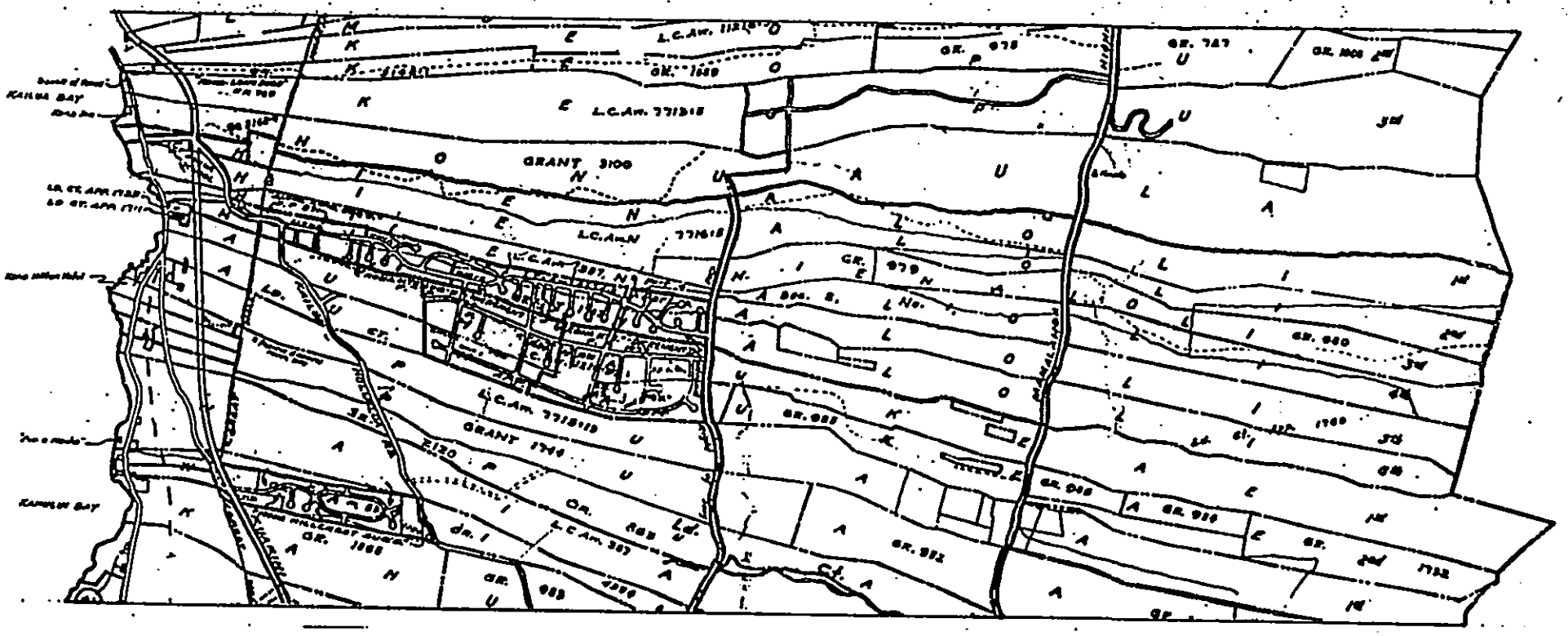


Figure 2. Hienaloli ahupua'a, 1st through 6th.

Both northern and southern boundaries were marked by stone walls. A barbed wire fence runs north-south across the property below where the stream bed becomes the southern boundary. There are jeep roads on each side of and paralleling the stream. The one on the south goes up to the fenceline. The one on the north side of the stream goes to the approximate location of the proposed well site. On the northern side of the stream was also a new wire fenceline close to the streambed. It appeared to be a cattle barrier to the stream.

Historical Overview
An alternate spelling in the Mahele Awards Book of Hienaloli is Hianaloli.

During the late prehistoric and early historic times, when Kamehameha I was still in residence, chiefs resided along the coast from Puapua'a to Lanihau *ahupua`a* (Kamakau 1961:222). Ellis had also observed in 1823, "Leaving Kailua, we passed through the villages thickly scattered along the shore to the southward" (1979:73). Just inland of the chiefs' residences , sweet potato and tobacco (Ellis 1979:31; Allen 1986:232) were probably cultivated.

Kamakau describes Kamehameha I's own garden in the uplands of Kailua called Kuahewa (1961:204). It's exact location is not known today but Kelly thought it extended in the uplands from Lanihau to Keauhou *ahupua`a* (1983:74-75).

The cultivated fields and breadfruit trees of the uplands of Kailua were well documented (Menzies Wilkes, Ellis, P. G. Thurston's drawing) even though the early observers did not always agree on the breadfruits' location. Their estimates ranged from 1.5 to 3miles (2.4-5km) from shore. The breadfruit zone appeared to have been the dividing line between the grassy *kula* lands downslope and the cultivated gardens upslope. Emerson recorded the breadfruit tree line at the 520 ft/158.5m elevation, 1.14 mi/1.8km from the shore in Hienaloli in the 1880s (Reg Map 1280). Some of the breadfruit trees or their descendants can still be seen today.

The *kula* lands ("plain, field, open country, pasture. An act of 1884 distinguished dry or *kula* land from wet or taro land" [Pukui and Elbert 1986:178]) behind Kailua was used for grazing cattle and horses in the early historic period (Kelly 1983:79). Cattle and horses were introduced to Hawaii in1794 and respectively. Encouraged to multiply, they were allowed to roam free in the uplands of Kawaihae and in Kona. It was probably during this period that the Great Wall was built by Kuakini, then govenor (1820-1844), to protect the makai cultivated lands (Henry & Rosendahl 1993:A-7) from the cattle and horses.

In 1906, a remnant taro patch was recorded by Wright (Reg Map 2358) at the 2080 ft (634m) elevation at the Hienaloli 1 and Honuaula boundary (Figure 3). In the early 1930s, Handy observed "In North Kona dry taro flourishes only in the uplands, which

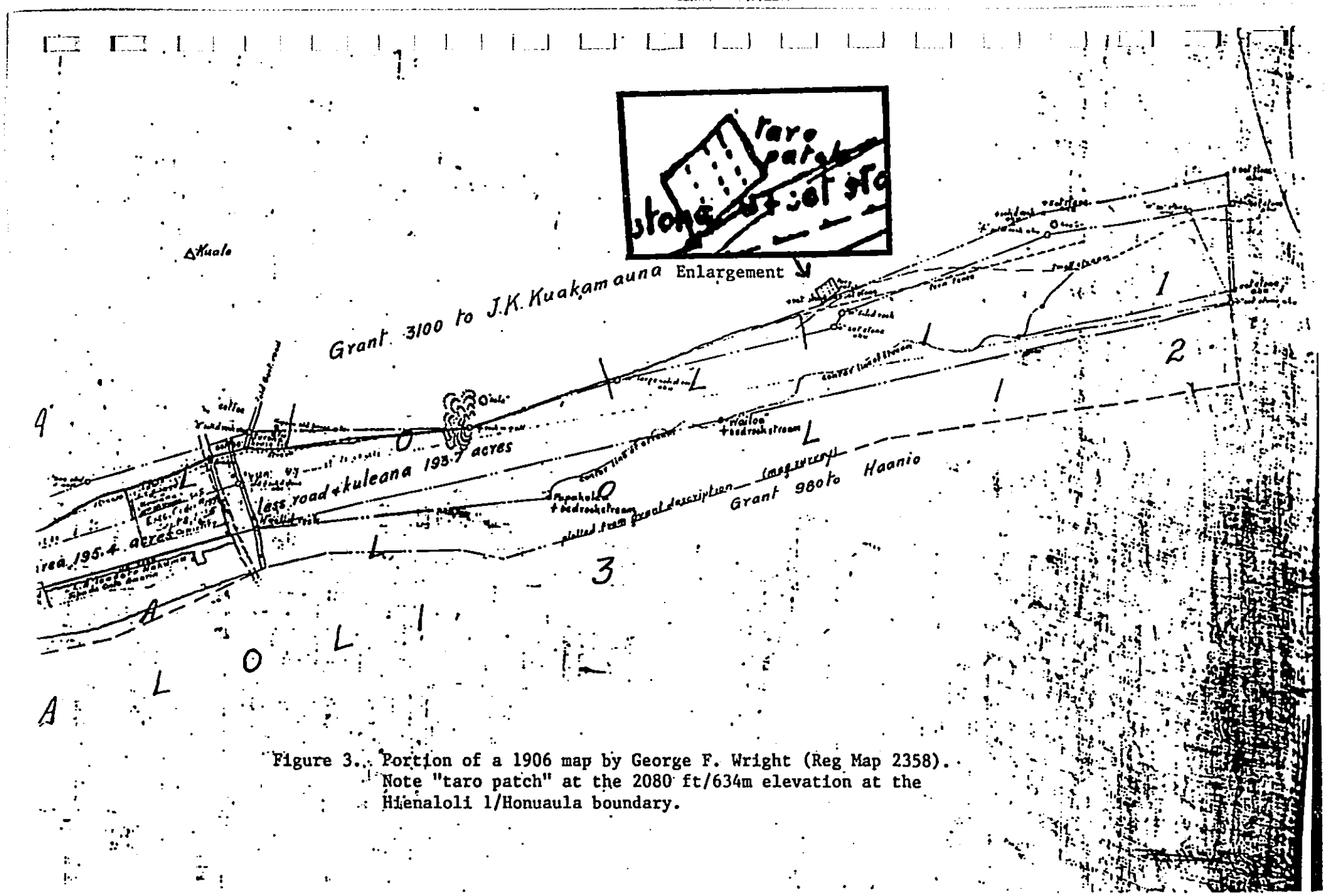


Figure 3. Portion of a 1906 map by George F. Wright (Reg Map 2358). Note "taro patch" at the 2080 ft/634m elevation at the Hienaloli 1/Honuaula boundary.

are now largely given over to ranching, though some Hawaiians still have plantations above Kalaoa" (1971:114).

A 1924 USGS quad map shows a trail which appears to originally have been a part of Hualalai Road. The c. 1880 map of Emerson and Kanakanui indicates Hualalai Road's turn to the southeast to be a "New Road to Holualoa" (Reg Map 1676). The trail would have gone upslope south of Bishop/Andrew's house, south of Thurston's house/Laniakea cave and on upslope (east/mauka) to the unnamed intermittent stream which is the subject of this paper. On this map, there are two trails from Kailua village. The other is more to the north between Moeauoa and Keopu *ahupua`a*. This suggests that the project site may be within or near Kamehameha I's garden Kuahewa. Trails gave access to the upland gardens, forest products and for those wanting to get away from the heat of the shore, houses in cooler climes Trails were also an important aspect of the coastal-inland (marine resources-taro & forest resources) exchange process.

The Great Mahele or Land Division of 1848 brought private land ownership to the Hawaiian Islands. Although the King could keep the best lands for himself, he only kept one part (Crown Lands) and gave the other part to the government (Government Lands). The remaining lands were to be divided equally between the government, the chiefs and *konohiki*, and the common people (Chinen 1966:16).

Hienaloli 1, 2 and 6 were determined Government lands at the time of the Great Mahele (Kelly 1983:22). Native tenants had to prove they actually lived on the land or cultivated it for their own sustenance to receive a Land Commission Award (LCA) (Chinen 1966:30). An exception appears to be those lands awarded to the American Board of Commissioners for Foreign Missions (ABCFM). The lands they received in Hienaloli were a gift from Kuakini after he became a Christian convert (Kelly 1983:8). Unlike other areas, there were no non-Hawaiians who received LCAs or Grants in Hienaloli.

In the following, the material will be presented in north-south, west-east. That is, from Hienaloli 1 to 6, from the coast to the mountains.

