DEPARTMENT OF WATER SUPPLY • COUNTY OF HAWAI'I
345 KEKŪANAŌ'A STREET, SUITE 20 • HILO, HAWAI'I 96720
TELEPHONE (808) 961-8050 • FAX (808) 961-8657

July 25, 2006

Ms. Genevieve Salmonson, Director
State of Hawai'i
Office of Environmental Quality Control
235 South Beretania Street, Suite 702
Honolulu, HI 96813

FINAL ENVIRONMENTAL ASSESSMENT/FINDING OF NO SIGNIFICANT IMPACT
WAIMEA PRODUCTION WELL
TAX MAP KEY 6-5-001:003
DISTRICT OF SOUTH KOHALA, COUNTY OF HAWAI'I, STATE OF HAWAI'I

The County of Hawai'i, Department of Water Supply, has reviewed the comments received during the public review period which began on May 24, 2006. Based on our review, we have affirmed our determination that this project will not have significant environmental effects. Consequently, we have issued a Finding of No Significant Impact (FONSI). Please publish this notice in the next available Office of the Environmental Quality Control (OEQC) *Environmental Notice.*

We have enclosed the following:

1. A completed OEQC Publication Form.
2. Four (4) copies of the Final Environmental Assessment (FEA).
3. A hard copy of the project summary. The project summary has not changed from the initial summary that we sent to your office, along with the copies of the Draft Environmental Assessment on May 1, 2006.

If you have any questions, please contact either Mr. Owen Nishioka at (808) 961-8070, extension259, or the project consultant Mr. Ron Terry at (808) 982-5831.

Sincerely yours,

Milton D. Pavao, P.E.
Manager

RECEIVED
'06 AUG -1 P2:23
OFC. OF ENVIRONMENTAL QUALITY CONTROL

ON:sco

Encs.

copy – (w/o encs.) Akinaka & Associates, Ltd.

... Water brings progress...

2006-08-23-HA-FEA-WAIMEA PRODUCTION WELL

AUG 2 3 2006

WAIMEA PRODUCTION WELL
SOUTH KOHALA, ISLAND OF HAWAI`I
STATE OF HAWAI`I

FINAL ENVIRONMENTAL ASSESSMENT

Submitted Pursuant to Chapter 343, Hawai`i Revised Statutes (HRS)

State of Hawai`i
Department of Land and Natural Resources

August 2006

WAIMEA PRODUCTION WELL
SOUTH KOHALA, ISLAND OF HAWAI`I

FINAL ENVIRONMENTAL ASSESSMENT

Tax Map Key Number: (3rd): 6-5-01:03

PROPOSING AGENCY:

County of Hawai`i
Department of Water Supply
345 Kekuanaoa Street, Suite 20
Hilo HI 96720

CONSULTANT:

Geometrician Associates
HC 2 Box 9575
Keaau HI 96749

and

Akinaka and Associates.
3049 Ualena Street, Suite 500
Honolulu HI 96819-1947

CLASS OF ACTION:

Use of County Funds
Use of State Land

This document is prepared pursuant to:
the Hawai`i Environmental Protection Act,
Chapter 343, Hawai`i Revised Statutes (HRS), and
Title 11, Chapter 200, Hawai`i Department of Health Administrative Rules (HAR)

SUMMARY

The Hawai'i County Department of Water Supply (DWS) plans to convert the Waimea Exploratory Well to a production well (State Well No. 6240-02). In overview, the project consists of:

- Conversion of an exploratory well to a production well, including installation of a deep submersible pump;
- Construction of a pipeline from the well to an existing 12-inch pipeline leading to the 4.0 million gallon (mg) Clearwater Reservoir; and
- Construction of a pump control building, fencing, a gate, drainage features, paving, electrical power facilities, and miscellaneous site improvements.

The proposed pump capacity is 1,000 gallons per minute (gpm). Depending on how the aquifer responds to continued pumping, the pump is expected to operate between 17 and 24 hours a day. No individual or cumulative effects to the sustainability of the aquifer are expected. The well water will be pumped through the existing 12-inch main adjacent to the site into the Clearwater Reservoir and mixed with the Waimea Treatment Plan treated surface water prior to distribution. DWS's long-term goal is to replace the entire treated potable water supply with well water. The surface water could then be used without any required treatment for irrigation and pasture activities in the Waimea area. The facility would promote public health and safety by improving water service for the Waimea community, which is experiencing steady planned growth.

The budget for the project, which is funded by DWS capital improvement funds, is approximately $2.0 million, an estimate that will be refined through final design. After the EA is complete and permits are granted, DWS will finish design and advertise the project for construction, which is scheduled for completion in 2006.