Asa and Lucy Thurston, American Calvinist missionaries arrived in Kailua in April 1820 and were later given a house lot by Kuakini. Thurston's daughter Persis Goodale Thurston sketched their house and the uplands behind it (Kelly 1983). Thurston received Laniakea, a 5.26 acre (2.13ha) homestead parcel straddling Hienaloli 1 and Honuaula. It was named after a nearby refuge cave which had been a "valuable appendage" to the military fortification which by 1823, was a wall "about eighteeen or twenty feet high, and fourteen feet thick at the bottom" (Ellis 1979:62). In its spacious interior was a large brackish water pool (Ellis 1979:30). See Kelly 1983 for a more detailed description of Thurston's house "Laniakea" (State site number 50-10-28-2248).

Reverend Artemas and Elizabeth Bishop arrived in 1824 and received a smaller parcel (2.06ac/0.8ha) closer to the shore and also straddling Hienaloli 1 and Honuaula. The house Reverend Bishop built in 1831 became Dr. Seth Andrew's 1837 to 1848 (Kelly 1983:42).

On the coast of Hienaloli 1, just southwest of Bishop's parcel, Kawaha received LCA 7630 (Table 1). Neither he nor his witnesses described what appears to be a houselot on the coast of Hienaloli 1. Instead his claim and witness all describe *kihapai* in Hianaloli 2 and 3 (Appendix A). A parcel marked LCA 7630:2 is found on the tax map at approximately 1420 foot (433m) elevation in Hienaloli 1 just below Mamalahoa Highway which was likely a *kihapai*. *Kihapai* was a "cultivated patch, garden, orchard, field, small farm" (Pukui and Elbert 1986:147).

Namimi claimed "3 kihapai in the ahupua`a of Hianaloli 1" (Native Register 8:481). Emersons and Kanakanui's c. 1870 map (Reg Map 1676) show a house lot with what appears to be "Namimi" on the coast near the Hienaloli 1/Honuaula boundary. The structure shown is very small so perhaps the rest of the property was in sweet potato cultivation.

Luka Ruth Ke`elikolani, half sister of King Kamehameha IV and V, Moses Kekuaiwa and Victoria Kamamalu, received LCA 7716:*apana* 5, the entire *ahupua`a* of Hienaloli 2 (Office . . .1929: Lands of Aliis and Chiefs p10). Luka was the daughter of Kekuanaoa and Pauahi Nui, born in 1826. She married William Pitt Leleiohoku and after his death in 1848, married Isaac Young Davis in 1856. She died in Kailua Kona in 1883 (Barrera 1994:316-7).

Kuae, a *konohiki*, (LCA 4226) and Kaupa (LCA 7469) both had houselots at the shore of Hienaloli 2. Nakunu (LCA 10406) did not claim a houselot, but had *kihapai* of taro, sweet potato and coffee in the uplands (~1400ft/427m elevation) of Hienaloli 2 (Appendix A).

Hienaloli 3 did not begin from the shore but from the 640 ft (195m) elevation. Only one LCA claim was made within the 96 acres (39ha) of Hienaloli 3. In December 1848, Pupule put in a claim for a houselot and *pauku* (garden plots: Maly 1993:A-10) but does not appear to have bought it for there is no Royal Patent for it (Table 1). His claim (LCA 10735) for Section 1 describes "Hianaloli 4 `ili" on the southern boundary and "Hianaloli 2 `ili" on its northern boundary (Maly 1993:A-10). According to Maly, Pupule's claim was between the 720-1480ft (219.5-451m) elevation) within Grant 979 bought by Kaupa (1993:A-10) The upper section was bought by S. Haanio as Grant 980. Both Grants were bought in 1852 (Table 2).

The American Board of Commissioners for Foreign Missions (ABCFM) received the entire *ahupua`a* of Hienaloli 4 (402 ac/163ha) in addition to the houselots given to Bishop and Thurston in Hienaloli 1 (see above) from Kuakini. Haleokane (LCA 2316)

Table 1. LAND COMMISSION AWARDS

LCA	RP	Awardee	Acres	Hienaloli	Elev	Land Use
387	1600	Am Bd of Commissioners for Foreign Missions	7.25 (2) ahp	1, 4	120 60-~1460'	Kealaokamalamalama Church
2316	7688	Haleokane	0.79	4	>40'	houselot
2334	2384 1360	Kupuna	0.45	4		enclosed houselot
3278	----	Waikele	0.17	1	>40'	enclosed houselot
4226	7904	Kuae	1.68	2; 4	~60'	houselot; houselot w/coconut trees
7075	----	Kaiamakini	0.635	6		fenced house lot
7469	7898	Kaupa	0.38	1 2	>40'	enclosed houselot;
7630:1 :2	7820	Kawaha	1.23 1.03	1 1 2 3	>40' ~1420'	8 *kihapai* 14 *kihapai*
7716	----	Luka (Ruth) Keelikolani	ahp	2	0-2440'	
8524-B	----	M. Peke (Betty Davis)	ahp (part3)	5	0-2440'	Kealaokamalamalama Church
10404	4783	Namimi	1.75	1 5 6	1060'	*kihapai* *kihapai:* swt pt *kihapai:* swtpt, taro
10406	4049	Nakunu	2.30	2	1400'	*kihapai*: taro, swtpt, coffee
10698	----	Pupuka	2.06	5		house lot, 6 sections of *kihapai*
10735	----	*Pupule	----	3		5 cultivated *pauku*

Table 2. GRANTS

No.	Awardee	Acres	Hienaloli	Year Rcvd
979	Kaupa	41.00	3	1852
980	S. Haanio	58.00	3	1852
981	Maewa	6.00	6	1852
1572	Kapalahua	86.00	6	1855
1752	Kawelo	96.00	6	1855
1848	Kepio	.16	6	1855

and Kupuna (LCA 2334) both received houselots along the shore of Hienaloli 4. By 1855, 86 acres (35ha) of Hienaloli 4 had been sold to Kapalahua as Grant 1572.

M. Peke, aka Elizabeth or Betty Davis, was awarded the entire *ahupua`a* of Hienaloli 5 as LCA 8524-B. Peke was the daughter of Isaac Davis and his third wife, Kaiona. Born in 1803, she married George Humehume, son of Kaumualii. Her death date is unknown (Barrere 1994: part II:529).

Pupuka claimed six sections of *kihapai* (LCA 10698) and a house lot in Hienaloli 5. He received the land from Kuae, a *konohiki,* who had received it from Thurston. He named no crops but five sections had Hienaloli 6 as its Ka`u or southern boundary. The sixth section named Hienaloli 4 on its Kohala or northern boundary. There were no indication of size or location either (Appendix A).

Until 1855, Hienaloli 6 was government land with only three small claims. On the coast of Hienaloli 6, bordering `Auhaukea`e, Kaimakini received approximately an acre for his enclosed house lot (LCA 7075). Namimi received LCA 10404, *kihapai,* in Hienaloli 6 at about the 1120 ft (341m) elevation. His claim describes "3 sweet potato kihapai on the kula, 3 adjoin makai of these, 3 kihapai are in the ulu, 2 taro kihapai are mauka of kaluulu" (Native Register 8:481). *`Ulu* is breadfruit (*Artocarpus communis*). *Kaluulu* is defined by Schilt (1984:6) as the zone between 500-1000 ft (150-300m). Pukui and Elbert defined it as "A land term of uncertain meaning and pronunciation commonly used in Kona, Hawai`i, in about 1848. Perhaps ulu is *`ulu,* breadfruuit." (1986:124). Namimi probably had sweet potato at the lower, more dry zone and taro at higher elevations.

In 1852, Maewa bought a small 6.0 acre (2.4ha) parcel as Grant 981 just downslope of Namimi. In 1855, Kawelo and Kapalahua bought up the rest of the *ahupua`a* as Grants 1752 (96 ac/39ha) and 1572 (86 a/35ha) respectively except for 0.16 acre (0.06ha) that Billa Kepio bought along the coast (Grant 1848) (Table 2).

The "private" ownership of so much of Hienaloli may account for the small number (11) of Land Commission Award (LCA) claims and Grants (6). It has been suggested that the large Grants in the upper portions of Hienaloli 3 and 6 (Table 2) were bought for

agricultural or ranching purposes (Wong-Smith 1990:B-6). Kaupa (Grant 979) had his houselot (LCA 7469) on the coast of Hienaloli 4 (Table 1).

PRIOR ARCHAEOLOGY

The first formal archaeological survey of Hienaloli was done by John E. Reinecke in 1930. He recorded two sites: site 72 on the shore of Hienaloli 5: "An indistinct site" and site 73: "A house site, and apparently a blocked-up entrance to a cave" (1930: 38) inland in Hienaloli 2. The latter was probably Laniakea Cave.

Although the presence of cultivated fields in the uplands had been recorded in the literature (Menzies, Wilkes, Ellis, Thurstons' drawing, Kamakau), it wasn't until 1968 when Lloyd Soehren and T. Stell Newman noted the fields from the air and formally named it the Kona Field System, State site number 6601. They observed that this extensive aboriginal field system extended from Kealakekua Bay to Kailua, virtually continuous and extending 3-4 miles (5-6.4km) inland (1968:3). At the Hienaloli 1/Honuaula boundary, Wright had recorded a stream fed "taro patch" at about the 2080 foot (34m) elevation in 1906 (Reg Map 2358). By 1994, archaeological research had extended the field system to Kau in the north and to Kapua in the south. The field system extends up to 3500 ft (1066m) in Kaloko, (Cordy et al 1991:440), 2600 ft (792.5m) in Haleki`i, Ke`eke`e, `ilikahi, Kanakau, and Kalukalu (Burgett and Rosendahl 1991), North Kona; and 2320 ft (707m) in Kealakekua (Hammatt et al 1993), South Kona.

Only a few archaeological surveys have been done in Hienaloli *ahupua`a* and a couple parcels have been surveyed more than once. The majority of them have been on the coast (Table 3) with only two in the uplands (*`apa`a*) and one in the mid-zone (*kaluulu*). The following cultivation subzones are from Schilt (1984:6):

kula: coast to 500ft/0 to 150m elevation
kaluulu: 500-1000ft/150-300m elevation
`apa`a: 1000-2500 ft/300-750m elevation
`ama`u: 2500-4000 ft/750-1200m elevation

As with the previous section, the following material will be presented from north to south, Hienaloli 1 to 6, and from the coast to the uplands (*kula* to *`apa`a*). No work has yet been done in the *`ama`u* subzone of Hienaloli.

The Kuakini Highway realignment project extended from Keahuolu to Holualoa partially in the *kula* and partially in the *kaluulu* zones (Schilt 1984). The 300ft (91.5m) wide corridor went from the 200 ft (61m) to the 320 ft (97.5m) elevation north to south. A total of six sites (57 through 62) were recorded for Hienaloli. Four of these sites were historic boundary walls: site 57 lies between Hienaloli 1 and Honuaula; site 59 between Hienaloli 2 and 3; site 61 between Hienaloli 5 and 6; and site 62 between Hienaloli 6 and `Auhaukea`e.

Table 3. ARCHAEOLOGICAL FINDINGS

	kula	*kaluulu*	*`apa`a*	LCA description	Archaeological findings	Reference
1	x			----	habitation remains	Soehren 1978
1			x	----	agricultural features, boundary walls	Yent 1991
1	x			----	habitation remains; bulldozed	Soehren 1979
1	x			----	Laniakea refuge cave: habitation remains	Soehren 1980
1	x			----	historic boundary wall	Schilt 1984
2	x			4226: house lot	platform	State 1974
2	x			----	house site and Laniakea Cave	Reinecke 1930
2	x			----	grindstone fragment, burial cave, sweet potato gardens	Soehren 1978
2	x			----	historic garden plot	Schilt 1984
3	x			----	historic boundary wall	Schilt 1984
3		x	x	10735: gardens	agricultural mounds, terraces	Henry & Rosendahl 1993
4	x			----	historic boundary wall	Schilt 1984
4	x			----	Great Wall of Kuakini, habitation, burial platform, walls, cave shelter	Barrera 1990a & b
5	x			----	"An indistinct site"	Reinecke 1930
5	x			----	boundary trail	Schilt 1984
6	x			7075: houselot	papamu, petroglyphs, chiefly residence	Sinoto 1980; Athens 1981; Allen 1986; Wickler 1989,1990
6	x			Grant 1752	habitation, agricultural features, midden, artifacts	Barrera 1979 Donham & Kai 1990
6	x			----	historic boundary wall	Schilt 1984

Site 58 was an enclosed historic garden plot in Hienaloli 2 on its northern boundary (Schilt 1984:40). Site 60 was a "boundary trail" in Hienaloli 5 near its northern boundary (Schilt 1984:42).