There are no biological, archaeological or cultural resources in the affected area. Minor effects to noise, erosion/sedimentation and air quality can be avoided or minimized to very minor levels through adherence to standard best management practices.

Table of Contents

LIST OF TABLES

LIST OF APPENDICES

LIST OF ABBREVIATIONS

ALISH	Agricultural Lands of Importance to the State of Hawaii
BMP	Best Management Practice
CDUP	Hawai`i State Conservation District Use Permit
DHHL	Department of Hawaiian Home Lands
DLNR	Hawai`i State Department of Land and Natural Resources
DWS	Hawai`i County Department of Water Supply
EA	Environmental Assessment
EIS	Environmental Impact Statement
FIRM	Flood Insurance Rate Map
FONSI	Finding of No Significant Impact
gpm	Gallons per minute
HDOH	Hawai`i State Department of Health
HAR	Hawai`i Administrative Rules
HEPA	Hawai`i Environmental Policy Act
HCGP	Hawai`i County General Plan
HRS	Hawai`i Revised Statutes
MCL	Maximum Contaminant Level
mgd	Million gallons per day
mg/L	Milligrams per liter
OEQC	Hawai`i State Office of Environmental Quality Control
SFHA	Special Flood Hazard Area
SHPD/O	State Historic Preservation Division/Officer
SMA	Special Management Area
UH	University of Hawai`i
USF&WS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
USNRCS	U.S. Natural Resources Conservation Service

1 PROJECT LOCATION, DESCRIPTION, PURPOSE AND NEED

1.1 Project Location, Purpose and Need and Background

Waimea is a residential, ranching and farming community with a dramatic setting nearly 3,000 feet above sea level in the misty saddle between the Kohala Mountains and Mauna Kea (Fig. 1). Headquarters for Parker Ranch for over a century and a half, its rich history is reflected in its people, architecture, and cultural traditions.

Twenty years of steady growth have added hundreds of homes for transplanted mainlanders and South Kohala resort workers to the charming cattle town, which had over 7,000 residents in 2000. Notwithstanding the planned development of Parker Ranch's Waimea Town Center project and the Department of Hawaiian Home Lands (DHHL) Lalamilo and Pu`ukapu communities, future growth is likely to proceed somewhat less rapidly because of land use restrictions adopted as part of the 2005 *Hawai`i County General Plan* (http://www.hawaii-county.com/la/gp/toc.html).

There are two public water systems that serve Waimea, both supplied by surface water from streams on the southern slopes of the Kohala Mountains. One system provides irrigation water and is managed by the Hawai`i State Department of Agriculture (DOA). The irrigation water is collected into the Hamakua Ditch, which is channeled into two reservoirs on the eastern side of Waimea. The system provides irrigation water to DHHL and other users in the area between Honokaa and Lalamilo.

The Hawai`i County Department of Water Supply's (DWS) provides domestic water services. DWS in Waimea has approximately 3,100 connections currently, and the number of connections has been growing at about three percent annually. Current consumption in the Waimea system is about 1.21 million gallons per day mgd, and the projected demand for 2025 in Waimea is 2.533 mgd, over double the current level.[1] The source feeding the Waimea System is primarily the Waikoloa and Kohakohau Streams. Flow from the streams varies greatly with the weather, and during extended drought periods, the supply is not sufficient to meet demand. The supply problem plus the expense of treating surface water for odor and color control led DWS in the 1990s to seek supplemental sources and eventual replacement of all surface sources with groundwater.

To help achieve this goal, several exploratory wells tapping high-level groundwater have been drilled in South Kohala. The first was a small-bore well drilled by the U.S. Geological Survey to

[1] Consumption trends in the related Lalamilo water system in South Kohala are also relevant. Although the Waimea and Lalamilo systems are currently not connected, Waimea water may one day be sent towards Lalamilo and Kawaihae at the west end of South Kohala, where demand is expected to rise from the current figure of 3.91 mgd to 5.56 mgd by 2025.

test the aquifer; this now serves as an observation well. Another was built at the DWS treatment plant site by Parker Ranch to support their Waimea Town Center development plan. This well was converted to production and dedicated to DWS, and it currently supplements stored surface water in the 4.0 million gallon Clearwater Reservoir.

The Hawai'i Department of Land and Natural Resources (DLNR) drilled the Waimea Exploratory Well (State Well No. 6240-02) in 1999 (Figs. 1-2). The exploratory well was drilled, cased and pump tested by Waieli Drilling and Development, beginning in December 1998 and ending in January 1999. The total depth of the well is 2,000 feet, ending approximately 970 feet above sea level. Its completed construction consists of 1,730 feet of solid 16-inch casing, 120 feet of full-flow perforated casing, and 150 feet of 15-inch diameter open hole.