Near the coast of Hienaloli 1, Soehren (1978) surveyed a small parcel approximately 660 feet (201m) inland. This would be upslope of Waikele's houselot (LCA 3728). Soehren found "No identifiable prehistoric structures" but did find midden common to "pre-contact Hawaiian habitation sites" (1978:1).

East of the last project, Soehren surveyed the northern portion of Laniakea, the home of the Thurstons, in 1979. By then, the entire lot had been "bulldozed recently, leaving only a few large kiawe and kukui trees," midden "indicative of former habitation sites," and the Great Wall of Kuakini replaced by a wire fence.

In 1980, Soehren surveyed the rest of Laniakea and found the cave entrance partially blocked by a stone wall as seen by Reinecke in 1930. Inside, were midden and coral, "traces of occupation." The entrance to the cave is where Reinecke indicated site 73 on his map (1930:47).

In the uplands of Hienaloli 1, Yent surveyed 80 acres (32.4ha) from above Mamalahoa Highway to the top of the *ahupua`a* (2440 feet/744m elevation) in 1991. Yent recorded several agricultural sites, a petroglyph, walls and a rock mound (Figure 4). The site closest to the proposed well is at the 1620 ft (494m) elevation and is located south of the stream bed. Function was not determined for this feature

On the inland side of Ali`i Drive and just south of the Keopu Channel in Hienaloli 2, Soehren surveyed a 0.07 acre (0.02ha) parcel in 1978. Here he found a large fragment of a grindstone and a probable burial cave concealed with coral pebbles. According to his informant, the house being demolished was built around 1890 by her father. Her maternal grandfather had built the stone wall and stone planters fronting Ali`i Drive and the cistern. She also recalled sweet potato cultivation on much of the parcel.

Henry and Rosendahl (PHRI 1993) surveyed Hienaloli 3 and 4 between the 720-1480ft (219.5-451m) elevation. An LCA claim was made somewhere within this area for five garden plots by Pupule (10735) in Hienaloli 3 (Maly 1993:A-10). Having a banana patch at its mauka boundary would imply the upper bounds were at approximately 1000 foot (305m) (Kawachi 1983:35). No crops were named but the the agricultural features (mounds, terraces) found between habitation sites 18663 (approx 1000ft/305m elev) and 18662 (900ft/274m) could have been used for sweet potato and dryland taro.

In Hienaloli 4, approximately 1140 ft (347.5m) inland and at about the 100 ft (30.5m) elevation, Barrera did a survey and data recovery of a 5.34 acre (2.16ha) parcel in May and December 1990 respectively. It is bound on the west by Hualalai Road and the Keopu Channel Improvement on the east. The Great Wall of Kuakini runs north-

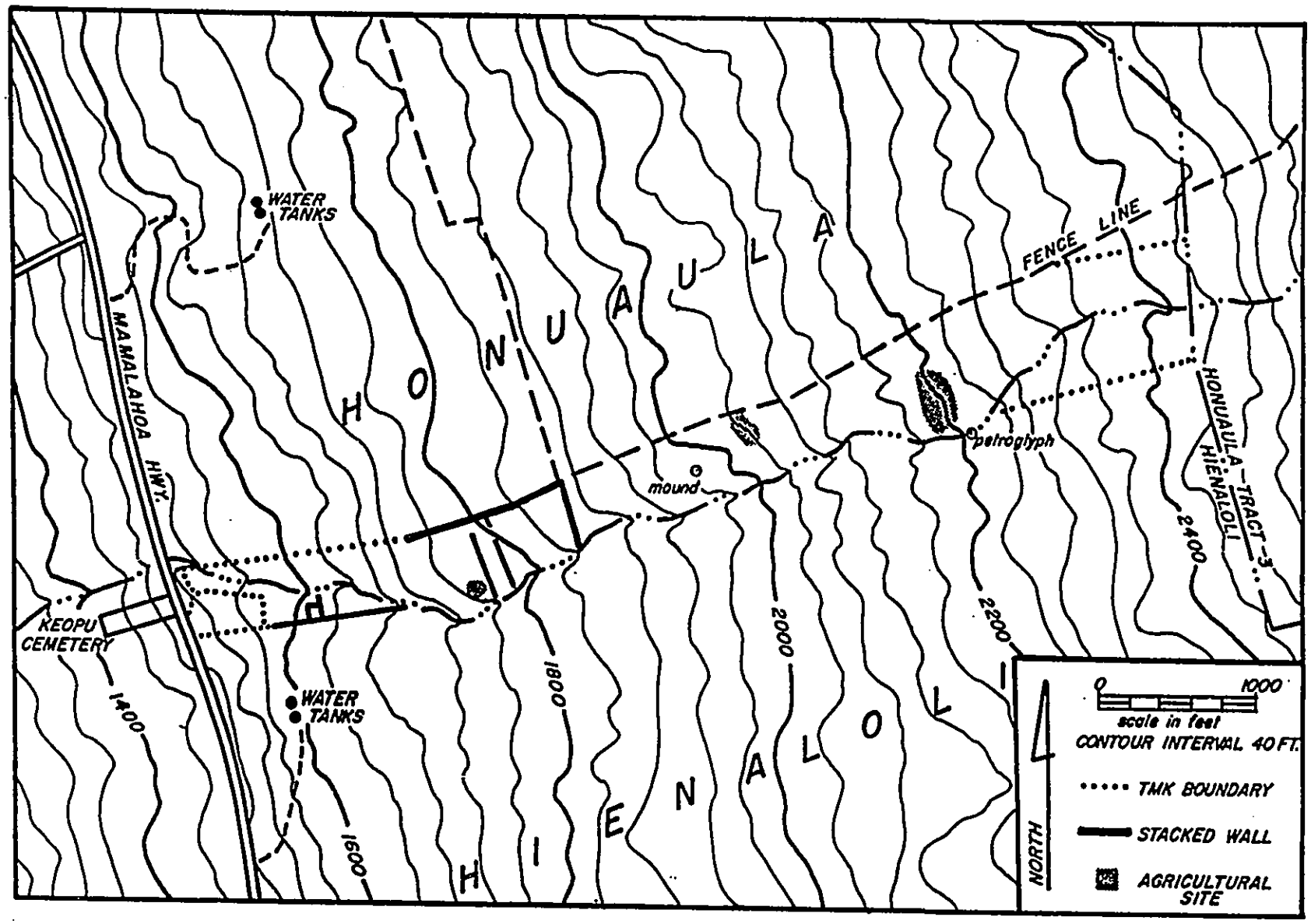


Figure 4. From Yent 1991:14. Approximate location of archaeological sites inventoried in Hienaloli 1st survey area. Proposed well site is at the 1660 ft/506m elevation north of the intermittent stream bed.

south through the middle of the parcel. During the inventory survey Barrera recorded seven sites including the Great Wall of Kuakini (site 6762). The sites included platforms, walls, and a lava bubble. During data recovery, one of the platforms revealed a burial cyst and the lava bubble, two cultural deposits sandwiching a sterile volcanic ash layer.

Archaeology in Hienaloli 5 has been limited to Schilt (1984) and Reinecke (1930). Schilt recorded an historic boundary wall between Hienaloli 5 and 6; Reinecke, "an indistinct site" along the coast.

On the coast, on a parcel that straddles the boundary of Hienaloli 6 and `Auhaukea`e, four archaeological investigations (Sinoto 1980, Athens 1981, Allen 1986, Wickler 1989, 1990) were done. Kaimakini's (LCA 7075) and part of Kapae's *kuleana* (LCA 7073) were merged in 1896 when A`alona's purchased LCA 7073 (Allen 1986:12). It was apparent that this parcel has been continuously in use or inhabited since 1650 (Allen 1986:206). According to *Opumomona* who testified for Kaimakani, this house lot was "old land for his (Kaiamakini) parents at the time of Kam I" (Native Testimony 4:523). The presence of five *papamu* and three petroglyphs suggested that some of the original inhabitants had had leisure time thereby implying chiefly status (Allen 1986:207).

At the 50 - 120 ft (15 - 37m) elevation of Hienaloli 6 between Kuakini Highway and the Hualalai Road to the east, Donham and Kai (PHRI 1990) did a resurvey of a parcel previously determined to have "no evidence of permanent or temporary habitation" (Barrera Nov 1979). The project parcel was part of Grant 1752, originally purchased by Kawelo in 1855. The later survey yielded habitation and agricultural features as well as midden and artifacts dating to prehistoric times (Donham & Kai 1990).

Although limited, the archaeological evidence of Hienaloli 1-6 suggest residence of high status on the coast, agriculture with some habitation in the *kula*, and mostly agriculture in the uplands. This follows the generally accepted settlement pattern for leeward sections of the Hawaiian Islands. This section of North Kona did not have the barren or transition zone sometimes found in drier areas. The *kaluulu* zone, however, is unique to Kona.

METHODOLOGY AND FINDINGS

The present survey covered only about 15 acres (6.0ha) of the the lower portion of the same 80 acre (32.4ha) parcel that Yent surveyed in 1991. No new sites were found. Much of the area covered in this survey had been heavily disturbed by bulldozing and ranching.

An approximate 15 acres (6.0ha) were covered by two people in one day doing east-west transects. The area is open with grass and shrubs. Walking and visibility was

easy. In fact, there were two roads, one on each side of the stream. The parcel is only about 450 feet (137m) wide and part of this is taken up by about 20 feet (6m) of the dry stream bed.

North of the stream bed where the streambed became the southern boundary, the area appeared undisturbed for the vegetation was dense and the topography quite hilly.

Both northern and southern boundaries were marked by stone walls. A barbed wire fence runs north-south across the property below where the stream bed becomes the southern boundary. We ended our survey upland where the stream bed became the southern boundary when the vegetation got more thick and evidence of a wild bull's presence was noted. .

There are jeep roads on each side of and paralleling the stream. The one on the south goes up to the fenceline. The one on the north side goes to the approximate location of the proposed well site. On the northern side of the stream was also a new wire fenceline close to the streambed. It appeared to be a cattle barrier to the stream.

CONCLUSION AND SUMMARY

Hienaloli's coastline was once inhabited by high status Hawaiian chiefs. Laniakea was a huge refuge cave with a pool in its interior. Hienalaoli's mid- and uplands were part of a massive aboriginal field system. Kamehameha I's garden might even have been in the project area. Unfortunately development and time has destroyed much of the evidence. But as Yent found, there might still be pockets of sites missed by development and ranching.

In this case, the project area has been bulldozed, planted with grass and used for ranching. These activities have destroyed any sites that might have been present: the stone walls, mounds and terraces, possible *`auwai*, platforms, etc. Again, no sites were in the project area. There will be no need for archaeological monitoring.

BIBLIOGRAPHY

Allen, Jane
1986 Phase I: Intensive Survey and Phase II Excavations at TMK 7-5-09:31, Kailua, North Kona, Island of Hawai`i. Bishop Museum. Honolulu.

Athens, Stephen
1981 Letter Report: Archaeological Investigations of Kailua-Kona Parcel 1 (TMK 7-5-09:31), Island of Hawaii. Bishop Museum. Honolulu.

Barrera Jr., William
1990a DRAFT. Hienaloli 4th, North Kona, Hawaii Island: Archaeological Inventory Survey. CHINIAGO INC. Kamuela, Hawaii. May.

1990b Letter Report: Archaeological Data Recovery at Hienaloli, North Kona [TMK: 7-5-10:13]. CHINIAGO INC. Kamuela, Hawaii. Dec.

1991 Human Skeletal Remains at Hienaloli, North Kona. CHINIAGO INC. Kamuela, Hawaii. Jan.

Bingham, Hiram
1981 A Residence of Twenty-One Years in the Sandwich Islands. Charles E. Tuttle Company. Rutland, Vermont & Tokyo, Japan.

Burgett, Berdena, D. and Paul H. Rosendahl
1991 Archaeological Inventory Survey, Hokukano Ranch Development, Lands of Kanueue 1,2; and Keekee 1,2; Kanakau 1,2; and Halekii, Districts of North and South Kona, Island of Hawaii. Paul H. Rosendahl, Ph.D., Inc. Hilo, Hawaii.

Chinen, Jon J.
1966 The Great Mahele: Hawaii's Land Division of 1848. University of Hawaii Press. Honolulu.

1971 Original Land Titles in Hawaii. Honolulu.

Cordy, Ross, Joseph Tainter, Robert Renger, and Robert Hitchcock
1991 An Ahupua`a Study: The 1971 Archaeological Work at Kaloko Ahupua`a, North Kona, Hawai`i. Western Archaeological and Conservation Center Publications in Antrhopology No. 58. National Park Service. U.S. Department of the Interior.

Donham, Theresa K. and Victoria K. Kai
1990 Archaeological Inventory Survey, Hienaloli 6th Development Parcel, Land of Hienaloli 6th, North Kona District, Island of Hawaii. Paul H. Rosendahl, PhD, Inc. Hilo, Hawaii.

Ellis, William
1979 Journal of William Elllis: Narrative of a Tour of Hawaii, or Owyhee; with Remarks on the History, Traditions Manners, Customs, and Language of the Inhabitants of the Sandwich Islands. Charles E. Tuttle Company. Rutland, Vermont & Tokyo, Japan.

Hammatt, Hallett H., David W. Shideler, Mark Stride and Ian Masterson
1993 Archaeological Inventory Survey for the Kealakekua Development Company, Phase I Area (8-02-12:1), Kealakekua, S. Kona, Hawai`i Island. Cultural Surveys Hawaii. Kailua, Hawaii.

Handy, E. S. Craighill
1971 The Hawaiian Planter Volume I: His Plants, Methods and Areas of Cultivation. Bernice P. Bishop Museum Bulletin 161. 1940. Bernice P. Bishop Museum. Honolulu. Kraus Reprint. New York.

Henry, Jack D. and Paul H. Rosendahl, Ph.D.
1993 Archaeological Inventory Survey, Hienaloli 3-4 Mauka Parcel, Lands of Hienaloli 3 and 4, North Kona District, Island of Hawaii. Paul H. Rosendahl, PhD, Inc. Hilo, Hawaii.

Kamakau, Samuel M.
1961 Ruling Chiefs of Hawaii. The Kamehameha Schools Press. Honolulu.

Kawachi, Carol T.
1983 The Kona Field System. Student paper. University of Hawaii at Manoa. Honolulu.

1989 Pua`a 2: An Upland Habitation and Agricultural Complex in North Kona, Hawai`i Island. Masters Thesis. University of Hawaii. Manuscript. State Historic Preservation Division Library. Honolulu.

Kelly, Marion
1983 na mala o kona: Gardens of Kona: A History of Land Use in Kona, Hawai`i. Report 83-2. Bishop Museum. Honolulu, Hawai`i.

Kelly, Marion and Dorothy B. Barrere
1980 Background History of the Kona Area, Island of Hawai`i. Bishop Museum. Honolulu.

Maly, Kepa
1993 Appendix A. Historical Documentary Research IN Henry and Rosendahl. Archaeological Inventory Survey, Hienaloli 3-4 Mauka Parcel, Lands of Hienaloli 3 and 4, North Kona District, Island of Hawaii. Paul H. Rosendahl, PhD, Inc. Hilo, Hawaii.

Menzies, Archibald
1920 Hawaii Nei of 128 Years Ago. W.F. Wilson, ed. Honolulu.

Office of the Commissioner of Public Lands of the Territory of Hawaii
1929 Indices of Awards Made by the Board of Commissioners to Quiet Land Titles in the Hawaiian Islands. Office of the Commissioner of Public Lands of the Territory of Hawaii. Honolulu.

Pukui, Mary Kawena and Samuel H. Elbert
1986 Hawaiian Dictionary. Revised and Enlarged Edition. University of Hawaii Press. Honolulu.

Pukui, Mary Kawena, Samuel H. Elbert and Esther T. Mookini
1981 Place Names of Hawaii. Revised and Enlarged Edition. University Press of Hawaii. Honolulu.

Reinecke, John e.
1930 Survey of Sites on West Hawaii. Manuscript. State Historic Preservation Library. Honolulu.

Sato, Harry H., Warren Ikeda, Robert Paeth, Richard Smythe, and Minoru Takehiro Jr.
1973 Soil Survey of the Island of Hawaii, State of Hawaii. US Dept of Agriculture, Soil Conservation Service, in cooperation with the University of Hawaii Agricultural Experiment Station. US Government Printing Office. Wahington, D.C.

Schilt, Rose
1984 Subsistence and Conflict in Kona, Hawai`i: An Archaeological Study of the Kuakini Highway Realignment Corridor. Department of Anthropology. Bernice P. Bishop Museum. Honolulu.

Sinoto, Aki
1980 Archaeological Reconnaissane Survey of Parcel 1 (TMK: 7-5-90-31), Kailua-Kona, Hawai`i. Bishop Museum. Honolulu.

Soehren, Lloyd
1978 Letter Report: Archaeological Reconnaissance of Property at Hienaloli, North Kona, TMK: 7-5-08: 12 and 22. Captain Cook, Hawaii. Jan.

1979a. Letter Report: Archaeological Reconnaisance on Undeveloped Portion of TMK 7-5-09:48, Hienaloli 6, North Kona, Hawaii. Captain Cook, Hawaii. Nov.

1979b. Letter Report:Archaeological Reconnaissance of Lot A of TMK 7-5-04:2, Honuaula and Hienaloli 1, North Kona, Hawaii. Captain Cook, Hawaii. [Parcel 35]. Nov.

1980 Letter Report: Archaeological Reconnaissancein the Mauka Portion of the Laniakea Lava Tube, Hienaloli 1, North Kona, TMK: 7-5-04: 2. Captain Cook, Hawaii. Sept.

Wickler, Stephen

1989 Letter Report on Disinterment of Three Historic Burials and Archaeological Monitoring at Site 50-Ha-D8-64, Kailua-Kona. International Archaeological Research Institute, Inc. Honolulu.

1990 Removal of Historic Burials and Archaeological Monitoring Site BPBM 50-Ha-D8-64 (TMK 7-5-09:31), Kailua-Kona, Island of Hawaii. International Archaeological Research Institute, Inc. Honolulu.

Wong-Smith, Helen

1990 Appendix B. Limited Historical Documentary Research Land of Hienaloli 6th, Island of Hawaii IN Henry and Rosendahl. Archaeological Inventory Survey, Hienaloli 3-4 Mauka Parcel, Lands of Hienaloli 3 and 4, North Kona District, Island of Hawaii. Paul H. Rosendahl, PhD, Inc. Hilo, Hawaii.

Yent, Martha

1991 Archaeological Reconnaissance Survey: Hienaloli 1st, North Kona, Island of Hawaii (TMK: 7-5-13: 13 and 22). Division of State Parks. State Department of Land and Natural Resources. Honolulu, Hawaii.

APPENDIX A

LAND COMMISSION AWARD
CLAIMS AND TESTIMONY

LAND COMMISSION AWARDS

Land Commission Awards (LCA) were awarded to native tenants who could "prove that they had actually cultivated those lands for a living" (Chinen 1966:30).

NR: Native Register
NT: Native Testimony
FT: Foreign Register
FT: Foreign Testimony
The number after the register or testimony is the volume number followed by the page number. The registers have the claims as related by the claimant. The testimony have witnesses, usually two, who swear and testify to confirm the claims.

RP: Royal Patent
Royal patents were issued "upon confirmation of a claim and the issuance of an award [LCA}. . .[and] upon payment of commutation to the government" (Chinen1966:9). The "owner of the ahupua`a . . was deemed responsible for the settlement of the whole government commutation" (Chinen1966:30) and payment "quitclaimed the government's interest in the land" (Chinen 1966:140.

The directions given are:

Makai	toward the sea; west
Ka`u	towards the district of Ka`u; south
Mauka	towards the mountain; east
Kohala	towards the district of Kohala; north

The following will be presented by sections and ascending numerical order.

HIENALOLI 1st

LCA 387
RP 1600
No description available.

American Board of Commissioners for Foreign Missions

LCA 3728
RP 0000
NR 8:377

Waikele

December 25, 1847

. . . given me by Lapalaau, also some was purchased from Lapalaau for $3.00.

NT 4:561
Napela (F), sworn . . ., a house lot. All konohiki boundaries, 1 enclosed house lot . . . Land from Lapalaau by a sale in cloth costing $3.00 in 1844, no one has objected.
Keliimaikai sworn . . .

LCA 7469 Kaupa
RP 7898
NR 8:440 January 25, 1848
. . . my house lot claim which is 16 fathoms on the north side, 21 fathoms on the east, 25 fathoms on the south and 27 on the west. It is in the land of Hopu in Hianaloli 1. My house lot is in the land of Luka at Hianaloli 2. /It has been held from the time of the battle of/ Mokuohai until the present. It was from my Kupunas. The witnesses are Lapalaau, Kawaha and U [sic].

NT 4:519 December 25, 1848
Mose (konohiki) sworn He has seen one section in Hianaloli 2 ahupuaa and another section in Kianaloli [sic] 1 ahupuaa.
House lot's boundaries

Mauka	Waikele's lot
Ka`u	Palanu's lot
Makai	Malo's lot
Kohala	

Kaupa has enclosed the lot himself. Three (3) houses for Kaupa, land interest also with boundaries. The land surveyor will establish. Partially cultivated land, kihapais in Kaumeo ili from Mose. House lot was vacant, so Kaupa built a house there, no one has objected.

+LCA 7630 Kawaha
RP 7820
NOTE: +A lot (LCA 7630:1) is shown on tax map 7-5-07: 21 (1.23ac/0.5ha) in Hienaloli 1 just seaside of Ali`i Drive and at the Hienaloli 2 boundary.
NOTE: +Another lot (LCA 7630:2) is shown on tax map 7-5-11:7 (1.03 ac/0.4ha) in Hienaloli 1 within the Keopu Cemetery lot below the Mamalahoa Highway.

Neither claim or testimony place any lots in Hienaloli 1. SEE Hienaloli 2 for description.

HIENALOLI 2nd

LCA 4226 Kuae
RP 7904
NR 8: 385 January 6, 1848
. . . my claim for a house lot at Hianaloli 2 in the land of Luka. Its circumference is 158 fathoms. In the land of Hueu, in Hianaloli 4, is another house lot, 100 fathoms in circumference, with 4 coconut trees within the lot. . . . claims which I received from Keawekolohe. Tatina /Thurston?/ is a witness and Kaiwipalupalu . . .

NT 4: 552 January 9, 1849
Keawelawaia sworn He has seen one section in Hianaloli 2 and in Hianaloli 4 ahupua`a . . .
Section 1 - house lot

Mauka, Ka`u, Makai	Idle land
Kohala	Mikakina's land

Keawholohe [sic] fenced the lot, 1 house for him. Kuae acquired all of Keawekolohe's work in 1842.

Section 2 - House lot

Mauka	Idle land
?Ka`u	Ma -?'s land
Makai	Government road
Kohala	Haleokau's lot

Keawekolohe has fenced the lot, 2 houses - 1 for Keawekolohe and one for the foreigner. Kuae has no house at this time /1842/. He acquired everything in 1842 and lives there now, no one has objected.
Kawaha sworn both have known alike.