The water table was found at approximately 1,260 feet above sea level, or about 1,700 feet below the top of the well and about six feet lower than the Parker Ranch well. It appears that the well taps the same high-level compartment as the USGS well, as the later well responded within minutes of the start and stop of the pump in the Waimea Exploratory Well. Pump tests indicate that pumping rates between 700 and 1,000 gallons per minute would provide a steady yield from the well and would not likely adversely affect nearby wells (see Appendix 4 for full report). The well report recommended use of a submersible pump set approximately 60 feet into the water, to provide adequate submergence for seasonal water level variations and drawdown due to pumping. The well yielded water of consistently excellent quality, with chlorides in the range of 4 to 6 milligrams per liter and a field temperature of 69 degrees F.

1.2 Project Description

The Hawai'i County Department of Water Supply (DWS) plans to convert the Waimea Exploratory Well to a production well, under an agreement with DLNR. In overview (see Fig. 3), the project consists of:

- Conversion of an exploratory well to a production well, including installation of a deep submersible pump;
- Construction of a pipeline from the well to an existing 12-inch pipeline leading to the Clearwater Reservoir; and
- Construction of a pump control building, fencing, a gate, drainage features, paving, electrical power facilities, and miscellaneous site improvements.

The proposed pump capacity is 1,000 gallons per minute (gpm). Depending on how the aquifer responds to continued pumping, the pump is expected to operate between 17 and 24 hours a day. The well water will be pumped through the existing 12-inch main adjacent to the site into the Clearwater Reservoir and mixed with the Waimea Treatment Plan treated surface water prior to distribution. DWS's long-term goal is to replace the entire potable water supply with well water. The surface water could then be used without any required treatment for irrigation and

pasture activities in the Waimea area. The facility would promote public health and safety by improving water service for the Waimea community, which is experiencing steady planned growth.

The budget for the project, which is funded by DWS capital improvement funds, is approximately $2.0 million, an estimate that will be refined through final design. After the EA is complete and permits are granted, DWS will finish design and advertise the project for construction, which is scheduled for completion in 2006.

1.3 Alternatives Considered

1.3.1 Alternative Water Well Sites

The feasibility of alternative well sites was considered during the planning process for the exploratory well based on several criteria. These included proximity and proper elevational relation to where the water would be utilized, proximity and proper elevational relation to existing transmission and storage facilities, minimization of transmission distance, minimization of potential for current or future contamination, location on State land (if possible), and minimization of total environmental impact. Much of the surrounding area is undisturbed forest reserve or active pasture. The general site was by the only site that reasonably met all criteria, and it was thus unnecessary to consider other specific sites in detail.

1.3.2 Surface Water, Catchment, Wastewater Re-Use, and Desalination

Surface water is currently the main source of water in Waimea. Compliance with State and federal requirements for surface water necessitates costly water treatment plants, and DWS County is attempting to replace most/all of its surface water systems with groundwater sources.

Rainfall catchment is used in many parts of Hawai'i County, and in fact is the most common water system for residents of Puna, where County water service is not widely available. Although catchment does provide a potable water source of last resort, it has many drawbacks, including high maintenance costs and susceptibility to microbiological and chemical contamination. Sources of these contaminants vary from dead animals in the storage tank to materials eroded or leached from roofs, gutters and paint. The State Department of Health (DOH) recommends using catchment water for non-consumptive needs and obtaining drinking or cooking water from regulated public water systems and/or purchased bottled drinking water.

Wastewater re-use can be an important source of water, particularly for irrigation, although treatment expense may elevate the cost of the water beyond the budget of agricultural users. In situations with critical water shortages, the cost of treated wastewater can be borne by municipal users, who then are able to utilize surface water or groundwater that would otherwise be used for irrigation. The Parker Ranch Wastewater Treatment Plan produces water that is treated to R3

levels, i.e., without chlorination. This water is used to irrigate two adjacent grazing paddocks in alternation. In general, the effluent is utilized by plants and evapotranspires, avoiding significant penetration to the groundwater table. This reuse benefits agriculture and water resources. Given the existing state of groundwater resources and the existing beneficial reuse, it would be inefficient to substitute further treated wastewater for groundwater resources.

Similarly, DWS and other agencies concerned with developing and utilizing water on the Big Island consider desalination, an energy-intensive and expensive process, to be unjustified for cost reasons on the island of Hawai`i and unnecessary to consider when better options exist. For Waimea, at 3,000 feet in elevation and over six miles from the coast, desalination is also not practical.