LCA 7469 Kaupa
RP 7898
SEE Hienaloli 1 for description.

+LCA 7630 Kawaha
RP 7820
NR 8:445 January 27, 1848
. . . for my kihapais at Hianaloli 2. There are 18 kihapai on the kula. There is 1 pauku of land at Hianaloli 3. 11 kihapai are in this pauku. The witnesses are Lapalaau, Kaupa and Moke.

NT 4: 519 December 25, 1848

Mose sworn He has seen in the ili land of Ililoa of Hianaloli 3 ahupuaa, 14 kihapais, just as he had indicated in his claim. There is in the ili land at Papaawela of Hianaloli 2 ahupuaaa, 8 cultivated kihapais. This interest was given by Mose at the time the kingdom was turned over to Kamehameha III. No one has objected to him.

The kihapais in Hianaloli 2d is an old land since the time of Kam I. Now it has been from Wahakane, no one has objected to Kawaha. He has a house site interest in Kaupa's lot for life. This interest will be for Kaupa upon his (Kawaha) death.

+See notes in Hienaloli 1.

LCA 7716 Luka (Ruth) Keelikolani
RP 0000
No description available.

LCA 10406 Nakunu
RP 4049
NR 8:480 January 26, 1848

. . . my kihapais at Hianaloli 2. There are 9 kihapai -- 7 of taro, 1 of sweet potato and 1 of coffee. It was through Kapule that I acquired these. That is it, for your information.

NT 4:537 December 29, 1848

Kapule sworn He has seen in Ililoa ili of Hianaloli ah puaa [sic], 8 kihapis in 2 sections of land.

Section 1	Mauka	Kapule's land
	Ka`u	Ulua's land
	Makai	Kapule's land
	Kohala	Ulu'as land

8 cultivated kihapais.

Land from Kapule in 1847, no one had objected.

HIENALOLI 3rd

LCA 7630 Kawaha
RP 7820
SEE description in Hienaloli 2.

*LCA 10735 Pupule
RP 0000
NT 4:523 (Two parcels, one within the . . . *ahupua`a* of Hienaloli 3 and the other in Honua`ula).
Mose sworn: I have seen in the land parcels of `Ililoa I, Ka`au`elua, Paohale, Kaumeo 1 and Kaumeo 2 of Kamuku Ahupua`a.

Section 1:mauka, banana patch of Kemeki; Ka`u, Hianaloli 4 `ili; makai, land of Waihou; Kohala, Hianaloli 2 `ili, 5 cultivated *pauku* (garden plots), no house.

Section 2: (Honua`ula)

. . . the agricultural plots and house lot is an old place from the elders. No one has objected to him to this day.
*Maly 1993: A-10

HIENALOLI 4th

LCA 387 American Board of Commissioners for Foreign
RP 1600 Missions
No description available.

LCA 2316 Haleokane
RP 7688
NR 8:378 December 21, 1847
I hereby petition for my house lot claim in Kailua. It has not been measured. It was occupied previous to the time of Kamehameha I -- we do not know how long ago. Our ancestors and parents are all dead, and we, their children, still live on in their place where they lived. That is my claim.
See page 446, Book 3.

LCA 2334 Kupuna [f]
RP 2384/1360
NR 3:456 December 29, 1847
. . . for my house lot, which is here in Kailua. It has not been surveyed. This is our old residence which the makuas had before the time of Kamehameha I. When they died, we continued to live here. This is our claim.

January 9, 1848

NT 4:555
Haleokane sworn He has seen in Hianaloli 4 ahupuaa

Mauka	Haleokane's lot
Ka`u	Idle land
Makai	Beach
Kohala	Keliimahiai's lot

Kupuna's father built the enclosure for the lot. Kaanehe, Kupuna's father died in 1848, and had left this place for his daughter.
3 houses - 1 house for Kupuna, 2 houses for Kaanehe.
?Kupuna is a daughter, Kaanehe is a father. Old land for her grandparents, then to her parents at the time of Kam I. She /Kupuna/ has it now, no objections.
Kalei sworn both have known in the same way.

LCA 4226 Kuae
RP 7904
SEE description in Hienaloli 2.

HIENALOLI 5th

LCA 8524-b M.Peke (Betty Davis)
RP 0000
No description available

LCA 10404 Namimi
RP 4783
NR 8:481 January 27, 1848
. . . for land in the ahupua`a of Hianaloli 6. There are 3 sweet potato kihapai on the kula, 3 adjoin makai of these, 3 kihapai are in the ulu, 2 taro kihapai are mauka of kaluulu. There are 8 kihapai, which however have no crops growing in them. There are 6 kihapai without crops in the ahupua`a of Hianaloli 5. There are 3 kihapai in the ahupua`a of Hianaloli 1, however these kihapai were made by me.

January 10, 1849

NT 4:556
Makaole (F), sworn she has seen in Hianaloli 6 ahupuaa, 25 kihapais paritally cultivated and no house. Two kihapais not cultivated are in Hianaloli 5 ahupuaa. The boundaries are not known to Makaole but the surveyor will establish the correct boundaries. The interest had been from Papakai at the time the Mokuaikana lai Chapel had been built. Land from Makaole at this time, no one had objected.
Inoaole sworn both have known in the same way.

LCA 10698 Pupuka
NR 8:485 February 2, 1848

. . . for my land and house lot claims. I received the right to my land from Kuae, and he received it from Tatina /Thurston/. My claim is for the kihapais, not an entire `ili. Here is my house lot claim which was received from my makuas, who are dead, having left it to me. However, it was I who built a house -- formerly there was no house -- it was completely idle land and I began to build a house there and for this reason I have a claim for this house lot. This claim of mine is at Hianaloli 5.

NT 4:559 January 15, 1849

Kuae/konohiki/, sworn He has seen in Hianaloli 5 ahupuaa

Section 1	Mauka	Kamahiwahine's land
	Ka`u	Hianaloli 6 ahupuaa
	Makai and Kohala	Kuae's land

6 partially cultivated kihapais, 1 house for Pupuka,no fence.

Section 2	Mauka	Kiooaiopua's land
	Ka`u	Hianaloli 6 ahupuaa
	Makai	Kiooaiopua's land
	Kohala	Kuae's land

7 cultivated kihapais

Section 3	Mauka	Kamahiwahine's land
	Ka`u	Hianaloli 6 ahupuaa
	Makai	Kiooaiopua's land
	Kohala	Kuae's land

3 partially cultivated kihapai

Section 4	Mauka	Kiooaiopua's land
	Ka`u	Hianaloli 6 ahupuaa
	Makai	Kiooaiopua's land
	Kohala	Kuae's land

1 kihapai not cultivated

Section 5	Mauka	Idle land
	Ka`u	Hianaloli 6 ahupuaa
	Makai	Konohiki
	Kohala	Hianaloli 4 ahupuaa

1 kihapai cultivated

Section 6 Mauka Kamahiwahine's land
Ka`u Kuae's land
Makai Kamahiwahine's land
Kohala Hianaloli 4 ahupuaa

4 kihapais, land from Kuae in 1826. No one has objected to him to the present day.

HIENALOLI 6th

LCA 7075 Kaiamakini
RP 0000
NR 8:416 January 25, 1848

. . . my house lot claim, which is makai in the ahupua`a of Hianaloli 6. It is 167 1/6 fathoms /in circumference/.

My land claim [4] is in the Ahupua`a of Auhaukeae 1 . . .

NT 4:523 December 28, 1848

Opumomona sworn He has seen the place on which Opumomona had tilled.
Section 5 House Lot
Mauka vacant land
Ka`u Kapae's land
Makai street
Kohala Makaole's lot

Kaimakini's parents had fenced the place. Two houses for Kaimakani there, he he [sic] living there. Old land from his (Kaiamakini) parents at the time of Kam I. No one had objected to him. Kauahaawe sworn they (Kauahaawe and Opumomona) have known in the same way on evey [sic] thing concerning Kaiamakini's land.

LCA 10404 Namimi
RP 4783
SEE Hienaloli 5 for description.

APPENDIX B

GRANTS

Helu 979

PALAPALA SILA NUI.

Ma keia palapala Sila Nui ke hoike aku nei o Kamehameha III., ke Alii nui a ke Akua i kona lokomaikai i hoonoho ai maluna o ko Hawaii Pae Aina, i na kanaka a pau, i keia la, nona iho, a no kona mau hope Alii, ua haawi lilo loa aku oia ma ke ano alodio ia Kaupa i kona waiwai kanaka i manao pono ia ia, i kela apana aina a pau o waiho la ma Hienaloli 2. Kona ma ka Mokupuni o Hawaii a penei hoi ka waiho ana o na Mokuna:

E hoomaka ma kahi ahu pohaku ma 10 kihi Hik. akau o keia, ma ke alanui mai Kealakeakua a Kiholo, a e holo aku ma kapa alanui. Hema 18½° Hik. 4.50 kaul. alaila ma ka mokuna o Hienaloli 1, Hema 19½° Kom. 7.39 kaul.—Hema 60° Kom. 6.10 kaul.—Hema 68½° Kom. 5.16 kaul.—Hema 54¾° Kom. 3.73 kaul.—Hema 65° Kom. 13.10 kaul.—Hema 63° Kom. 7.80 kaul.—Hema 67¾° Kom. 1.80 kaul.—Hema 57½° Kom. 6.23 kaul.—Hema 62° Kom. 2.32 kaul.—Hema 40° Kom. 1.56 kaul.—Hema 68½° Kom. 5.40 kaul.—Hema 66° Kom. 2.50 kaul.—Hema 63½° Kom. 3.86 kaul.—Hema 67½° Kom. 7.75 kaul. a Hema 61½° Kom. 11.70 kaul. alaila akau 22° Kom. 4.27 kaul. a i ka mokuna o Hienaloli 2. alaila ma ia mokuna akau 52½° Hik. 6.11 kaul.—akau 65° Hik. 7.58 kaul.—akau 57½° Hik. 8.44 kaul.—akau 64° Hik. 4.54 kaul.—akau 56¾° Hik. 4.42 kaul.—akau 54½° Hik. 4.67 kaul.—akau 59¾° Hik. 8.00 kaul.—akau 63° Hik. 8.60 kaul.—akau 74½° Hik. 9.20 kaul.—akau 77° Hik. 6.46 kaul.—akau 70° Hik. 14.37 kaul. a akau 57° Hik. 16.00 kaul. a hiki i kahi i hoomaka ai.

Koe ke Kuleana o na Kanaka

PALAPALA SILA NUI.

Ma keia palapala Sila Nui ke hoike aku nei o Kamehameha III., ko Alii nui a ke Akua i kona lokomaikai i hoonoho a maluna o ko Hawaii Pae Aina, i na kanaka a pau, i keia la, nona iho, a no kona mau hope Alii, ua haawi lilo loa aku oia ma ke ano alodio ia *J. Haanio* kanaka i manao pono ia ia, i kela apana aina a pau e waiho la ma *Hienaloli 3* kona *walii* *Kona* ma ka Mokupuni o *Hawaii*

a penei hoi ka waiho ana o na Mokuna:

E hoomaka ma kahi ahu pohaku i ke kihi Kom Hema o keia, ma ke alanui mai Kealakekua a Kikolo, a e holo ana ma kapa alanui akau 19° Kom 4.60 kaul.; alaila ma ka mokuna o Hienaloli 2, akau 65¾° Hik. 6.13 kaul. — akau 76¾° Hik. 7.45 kaul. — akau 76° Hik. 6.50 kaul. — akau 87½° Hik. 4.39 kaul. — akau 60¾° Hik. 4.85 kaul. — akau 62½° Hik. 8.70 kaul. — akau 63° Hik. 25.10 kaul. a akau 71½° Hik. 35.70 kaul. i ke pahu me ke ahu pohaku ma ke kihi Hik. akau o keia. Alaila Hema 21¼° Hik. 4.50 kaul. i ke kihi Hik. Hema, alaila ma ka palena o Hienaloli 4, Hema 58½° Kom. 2.50 kaul. — Hema 51° Kom. 7.50 kaul. — Hema 72° Kom. 26.20 kaul. — Hema 70° Kom. 24.20 kaul. — Hema 71½° Kom. 21.50 kaul. — Hema 75½° Kom. 8.96 kaul. a Hema 66° Kom. 8.16 kaul. a hiki i kahi i hoomaka ai.