1.3.3 Optimize Distribution of Existing Potable/Non-Potable Supplies

A key aspect of the project is freeing up surface water for agricultural uses, which do not require treated water. In this sense, the project incorporates optimal distribution of potable/non-potable supplies, and there is no alternative that would better accomplish this.

1.3.4 Conservation/Demand Side Strategies Alternative

According to agency officials, current conservation activities at DWS include the following:

- *100 percent customer metering*. All customer accounts are metered.
- *Meter repair/replacement programs*. Testing, repair and replacement of water meters are done on a systematic basis.
- *Water analysis/reports*. The difference between metered source production and metered sales to consumers is monitored to determine whether a leak detection program is justified.
- *Leak detection programs*. DWS is implementing investigations and repair for suspected sections of leaking pipelines.
- *Tank overflow controls/alarms*. These facilities prevent system losses from unnecessary overflows.
- *Voluntary water restriction notices*. DWS requests voluntary water conservation during dry periods and emergency water outages.
- *Public education outreach/education programs*. Exhibits in trade shows, the County fair, and public schools, among other venues, allow DWS to share information about the potable water system and water conservation.

These existing and future water conservation programs have reduced and will continue to reduce the per-capita growth of future water demand. In particular, an island-wide reduction in non-metered water use continues to be realized. Rather than an alternative to developing new sources, water conservation is seen by DWS as an integral and ever-increasing part of its strategy

to provide safe, affordable and reliable water service to the island of Hawai`i in a sustainable and financially secure manner.

1.3.5 Selection of Project Alternative

DWS has determined that the most rational and efficient strategy for dealing with the need for reliable supply for the Waimea area is to convert the exploratory well to production. The decision to advance this alternative was based on the successful yield and good water quality (as summarized in Section 1.1, above), the lack of impact on aquifer sustainability, and the fact that no alternative sources (such as catchment, wastewater reuse, or desalination) would provide a practical or economical source of potable water in this service area.

1.4 Consistency with Government Plans and Policies

The project is highly consistent with government plans and policies, which in general call for water systems that meet the needs of residents, support planned growth, and minimize environmental degradation. The following sections discuss consistency with key plans.

1.4.1 Hawai`i State Plan

The Hawai`i State Plan was adopted in 1978. It was revised in 1986 and again in 1991 (Hawai`i Revised Statutes, Chapter 226, as amended). The Plan establishes a set of goals, objectives and policies that are meant to guide the State's long-run growth and development activities. The proposed project is consistent with State goals and objectives that call for increases in employment, income and job choices, and a growing, diversified economic base extending to the neighbor islands.

The sections of the Hawai`i State Plan most relevant to the proposed project are centered on the theme of facility systems. The following objectives and policies are taken from the section dealing with water development.

- Objective a): Planning for the State's facility systems with regard to water shall be directed towards achievement of the objective of the provision of water to adequately accommodate domestic, agricultural, commercial, industrial, recreational and other needs within resource capacities.
- Objective b: To achieve the facility systems water objective, it shall be the policy of this State to:
  - (1) Coordinate development of land use activities with existing and potential water supply.
  - (2) Support research and development of alternative methods to meet future water requirements well in advance of anticipated needs.
  - (3) Reclaim and encourage the productive use of runoff water and

wastewater discharges.

(4) Assist in improving the quality, efficiency, service and storage capabilities of water systems for domestic and agricultural use.

(5) Support water supply services to areas experiencing critical water problems.

(6) Promote water conservation programs and practices in government, private industry, and the general public to help ensure adequate water to meet long-term needs.

The proposed project supports all relevant objectives and policies of the Hawai`i State Plan.

1.4.2 Hawai`i Water Plan

The *Hawai`i Water Plan* includes plans dealing with water resource protection, water quality, and development plans related to each individual county, to State projects, and to agricultural water systems. The most relevant plans for this discussion are the *Hawai`i State Water Resources Development Plan* (Hawai`i DLNR 1980), the *Water Resources Protection Plan* (Hawai`i State CWRM 1992) and the *State Water Projects Plan, Volume 2, Island of Hawai`i* (Hawai`i State Commission on Water Resources Management 2003).

The purpose of the *Hawai`i State Water Resources Development Plan* is to set forth specific objectives, policies, programs and projects to guide State and County governments. In summary, this plan presents guidelines for development of water resources for municipal, agricultural and industrial requirements; preservation of ecological, recreational, and aesthetic values and quality; and regulation of the use of water to assure adequate supplies for the future. The proposed project would develop a municipal water source in a rational manner to improve drinking water quality, assure adequate water for planned growth and would not adversely affect ecological, recreational or aesthetic values. The project is thus consistent with the basic guidelines of the plan.

In particular, the following objectives are noteworthy:

Objective A. Assure adequate municipal water supplies for planned urban growth.
Objective B. Support long-range municipal water supply planning by the counties.
Objective C. Promote municipal water conservation.
Objective D. Improve drinking water quality.
Objective E. Upgrade rural water systems.

The proposed project supports or is not inconsistent with each objective of the plan.

The *Water Resources Protection Plan* inventoried the water resources of the State, determined their sustainable yields based on available data, and recommended means of conserving and

augmenting these resources. As discussed in Section 3.1.2, because there is no recognized current or foreseeable threat of exceeding sustainable levels of withdrawal from the aquifers in this area, none have been declared a Groundwater Management Area by the State Commission on Water Resources Management.[2] The project will promote less reliance on surface water systems and is consistent with conserving beneficial uses of surface water.

The primary objective of the *State Water Projects Plan, Volume 2, Island of Hawai`i* (SWPP) is to provide a framework for the planning and implementation of water development strategy for future State projects. The relationship of State projects in the Waimea area to the aquifers utilized by the proposed Waimea Production Well is discussed in Section 3.1.2. The development of the well would provide for potable water needs and free up water for non-potable needs, and it is thus consistent with the SWPP.

A particularly relevant ongoing State project is the Department of Hawaiian Home Lands' *DHHL Pu`ukapu Pasture Lots Water Strategy* (Hawai`i State DHHL 2002). The "hybrid" potable water system would be supplied approximately 0.120 mgd of water from the DWS Waimea system but would be operated by an existing non-profit corporation or by DHHL. The project involves both institutional and physical components, including booster stations, water mains, reservoirs, distribution pipelines, and fire flow tanks and standpipes.

1.4.3 Hawai`i County Water Use and Development Plan

The *Hawai`i County Water Use and Development Plan* (HCWUDP) (Hawai`i County DWS 1989) is the most recent Hawai`i County water plan to be formally adopted by DWS and the Hawai`i State Commission on Water Resource Management (CWRM).[3] The Plan is meant to aid CWRM in granting permits for water use and designating water management areas, as well as serving as a reference document of current and future water resource conditions. The HCWUDP includes an inventory of existing water uses and developments by hydrologic units, addresses future land uses and related water needs, and is consistent with State and County land and water policies. This plan also guides DWS in future operations and to identify the improvements and facilities required to continue to provide safe, affordable and reliable water service to the island of Hawai`i in a sustainable and financially secure manner.

In 1989, the *Hawai`i County Water Use and Development Plan* estimated that public water needs in the Waimea area would be 4.2 mgd by 2010. This has proven to be an overestimation, as current usage is about 1.21 mgd, and the latest projected demand for 2025 in Waimea is 2.533

[2] See Section 3.1.2 for discussion of current petition to designate a portion of the Mahukona Aquifer System as a Groundwater Management Area.

[3] An update of the Plan (Hawai`i County DWS 1991) was performed but never formally adopted. The update contained no significant differences concerning water use or water facility needs for the Waimea area. An updated plan is currently in preparation.

mgd. Long-term plans called for in the HCWUDP included source improvements, particularly replacement of surface water with well water. The proposed project is consistent with the plan in that it provides an additional source of well water and provides more source.

1.4.4 Hawai`i County General Plan

The *General Plan* for the County of Hawai`i is the document expressing the broad goals and policies for the long-range development of the Island of Hawai`i. The latest plan was adopted by ordinance in 2005. The *General Plan* is organized into thirteen elements, with policies, objectives, standards, and principles for each. There are also discussions of the specific applicability of each element to the nine judicial districts comprising the County of Hawai`i. Below are pertinent Goals, Objectives, Policies and Standards, and Courses of Action sections related to Water Systems Development, followed by a discussion of conformance. In addition, the most relevant sections of aspects of the General Plan are briefly discussed.

1.4.4.1 General Plan and Water Systems

POLICIES

- Water system improvements shall correlate with the County's desired land use development pattern.
- All water systems shall be designed and built to Department of Water Supply standards.
- Improve and replace inadequate systems.
- Water sources shall be adequately protected to prevent depletion and contamination from natural and man-made occurrences or events.
- Water system improvements should be first installed in areas that have established needs and characteristics, such as occupied dwellings, agricultural operations and other uses, or in areas adjacent to them if there is need for urban expansion.
- A coordinated effort by County, State and private interests shall be developed to identify sources of additional water supply and be implemented to ensure the development of sufficient quantities of water for existing and future needs of high growth areas and agricultural production.
- The fire prevention systems shall be coordinated with water distribution systems in order to ensure water supplies for fire protection purposes.
- Develop and adopt standards for individual water catchment units.
- Cooperate with the State Department of Health to develop standards and/or guidelines for the construction and use of rainwater catchment systems to minimize the intrusion of any chemical and microbiological contaminants.
- Cooperate with appropriate State and Federal agencies and the private sector to develop, improve and expand agricultural water systems in appropriate areas on the island.