Koe ke Kuleana o na Kanaka

PALAPALA SILA NUI.

Ma keia palapala Sila Nui ke hoike aku nei o Kamehameha III., ke Alii nui a ke Akua i kona lokomaikai i hoonoho a maluna o ko Hawaii Pae Aina, i na kanaka a pau, i keia la, nona iho, a no kona mau hope Alii, ua haawi lilo loa aku oia ma ke ano alodio ia *Maawe.*
i kona *uuku* kanaka i manao pono ia ia, i kela apana aina a pau o waiho la ma *Hienaloli 6*
Kona ma ka Mokupuni o *Hawaii*
a penei hoi ka waiho ana o na Mokuna :

E hoomaka ma kahi aku pohaku ma ke kihi Hik. o keia aina, a e holo ana
akau 29½° Kom. 3.77 kaul. ma ka Kuleana o Namimi
Hema 74¾° Kom. 2.61 " " ka iwi o Hienaloli 5.
Hema 68¼° Kom. 11.00 " " " " "
Hema 19° Hik. 5.70 " " " aina Aupuni
akau 57¼° Hik. 3.00 " " " "
akau 64½° Hik. 7.58 " " " "
akau 67½° Hik. 3.90 " " " " a hiki i kahi i
hoomaka ai.

Koe ke Kuleana o na Kanaka.

1572.

HELU

PALAPALA SILA NUI.

Ma keia Palapala Sila Nui ke hoike aku nei o Kamehameha III, ke Alii nui a ke Akua i kona lokomaikai i hoonoho ai maluna o ko Hawaii Pae Aina, i na kanaka a pau, i keia la, ncna iho, a no kona mau hope Alii, ua haawi lilo loa aku oia ma ke ano alodio ia *Kapalaluna*

i kona *wahi* kanaka i manao pono ia ia, i kela apana aina a pau e waiho la ma *Hienaloli 6* *Kona* ma ka Mokupuni o *Hawaii* ; a penei hoi ka waiho ana o na Mokuna :

E hoomaka ana ke kihi Hema loa, e pili ana me Auhaukeae 1. Ma ke alaloa mauka, a e holo ana ma ke Alanui A. 22½° Hem. 6.72 Kaul. — Alaila ma Hienaloli 5. A. 66½° Hi. 6.90 Kaul. A. 65½° Hi 12.05 Kaul. A. 68½° Hi 12.59 Kaul. A. 69° Hi 22.00 Kaul. A. 69° Hi 9.00 Kaul. A. 66½° Hi 17.75 Kaul. A. 65¾° Hi 9.80 Kaul. A. 71° Hi 4.58 Kaul. a A. 82° Hi 6.65 Kaul., Alaila He. 21° Hi 4.90 Kaul. ma ke uluaoao Alaila ma Auhaukeae 1. He. 54½° Ko 4.87 Kaul. — He 66½° Ko. 4.65 Kaul. — He. 65½° Ko 6.75 Kaul. — He 65½° Hem. 12.82 Kaul. — He 75¾° Hem 4.54 Kaul. He 71½° Ko [illegible] Kaul. — He 59⅓° Ko. 12.24 Kaul. — He 74° Ko. 8.77 Kaul. a ka hoomaka ana

Koe ke Kuleana o na kanaka

HELU 1752

PALAPALA SILA NUI.

Ma keia Palapala Sila Nui ke hoike aku nei o Kamehameha III, ke Alii nui a ke Akua i kona lokomaikai i hoonoho ai maluna o ko Hawaii Pae Aina, i na kanaka a pau, i keia la, nona iho, a no kona mau hope Alii, ua haawi lilo loa aku oia ma ke ano alodio ia *Kawelo Kinaloli*

i kona *waiwai* konaka i manao pono ia ia, i kela apana aina a pau e waiho la ma *Kona* ma ka Mokupuni o *Hawaii* a penei hoi ka waiho ana o na Mokuna:

E hoomaka ana ma ka pou pohaku ma ka pa nui makai o ia ke kihi Hema o keia aina e huli ana me Auwaukena a malaila holo.

Ak 29° 45'	Ko 2.90	kaul ma ka pa a ke kihi Ko. o ka pou pohaku	
Ak 70° 30'	Hi 11.40	"	palena o Kinaloli aina
Ak 68° 30'	Hi 13.25	"	" "
Ak 70° 45'	Hi 2.40	"	" "
Ak 62°	Hi 6.	"	" "
Ak 69°	Hi 15.12	"	" "
Ak 62°	Hi 1.20	"	" "
Ak 68° 30'	Hi 14.	"	" "
Ak 66° 30'	Hi 15.50	"	" "
Ak 69° 30'	Hi 6.35	"	" "
Ak 59°	Hi 11.30	"	" "
Ak 67° 45'	Hi 12.04	"	" "
Ak 57° 45'	Hi 5.22	"	" "
Ak 61°	Hi 4.80	"	" "
Ak 64° 30'	Hi 3.65	"	" "
He 19°	Hi 5.10	"	Ko Maua aina
Ak 57° 18'	Hi 3.	"	" "
Ak 66° 30'	Hi 7.58	"	" "
Ak 67° 30'	Hi 3.90	"	" "
Ak 29° 30'	Ko 3.77	"	" "
Ak 62°	Hi 2.50	"	Kinaloli aina
Ak 58° 15'	Hi 4.95	"	" "
Ak 60°	Hi 10.	"	" "
Ak 67° 15'	Hi 13.10	"	" "

HELU 1848

PALAPALA SILA NUI.

Ma keia Palapala Sila-Nui ke hoike aku nei o Kamehameha IV., ke Alii nui a ke Akua i kona lokomaikai i hoonoho ai maluna o ko Hawaii Pae Aina, i na kanaka a pau, i keia la, nona iho, a no kona mau hope Alii, ua haawi lilo loa aku oia ma ke ano alodio ia Bill Kepio [illegible] i kona wahi kanaka i manao pono ia ia, i kela apana aina a pau e waiho la ma Kamoiliili, Kona, ma ka Mokupuni o Oahu; a penei hoi ka waiho ana o na Mokuna:

I hoomaka ana ma ke kihi Komohana ma [illegible]
e pili ana me ke Alanui makai a e holo ana ma ia alanui.

Hema 53°45' 93 Kaul a Loko a ke kihi Hema.

Akau 59°30' 1.56 " ma ka aina o [illegible]

Akau 29°30' 93 " " ke Alanui

Hema 57°30' 1.93 " " Kamoiliili

i kahi i hoomaka ai — $\frac{16}{100}$ Eka.

APPENDIX C

Comments from and Replies to Agencies and Organizations
Consulted During the Draft Environmental Assessment Process

The order of agencies and organizations presented in this appendix is as follows:

U.S. Department of the Interior, Fish and Wildlife Service
State Department of Land and Natural Resources, State Historic Preservation Division
State Department of Health
University of Hawaii, Environmental Center
County of Hawaii, Department of Public Works
Haseko, Hawaii, Inc.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Islands Office
P.O. Box 50167
Honolulu, Hawaii 96850

In Reply Refer To: AAP

APR 26 1994

Mr. Joseph Conant
Housing Finance and Development Corporation
Department of Budget and Finance
677 Queen Street, Suite 300
Honolulu, Hawaii 96813

Re: March 1994 Draft Environmental Assessment for the Drilling and Testing of the Keopu-HFDC Exploratory Well No. 1, Keopu, North Kona, Hawaii, Hawaii TMK:7-5-13:22

Dear Mr. Conant:

The U.S. Fish and Wildlife Service (Service) has reviewed the March 1994 Draft Environmental Assessment (EA) for the drilling and testing of the Keopu-HFDC exploratory well on Keopu, North Kona, Hawaii, Hawaii. The project is sponsored by the State Housing Finance and Development Corporation (HFDC), in coordination with the Department of Land and Natural Resources (DLNR) and the Division of Water and Land Development (DOWALD). The proposed action will evaluate the feasible development of potential ground water sources at the selected site.

The project involves constructing a 1,400 foot long temporary access road from Mamalahoa Highway to the exploratory well site; drilling an 18-inch diameter cased well 1,700 feet below a ground elevation of 1,660 feet; installation of 1,700 feet of 18-inch I.D. steel casing; and pump testing the aquifer from a range of 5,000 to 2,100 gallons per minute. The Service offers the following comments for your consideration.

The Service does not anticipate major adverse impacts to fish and wildlife resources at the proposed well site. The site lacks wetlands and does not provide habitat for any rare, threatened, or endangered plants and animal species. Thus, the Service concurs with the draft document's Negative Declaration and determination that an Environmental Impact Statement (EIS) is not required for the project.

We appreciate the opportunity to provide these comments. If you have questions or need further assistance, please contact Arlene Pangelinan at (808)/541-3441.

Sincerely,

Robert P. Smith

Robert P. Smith
Field Supervisor
Pacific Islands Office

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Islands Office
P.O. Box 50167
Honolulu, Hawaii 96850

H.F.D.C.
94 JUN 2 1 23 PM

In Reply Refer To: AAP

MAY 31 1994

Mr. Joseph Conant
Housing Finance and Development Corporation
Department of Budget and Finance
677 Queen Street, Suite 300
Honolulu, Hawaii 96813

Re: Additional Comments on the March 1994 Draft Environmental Assessment for the Drilling and Testing of the Keopu-HFDC Exploratory Well No. 1, Keopu, North Kona, Hawaii, Hawaii (TMK:7-5-13:22)

Dear Mr. Conant:

The U.S. Fish and Wildlife Service (Service) initially commented on the March 1994 Draft Environmental Assessment (EA) for the drilling and testing of the Keopu-HFDC Exploratory Well No. 1 at Keopu, North Kona, Hawaii, Hawaii, on April 26, 1994. In those comments, the Service stated that the area potentially affected by the proposed project does not provide habitat for any rare, threatened, or endangered plants and animal species. However, upon further review, we have determined that the affected area supports food resources for two federally endangered species, the Hawaiian hawk (*Buteo solitarius*) and the Hawaiian hoary bat (*Lasiurus cinereus semotus*).

The Hawaiian hawk may be affected by the well development since the amount of open lands surrounding the well site would be reduced by the construction of necessary pumping and storage facilities. Hawaiian hawks are usually observed over open areas or in areas with widely-scattered native and/or exotic trees.

In addition, Hawaiian hoary bats have been observed at elevations below 665 meters (2,182 feet) along the western coast of the Island of Hawaii. Although knowledge of the foraging habits of these bats is limited, potential foraging areas may occur in the vicinity of the proposed well site, which is located at an elevation of 506 meters (1,660 feet).
Nevertheless, the Service still does not anticipate major project-related adverse impacts to fish and wildlife resources at the proposed site and concurs with the Draft EA's Negative Declaration. The Service recommends that this information on the Hawaiian hawk and the Hawaiian hoary bat be incorporated into the Final EA.

The Service appreciates the opportunity to provide these additional comments. If you have questions regarding our comments or need further assistance, please contact staff biologist, Arlene Pangelinan, at 808/541-3441.

Sincerely,

Brooks Harper

Brooks Harper
Acting Field Supervisor
Pacific Islands Office

JOHN WAIHEE
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF BUDGET AND FINANCE
HOUSING FINANCE AND DEVELOPMENT CORPORATION
677 QUEEN STREET, SUITE 300
HONOLULU, HAWAII 96813
FAX (808) 587-0600

JOSEPH K. CONANT
EXECUTIVE DIRECTOR

IN REPLY REFER TO:
94:DEV/4292

August 15, 1994

Mr. Robert Smith, Field Supervisor
U.S. Department of the Interior
Fish and Wildlife Service
Pacific Islands Office
P.O. Box 50167
Honolulu, Hawaii 96850

Dear Mr. Smith:

Subject: KEOPU-HFDC EXPLORATORY WELL NO. 1
Draft Environmental Assessment

Thank you for submitting comments on the Draft Environmental Assessment. The information on the Hawaiian Hoary Bat is appreciated and will be incorporated in the Final Environmental Assessment.