- o Promote the use of ground water sources to meet State Department of Health water quality standards.
- o Continue to participate in the United States Geological Survey's exploratory well drilling program.
- o Seek State and Federal funds to assist in financing projects to bring the County into compliance with the Safe Drinking Water Act.
- o Develop and adopt a water master plan that will consider water yield, present and future demand, alternative sources of water, guidelines and policies for the issuing of water commitments.
- o Expand programs to provide for agricultural irrigation water.

STANDARD

- o Public and private water systems shall meet the requirements of the Department of Water Supply and the Subdivision Control Code.

COURSES OF ACTION FOR SOUTH KOHALA

(a) Seek alternative sources of water for the Lalamilo system.
(b) Improve and replace inadequate distribution mains and steel tanks.
(c) Continue to seek additional groundwater sources for the Waimea System.

Discussion: The proposed project is completely consistent with all elements of the General Plan dealing with water systems. In particular, it would correlate with the County's desired growth pattern by servicing areas already identified for urban and rural growth, with established needs and characteristics. The project would be designed and built to DWS standards. As discussed in Section 3.1.2 below, the project adequately is not expected to deplete aquifers or to contaminate them from natural and man-made sources. The project involves promotion of the use of groundwater sources (as opposed to surface water) to meet State Department of Health water quality standards. Finally, it provides new sources for Waimea. Implementation of the proposed project would not conflict with any goals, policies or courses of action, and would, in fact, contribute to their fulfillment.

1.4.4.2 Other Selected Elements of General Plan

ECONOMIC GOALS

- o Provide an economic environment that allows new, expanded, or improved economic opportunities that are compatible with the County's cultural, natural and social environment.

ENVIRONMENTAL QUALITY POLICIES

- Take positive action to further maintain the quality of the environment for residents both in the present and in the future.

ENVIRONMENTAL QUALITY STANDARDS

- Pollution shall be prevented, abated, and controlled at levels that will protect and preserve the public health and well being, through the enforcement of appropriate Federal, State and County standards.
- Incorporate environmental quality controls either as standards in appropriate ordinances or as conditions of approval.

HISTORIC SITES GOALS

- Protect, restore, and enhance the sites, buildings, and objects of significant historical and cultural importance to Hawaii.

HISTORIC SITES POLICIES

- Require both public and private developers of land to provide historical and archaeological surveys and cultural assessments, where appropriate, prior to the clearing or development of land when there are indications that the land under consideration has historical significance.
- Public access to significant historic sites and objects shall be acquired, where appropriate.

AGRICULTURAL LAND GOALS

- Identify, protect and maintain important agriculture lands on the island of Hawaii.
- Preserve the agricultural character of the island.

FLOOD CONTROL AND DRAINAGE GOALS

- Control pollution.
- Prevent damage from inundation.
- Reduce surface water and sediment runoff

FLOOD CONTROL AND DRAINAGE POLICIES

- Development-generated runoff shall be disposed of in a manner acceptable to the Department of Public Works and in compliance with all State and Federal laws.

FLOOD CONTROL AND DRAINAGE STANDARDS

- Applicable standards and regulations of Chapter 27, "Flood Control," of the Hawaii County Code.
- Applicable standards and regulations of the Federal Emergency Management Agency (FEMA).
- Applicable standards and regulations of Chapter 10, "Erosion and Sedimentation Control," of the Hawaii County Code.

NATURAL BEAUTY GOALS

- Protect, preserve and enhance the quality of areas endowed with natural beauty, including the quality of coastal scenic resources.
- Protect scenic vistas and view planes from becoming obstructed.

NATURAL BEAUTY POLICIES

- Protect the views of areas endowed with natural beauty by carefully considering the effects of proposed construction during all land use reviews.
- Do not allow incompatible construction in areas of natural beauty.

NATURAL RESOURCES AND SHORELINES GOALS

- Protect and conserve the natural resources of the County of Hawaii from undue exploitation, encroachment and damage.
- Ensure that alterations to existing land forms and vegetation, except crops, and construction of structures cause minimum adverse effect to water resources, and scenic and recreational amenities and minimum danger of floods, landslides, erosion, siltation, or failure in the event of earthquake.

Discussion: The project is consistent with these aspects of the General Plan. It will encourage economic opportunities that are compatible with the County's cultural, natural and social environment, the quality of which will be maintained. Historic sites or agricultural lands will not be adversely impacted. The improvements will be properly sited on the property to avoid encroachment into the flood zone or any other adverse drainage impact. Finally, the natural beauty and natural resources of the Waimea area will not be adversely affected directly or indirectly by the proposed project.

1.4.5 State of Hawai`i Drinking Water State Revolving Fund Program

This project may be funded by federal funds through the State of Hawai`i's Drinking Water State Revolving Fund (DWSRF) program. The U.S. Congress established the DWSRF program as a new section 1452 of the Safe Drinking Water Act (SDWA), 33 U.S.C. 300j-12, by the SWDA Amendments of 1996, Public Law 104-182. The DWSRF was established to help prevent contamination through source water protection and enhanced water system management. It also emphasizes the needs of small water systems, such as Waimea. The proposed project is consistent with the overall program intent to prevent potential contamination and with the program's emphasis on small water systems. The document includes environmental information required for compliance with the DWSRF program. Various subsections of the EA address the proposed project's relationship to federal "cross-cutting" authorities.

1.4.6 Coastal Zone Management Act (CZMA)

The purpose of the federal Coastal Zone Management Act (CZMA) of 1972 (U.S.C. 1451-1464) is to preserve, protect, develop and where possible enhance the resources of the coastal zone. Projects with federal involvement significantly affecting areas under jurisdiction of the State CZM Agency must undergo review for consistency with the State's approved coastal program. The entire State of Hawai'i is included in the coastal zone for such purposes.

The objectives of the Hawai'i Coastal Zone Management Program are presented below, along with discussion of the consistency of the project with each:

Recreational Resources: *Provide coastal recreational opportunities accessible to the public.* The proposed well does not affect trails or dedicated public right-of-way or any State, County or federal park. No streams, shoreline areas or other waterways are affected.

Historic Resources: *Protect, preserve, and where desirable, restore those natural and man-made historic and prehistoric resources in the CZM that are significant in Hawaiian and American history and culture.* No historic properties will be affected.

Scenic and Open Space Resources: *Protect, preserve, and where desirable, restore or improve the quality of coastal scenic and open space resources.* No scenic landmarks are present, and the project does not involve the construction of structures visible between the nearest coastal roadway and the shoreline.

Coastal Ecosystems: *Protect valuable coastal ecosystems from disruption and minimize adverse impacts on all coastal ecosystems.* No activities near the coastline are involved, and there will be no effect on coastal ecosystems. The well will conform with

appropriate laws and regulations in order to ensure minimal impacts on groundwater and coastal waters.

Economic Uses: *Provide public or private facilities and improvements important to the State's economy in suitable locations*. The location is highly suitable for a water well, and the project would not adversely affect existing economic activities.

Coastal Hazards: *Reduce hazard to life and property from tsunami, storm waves, stream flooding, erosion, and subsidence*. The proposed well is not adjacent to the coast and no coastal hazards are involved.

Managing Development: *Improve the development review process, communication, and public participation in the management of coastal resources and hazards*. The proposed activity conforms with the State and County land use designations for the area and would support land use in accordance with State and County plans.

Public Participation: Stimulate public awareness, education, and participation in coastal management, and maintain a public advisory body to identify coastal management problems and provide policy advice and assistance to the CZM program. The proposed well is not inconsistent with this objective.

Beach Protection:. Protect beaches for public use and recreation; locate new structures inland from the shoreline setback to conserve open space and minimize loss of improvements due to erosion. No beaches are present or would be affected by the proposed project

Marine Resources: *Implement the state's ocean resources management plan*. The project will not affect marine resources in any adverse way and is not inconsistent with this objective.

In summary, the project does not impact coastal zone resources and appears to be consistent with the objectives of the program. This Draft EA will be submitted to the Hawai'i Coastal Zone Management Program (HCZMP), part of the Hawai`i State Office of Business, Tourism and Economic Development, and the Department's response is expected to confirm the consistency of the project with the Coastal Zone Management Act.

2 ENVIRONMENTAL ASSESSMENT PROCESS

The project involves the use of State of Hawai`i land and County of Hawai`i funds, and therefore requires compliance with Chapter 343, Hawai`i Revised Statutes (HRS), the Hawai`i Environmental Policy Act (HEPA). The County of Hawai`i, Department of Water Supply, (DWS) is the proposing agency for this Environmental Assessment (EA).

HEPA was enacted by the Hawai`i State Legislature to require State and County agencies to consider the environmental impacts of various actions as part of the decision-making process. Agencies are required to conduct an investigation and evaluation of alternatives as part of the environmental impact analysis process, prior to making decisions that may impact the environment. The implementing regulations for HEPA are contained in Title 11, Chapter 200, Hawai`i Administrative Rules (HAR).