If you have any questions, please contact Mike McElroy, Project Manager, at 587-0550.

Sincerely,

JOSEPH K. CONANT
Executive Director

HFDC

JOHN WAIHEE
GOVERNOR OF HAWAII

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STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

HAWAII HISTORIC PLACES REVIEW BOARD
33 SOUTH KING STREET, 6TH FLOOR
HONOLULU, HAWAII 96813

KEITH W. AHUE, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCE

DEPUTIES

JOHN P. KEPPELER, II
DONA L. HANAIKE

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

April 15, 1994

LOG NO: 11053
DOC NO: 9404PM06

Mr. Joseph Conant, Executive Director
Department of Budget and Finance
Housing Finance and Development Corporation
677 Queen Street, Suite 300
Honolulu, Hawaii 96813

Dear Mr. Conant:

SUBJECT: Draft Environmental Assessment --
Keopu-HFDC Exploratory Well No. 1
Keopu, North Kona, Island of Hawaii
TMK: 7-5-13:22

This letter is in response to your letter of March 28, 1994 with a request for comments on the subject project. The project has already been reviewed (see Appendix A of the Draft Environmental Assessment) and a determination made that it will have "no effect" on historic sites.

Sincerely,

DON HIBBARD, Administrator
State Historic Preservation Division

PM:amk

JOHN WAIHEE
GOVERNOR OF HAWAII

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MAY 20 11 24 AM '94
STATE OF HAWAII
DEPARTMENT OF HEALTH
P. O. BOX 3378
HONOLULU, HAWAII 96801

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

In reply, please refer to:

May 13, 1994

94-061/epo

To: The Honorable Joseph K. Conant
Executive Director
Housing Finance and Development Corporation

From: John C. Lewin, M.D.
Director of Health

Subject: DRAFT ENVIRONMENTAL ASSESSMENT (DEA)
KEOPU-HFDC EXPLORATORY WELL NO. 1
STATE WELL NO. 3957-03
KEOPU, NORTH KONA, HAWAII
THK: 7-5-13: 22

Thank you for allowing us to review and comment on the subject document. We have the following comments to offer:

1. The DEA indicates that the project will include the development of a new source of potable water. As a new source, it will be necessary to comply with Hawaii Administrative Rules, Title 11, Chapter 20, "Rules Relating to Potable Water Systems." Section 11-20-29 requires that all new sources of potable water serving a public water system be approved by the Director of Health prior to its use. Such an approval is based primarily upon the submission of a satisfactory engineering report which addresses the requirements setforth in Section 11-20-29.

2. The engineering report must identify all potential sources of contamination and evaluate alternative control measures which could be implemented to reduce or eliminate the potential for contamination, including treatment of the water source. In addition, water quality analyses performed by a laboratory certified in the State of Hawaii must be submitted as part of the report to demonstrate compliance with all drinking water standards.

3. In an effort to clarify what is needed in engineering reports and to minimize unnecessary delays in the review process, we have provided the following information to the respective county Departments of Water Supply and consulting engineers who prepare such reports:

   a. Safe Drinking Water Branch (SDWB) New Source Approval Process.
      - SDWB New Source Approval Flowchart
      - Declaration of Covenants (sample form)
      - Operation and Maintenance Certification (sample form)

   b. Guidelines for Preparation of Preliminary Engineering Reports for New Potable Water Sources.
      - List of Minimum Required Contaminants to be Sampled and Analyzed.
      - Professional Engineer's Certification (sample form)

   c. Drinking Water Testing Laboratories Certified by the Hawaii Department of Health, State Laboratories Division.

   Copies of the above guidelines are enclosed for your information.

4. Section 11-20-30 requires that new or substantially modified distribution systems for public water systems be approved by the Director. However, if the water system is under the jurisdiction of the County of Hawaii, the Department of Water Supply will be responsible for the review and approval of the plans.

If you should have any questions, please contact William Wong, Chief, Safe Drinking Water Branch at 586-4258.

Attachments

c: Safe Drinking Water Branch

JOHN WAIHEE
GOVERNOR

JOSEPH K. CONANT
EXECUTIVE DIRECTOR

STATE OF HAWAII
DEPARTMENT OF BUDGET AND FINANCE
HOUSING FINANCE AND DEVELOPMENT CORPORATION
677 QUEEN STREET, SUITE 300
HONOLULU, HAWAII 96813
FAX (808) 587-0600

IN REPLY REFER TO:
94:DEV/4509

August 18, 1994

TO: The Honorable Peter Sybinsky, Director
Department of Health

FROM: Joseph K. Conant
Executive Director

SUBJECT: Draft Environmental Assessment (DEA) for Keopu-HFDC Well No. 1 Exploratory Well

The Housing Finance and Development Corporation (HFDC) is in receipt of your comments on the above subject.

It is HFDC's intent to comply with the Hawaii Administrative Rules, Title 11, Chapter 20, "Rules Relating to Potable Water Systems" as recommended in Item 1 of your comments. HFDC and its consultant will also take into consideration your recommendations stated in Items 2 and 4 of your comments to demonstrate compliance with all drinking water standards and to facilitate approval of the plans.

We appreciate your assistance in minimizing unnecessary delays in the review process as discussed in Item 3 of your comments.

Please call Cirvalina R. Longboy, Project Coordinator, at 1-800-468-4644-ext.70546, should you need more information.

HFDC

University of Hawai'i at Manoa

Environmental Center
A Unit of Water Resources Research Center
Crawford 317 • 2550 Campus Road • Honolulu, Hawai'i 96822
Telephone: (808) 956-7361 • Facsimile: (808) 956-3980

May 4, 1994
EA:00059

Ms. Cirvalina Longboy
Housing Finance and Development Corporation
Department of Budget and Finance
677 Queen Street, Suite 300
Honolulu, Hawaii 96813

Dear Ms. Longboy:

Draft Environmental Assessment
Keopu-HFDC Exploratory Well No. 1
Drilling and Testing
North Kona, Hawaii

This document addresses the proposal to drill and test an exploratory well to determine the feasibility of developing a new ground water source.

The Environmental Center has reviewed the permit application with the assistance of Sheila Conant, General Science; Clifford Smith, Botany; and Chris Welch, Environmental Center.

Our reviewers concur that the Draft Environmental Assessment for the drilling and testing of exploratory well #1 adequately documented the impacts of the project. However, a couple of points in the document do need clarification.

Section II (E) Flora and (F) Fauna

These sections describe the communities of plants and animals that reside in or around the proposed project area. In both of these sections, the flora and fauna are referred to by their common names. The biota should be referenced by both the common and scientific designation. We also note that neither section contains any citations referencing the source of biotic information.

One point that needs further study and/or elucidation is the impact that this project could have on the Hawaiian Hoary Bat (Lasiurus cinereus semoteus). David S. Jacobs recently published an article in Pacific Science (Volume 48 #2: 193-200) entitled The Distribution and Abundance of the Endangered Hawaiian Hoary Bat. The article includes a map that suggests that the Hoary Bat may be found within the project area. With the designation of the bat as an endangered species, this is a source of concern. It is suggested that a survey be carried out near the proposed well site to document the presence, or lack thereof, of the Hoary Bat. The survey should be done in accordance with proper scientific methodology that takes into account the bats nocturnal nature.

Section III (B) Long Term Impact

The need to address all potential longterm impacts is an imperative of the EA system. One of the potential impacts that was overlooked in the preparation of this document is the possible alteration of water quality characteristics in subterranean water flows. The question of whether the withdrawal of water will affect the anchialine ponds and offshore upwelling near the historic church needs to be addressed. The underground water flows may be important to the anchialine ponds and other fragile coastal biotic communities.

Thank you for the opportunity to comment on this EA.

Sincerely,

John T. Harrison
Environmental Coordinator

cc: OEQC
Roger Fujioka
Clifford Smith
Sheila Conant
Chris Welch

mailed 8/10 [illegible]

JOHN WAIHEE
GOVERNOR

FILE COPY

JOSEPH K. CONANT
EXECUTIVE DIRECTOR

STATE OF HAWAII
DEPARTMENT OF BUDGET AND FINANCE
HOUSING FINANCE AND DEVELOPMENT CORPORATION
677 QUEEN STREET, SUITE 300
HONOLULU, HAWAII 96813
FAX (808) 587-0600

IN REPLY REFER TO:
94:DEV/4294

August 15, 1994

Mr. John T. Harrison, Environmental Coordinator
University of Hawaii
Environmental Center
2550 Campus Road, Crawford 317
Honolulu, Hawaii 96822

Dear Mr. Harrison:

Subject: KEOPU-HFDC EXPLORATORY WELL NO. 1
Draft Environmental Assessment

Thank you for submitting comments on the Draft Environmental Assessment (EA). We have reviewed your comments transmitted by your letter dated May 4, 1994, and offer the following response:

1. Section II (E) Flora and (F) Fauna. As suggested, we will include the scientific names of the flora and fauna in the Final Environmental Assessment (FEA). Although the flora and fauna information are referenced on page 14 of the Draft Environmental Assessment as item 1, "Atlas of Hawaii, Second Edition" and item 10, "Archaeological Reconnaissance Survey: Hienaloli 1st, North Kona, Island of Hawaii (TMK: 7-15-13 and 22)", we did not cite these references in the proper sub-sections. Consequently, for clarification, we will cite the above references in the FEA.

   We appreciate the information regarding the endangered Hoary Bats. The article that is referenced in the letter entitled "Distribution and Abundance of the Hawaiian Hoary Bat", by David S. Jacobs, indicates that bat sightings did occur in the Waiono Meadows Ranch which is approximately two miles away from the proposed project site. The article also indicated other bat sightings at various locations on the island. This suggests that the Hoary Bat has a very extensive habitat. We realize that the project site may be a part of this habitat, but because the drilling and testing of the exploratory well will use less than one acre of land (a tiny portion of the Hoary Bat's habitat), it is anticipated that there will be no adverse impacts to the

HFDC

   Hawaiian Hoary Bat. This concurs with the comments received from the U.S. Fish and Wildlife Service for the subject EA which is enclosed with this letter.

   Furthermore, to minimize any disturbance to the Hoary Bat's habitat, the construction site will be restricted to a limited area. Construction will be done during the day to avoid interference with the Hoary Bat's mostly nocturnal foraging, and if during construction, a Hoary Bat is observed, a biologist will be consulted to recommend precautionary measures.

   In lieu of a survey, a check was done with the Nature Conservancy, and they have no record of any bat sightings within or adjacent to the well site.

2. Section III (B) Long Term Impact. The Keopu-HFDC project proposes to drill and test an exploratory well which will provide information on the hydrogeologic characteristics of the aquifer and determine the feasibility of developing a new source of ground water. Provided that the test results are positive, the proposed withdrawal from the well of approximately 1.0 million gallons a day (mgd) would represent a small fraction of the estimated sustainable yield of approximately 10 mgd per coastal mile. Therefore, no long-term impact is expected on the quality of groundwater flows near the coastline to anchialine ponds or offshore upwelling down gradient of the project well.

If you have any questions, please contact Mike McElroy, Project Manager, at 587-0550.

Sincerely,

JOSEPH K. CONANT
Executive Director

Stephen K. Yamashiro
Mayor

Donna Fay K. Kiyosaki
Chief Engineer

Riley W. Smith
Deputy Chief Engineer

County of Hawaii
DEPARTMENT OF PUBLIC WORKS

25 Aupuni Street, Room 202 • Hilo, Hawaii 96720-4252
(808) 961-8327 • Fax (808) 969-7138

April 21, 1994

MR JOSEPH K CONANT EXECUTIVE DIRECTOR
HOUSING FINANCE AND DEVELOPMENT CORPORATION
STATE DEPARTMENT OF BUDGET AND FINANCE
677 QUEEN STREET SUITE 300
HONOLULU HI 96813

SUBJECT: KEOPU-HFDC EXPLORATORY WELL NO. 1

He have reviewed the draft EIS and have the following comments:

1. What is the proposed alignment of the transmission main if the well proves successful?

2. What is the projected construction timetable for this project. Public Works will be resurfacing sections of Hamalahoa Highway and will not allow excavation in the areas for at least one year after completion of the resurfacing.

Should you have any questions, please contact our office at 961-8327.

GALEN M. KUBA, Acting Division Chief
Engineering Division

STT:ctc

JOHN WAIHEE
GOVERNOR

JOSEPH K. CONANT
EXECUTIVE DIRECTOR

STATE OF HAWAII
DEPARTMENT OF BUDGET AND FINANCE
HOUSING FINANCE AND DEVELOPMENT CORPORATION
677 QUEEN STREET, SUITE 300
HONOLULU, HAWAII 96813
FAX (808) 587-0600

IN REPLY REFER TO:
94:DEV/4293

August 15, 1994

Mr. Galen Kuba, Acting Division Chief
Engineering Division
Department of Public Works
County of Hawaii
25 Aupuni Street, Room 202
Hilo, Hawaii 96720-4252

Dear Mr. Kuba:

Subject: KEOPU-HFDC EXPLORATORY WELL NO. 1
Draft Environmental Assessment

Thank you for submitting comments on the Draft Environmental Assessment. We have reviewed your comments transmitted by letter dated April 21, 1994, and offer the following response:

1. If the well proves successful, connection to the distribution system is proposed along Manalahoa Highway.

2. The exploratory well is tentatively scheduled to be drilled sometime in 1995. Based on recent well developments in North Kona, we are anticipating a design and construction time of 20 months for the exploratory well and 18 months for well development. We understand the resurfacing requirements and, if the well is developed, we will coordinate with your department in order to avoid construction conflicts in the future.

We hope we have addressed your concerns to your satisfaction. Thank you again for taking the time to review our environmental documents.

If you should have any questions, please contact Mike McElroy, Project Manager, at 587-0550.

Sincerely,

JOSEPH K. CONANT
Executive Director

HFDC

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CASE & LYNCH
ATTORNEYS AT LAW
A PARTNERSHIP INCLUDING LAW CORPORATIONS
CASE & LYNCH BUSINESS CENTER
480 KILAUEA AVENUE
HILO, HAWAII 96720-3044
TELEPHONE: (808) 961-6811
FACSIMILE: (808) 961-4852

May 6, 1994

Housing Finance and Development Corporation
677 Queen Street, Suite 300
Honolulu, Hawaii 96813

Attn: Ms. Cervalina Longboy

Re: Keopu-HFDC Exploratory Well No. 1 Drilling and Testing
Draft Environmental Assessment

Dear Ms. Longboy:

On behalf of Haseko (Hawaii), Inc. we have reviewed the Draft Environmental Assessment ("Draft EA") for the Keopu-HFDC Exploratory Well No. 1 proposed by the Housing Finance and Development Corporation. We are concerned that the proposed project may have a significant effect on the environment so as to trigger an environmental impact statement ("EIS") under applicable law. We are also concerned that the proposed project may have adverse effects on our existing Keopu-Haseko Well (Well No. 3957-01) located on the adjacent property.

It is our understanding that the project would be located on State owned land situated at Henaloli 1st, North Kona, Hawaii. The project proposes to drill an 18-inch diameter cased well to a depth of approximately 1700 feet below ground elevation of 1660 feet, and to pump test the aquifer from a range of 500 to 2100 gallons per minute ("gpm"). The well would be located within 400 feet of an existing well owned by Haseko and within 2400 feet of a proposed well by Nansay Hawaii.

It is our opinion that information on the proposed project and contained within the draft EA as to the impact of proposed well on the existing ground water resources and particularly the impact upon the neighboring Haseko well cannot be adequately evaluated without more definitive information which can only be provided by actual drilling of the well and testing the reliability of the groundwater source. In the absence of more accurate and detailed information of the project's impact upon ground water resources, we wish to reserve comment until further testing is completed and the results provided to the appropriate governmental agencies for review.

In addition to the above general concerns, we offer the following specific examples of where impacts of the proposed project should be discussed more fully:

ENVIRONMENTAL CHARACTERISTICS - HYDROGEOLOGY

The Draft EA describes the expected water source to be a high level, semi-confined basal aquifer source discovered in 1990 by DOWALD. The availability of this source cannot be adequately assessed until additional information is provided regarding the results of the 1990 DOWALD test well.

It is our understanding that a well construction permit for the proposed HDFC well was approved by the Commission on Water Resource Management on June 2, 1993. When this permit was considered by the Commission, the staff analysis indicated that the nature of the geologic structure which holds water at high levels in the North and South Kona region was not known. The hydraulic properties of the high-level aquifer were also not known in detail because of few aquifer tests. They felt that lateral interference with existing high level wells, especially the Keopu-Haseko Well (Well No. 3957-01) located nearby, could be a problem when the wells are put into production. The report noted that HFDC was willing to take the risk of drilling in spite of its location near the Keopu-Haseko Well. HFDC agreed with the County Department of Water Supply that the amount of water commitments granted will depend on the outcome of the well test and long-term reliability of the aquifer.

ENVIRONMENTAL CHARACTERISTICS - WATER QUALITY

The Draft EA depicts several existing wells in the well field mauka of Mamalahoa Highway. However, the Draft EA contains no information regarding the water quality of the available groundwater from the area in the vicinity of the project.

PROBABLE IMPACTS AND MITIGATIVE MEASURES - SHORT TERM IMPACTS

The Draft EA states that a probable impact of well testing may include fluctuations of the groundwater table in the immediate vicinity of the well site and that hydrogeologic studies of the area indicate that the fluctuations should be minimal. The hydrogeologic study is not attached to the Draft EA; nor, is any hydrogeologic data provided to support this conclusion. Thus, it is not possible to properly assess the short term impacts upon the groundwater table because of the project. Hydrogeologic data should be included as part of the environmental information provided.

Pump tests are proposed to range between 500 to 2100 gpm. The impacts of these pump tests should be discussed.

There is also no analysis of the short-term impacts of the project upon the neighboring Haseko well. Because the Haseko well is an existing potable well, the impacts upon this water source should be discussed.

PROBABLE IMPACTS AND MITIGATIVE MEASURES - LONG TERM IMPACTS

The Draft EA does not discuss the long term impacts upon the existing well field in North Kona, the aquifer, or the neighboring wells. The impacts of the project cannot be adequately assessed if these items are not considered.

We understand that the long range plan for this project is to incorporate the well into the County of Hawaii Water system. It is our understanding that the County of Hawaii requires that potable wells be spaced at least 1,000 to 1,500 feet apart, so as not to adversely impact the existing ground water resources. We also understand that the State Commission on Water Resource Management concurs with this County requirement. The Draft EA does not discuss how the well is proposed to be incorporated into the County water system in light of this requirement.

Also, the Draft EA does not discuss the long term impact of the project upon the existing Haseko water source. This impact should be addressed.

CONCLUSION

Based on the information contained within the Draft EA, it is difficult to determine whether the proposed well will have any adverse effects on the nearby Keopu-Haseko well until the well is drilled and tested. We can only concur with the Department of Water Supply letter of May 7, 1993 which states that the amount of water development granted will depend on the outcome of the well test and long-term reliability of the aquifer. We, therefore, request a review of the results of any testing to be conducted in accordance with the conditions for HFDC's well construction permit.

Haseko has spent substantial time and expense in developing a ground water source which will be dedicated to the County as part of the County water system. Our client wishes to avoid a situation arising whereby the HFDC test well would damage this water source.

Very truly yours,

CASE & LYNCH

SANDRA PECHTER SCHUTTE

cc: Royce Fukunaga, Fukunaga and Associates

Mailed 8/16 fbs

JOHN WAIHEE
GOVERNOR

FILE COPY

JOSEPH K. CONANT
EXECUTIVE DIRECTOR

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DEPARTMENT OF BUDGET AND FINANCE
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IN REPLY REFER TO:
94:DEV/4291

August 15, 1994

Ms. Susan Pechter Schutte
Case & Lynch
Attorneys at Law
Case & Lynch Business Center
460 Kilauea Avenue
Hilo, Hawaii 96720-3084

Dear Ms. Schutte:

Subject: KEOPU-HFDC EXPLORATORY WELL NO. 1
Draft Environmental Assessment

Thank you for submitting comments on the Draft Environmental Assessment. We have reviewed your comments transmitted by letter dated May 6, 1994, and offer the following response:

1. Introduction. We are aware of your concerns on the effect the exploratory well will have on the neighboring Keopu-Haseko Well. We agree that these effects cannot be determined until the well is drilled and tested. The proposed Keopu-HFDC Exploratory Well No. 1 project will accomplish this. If the well proves successful, the Commission on Water Resource Management (CWRM) will review the pump test results and through their permit process determine if neighboring wells will be significantly impacted before determining whether a pump permit will be granted.

2. Environmental Characteristics - Water Quality. In 1990, the occurrence of high-level ground water in North Kona was discovered by the State Division of Water and Land Development in the Kalaoa Mauka Well, located 4.7 miles inland from the coast at Keahole. Several other wells were later drilled at similar elevations confirming the existence of high-level source. The extent of this high-level water body and the nature of the confining hydrogeologic structure that separates it from the basal aquifer and salt water intrusion are not completely known. The drilling of an exploratory well will provide the necessary information to

HFDC

understanding the hydrogeologic characteristic of the aquifer.

3. Environmental Characteristics - Water Quality. Based on water samples analyzed from Keopu-Haseko Well, the water from the proposed Keopu-HFDC Exploratory Well No. 1 is expected to be of pristine quality. The Keopu-Haseko Well had a low chloride content (a measure of freshness of ground water in Hawaii) of 10 to 12 mg/l.

4. Probable Impacts and Mitigative Measures - Short Term Impacts. Based on test results of the Keopu-Haseko Well, no drawdown interference due to low permeability is anticipated between the proposed Keopu-HFDC Well and Keopu-Haseko Well. According to records filed with the CWRM, Haseko Well was pump tested on January 23, 1993, for 95 hours at a constant rate of 1.0 million gallons a day (mgd) with drawdown of 6.4 feet despite the fact that the solid casing extends to a depth of 31 feet below static water level. Other pump tests for wells in the vicinity support that high permeability does occur throughout the high-level aquifer. Honokohau Well located 2.5 miles north of Keopu had a drawdown of 9 feet at 2.1 mgd; Kamehameha Development Well had a drawdown 5.6 feet at 2.2 mgd; and the Keei 4 Well had a drawdown of 4.6 feet at 2.6 mgd. This is consistent with the geologically young age and unweathered condition of the flank flow basalts of Kona.

5. Probable Impacts and Mitigative Measures - Long Term Impacts. You noted that the County of Hawaii, Department of Water Supply (DWS) requires that potable wells be spaced 1,000 to 1,500 feet apart. During the processing of the well construction permit for the Keopu-HFDC Well No. 1, there were no adverse comments made by the DWS regarding the close proximity of the Keopu-Haseko Well and the Keopu-HFDC Exploratory Well site, indicating that the aforementioned requirement is no longer in effect.

No long term drawdown effect is expected to occur due to the Haseko-Well having a stable drawdown that varied 0.2 ft. after 95 hours of pumping at 1.0 mgd, indicating that recharge to the well was not exceeded.

The above information will be incorporated in the final environmental assessment. Thank you for reviewing the DEA.

If you should have any questions, please contact Mike McElroy, Project Manager, at 587-0550.

Sincerely,

JOSEPH K. CONANT
Executive Director