This Environmental Assessment (EA) process was conducted in accordance with HEPA. According to HEPA and its implementing regulations, a Draft EA is prepared to document environmental conditions and impacts, to develop mitigation measures that avoid, minimize or compensate for adverse environmental impacts, and determine whether or not an action has significant impacts upon the environment. Impacts are evaluated for significance according to thirteen specific criteria as presented in HAR 11-200-12. If no significant impacts are expected, then a Final EA with a Finding of No Significant Impact (FONSI) may be issued. When the Draft EA determines that significant impacts are present, then a Notice of Intent is prepared and the Final EA facilitates preparation of an Environmental Impact Statement (EIS).

3 ENVIRONMENTAL SETTING AND IMPACTS

This section describes the existing social, economic, cultural, and environmental conditions surrounding the proposed project along with the probable impacts of the proposed action and mitigation measures designed to reduce or eliminate adverse environmental impacts. For many categories, the No Build Alternative would result in no impacts. Therefore, unless explicitly mentioned, discussion of impacts and mitigation relates to the Build Alternative only.

Basic Geographic Setting

The already existing exploratory well, which will be converted to a production well, is located at the 2,970-foot elevation on State of Hawai`i land under Executive Order to the County of Hawai`i, on the southern flank of the Kohala Mountains (Figs. 1-3). The private access road to the site leads from Spencer Road in Waimea. The area surrounding the well is dedicated to water supply uses, including various wells and reservoirs; residential neighborhoods and pasture are present at lower elevations on the south and at similar elevations to the west and east.

3.1 Physical Environment

3.1.1 Surface Geology and Hazards

Existing Environment

Northwest Hawai`i is the product of Pleistocene and Holocene lava flows and pyroclastic deposits from the Kohala and Mauna Kea volcanoes. The project site lies on ash-covered, 120,000 to 230,000-year old lava flows from the Kohala Volcano.

The project site is rated Lava Flow Hazard Zone 9 on a scale of ascending risk 9 to 1. Zone 9 areas have had no eruptions in the past 60,000 years and are therefore considered the least hazardous areas on the island. As such, there is negligible risk of lava inundation over relatively short time scales in the project area.

In terms of seismic risk, the entire Island of Hawai`i is rated Zone 4 Seismic Probability Rating (Uniform Building Code, Appendix Chapter 25, Section 2518). Zone 4 areas are at risk from major earthquake damage, especially to structures that are poorly designed or built.

Impacts and Mitigation Measures

In general, geologic conditions impose no overriding constraints on the project, it is not imprudent to construct in terms of geological hazard, and no mitigation measures are expected to be required.

3.1.2 Groundwater Hydrology

Existing Environment

Hydrogeological Setting

No aquifers designated as Principal or Sole-Source aquifers are located in or near the well pad (Source: *Designated Sole Source Aquifers in EPA Region IX*, www.epa.gov/safewater/swp/ssa/reg9.html. U.S. Environmental Protection Agency web page, checked April 2006). There are no State Wellhead Protection Plans in force in or near the project corridor.

The State Commission on Water Resources Management (CWRM) classification of aquifers locates this part of Waimea on the border between the Waimanu (80102) and Mahukona (80103) Aquifer Systems of the Kohala Hydrologic Sector, so both are discussed here. The surface boundaries of these aquifers are shown in Figure 5. The southern boundaries roughly follow the contact between lava flows and ash from Mauna Kea and the Kohala Mountains. The boundary between the two aquifer systems follows a northwest to southeast ridge line that forms the primary hydrologic divide for the Kohala Mountains.

Precipitation that is not lost through evapotranspiration or through streams into the ocean percolates into the ground to collect in the aquifers under the island before slowly making its way to the sea. As streams in Hawai`i are generally flashy or even ephemeral, underground water is the most reliable source of water supply, because there is less daily or seasonal change in water tables. Most water is maintained in the basal freshwater lens that "floats" on the salt-water permeated rock below, but in some locations, such as the Kohala Mountains, substantial quantities of water are trapped between dikes or perched above confining ash layers.

The recharge area for the Kohala and Mahukona Aquifer Systems is assumed to consist of essentially the surface area contained within the boundaries of the aquifer system. The extent of contribution from or leakage into adjacent aquifer systems is not known. Within these aquifer system, average annual rainfall ranges from about 10 inches on the leeward slopes to more than 160 inches near the summit. The windward side receives the great majority of precipitation, which is why the Waimanu Aquifer Sector, though roughly the same size as the Mahukona Aquifer Sector, is calculated to have more than 6 times the sustainable yield (Hawai`i State CWRM 1990). As determined by CWRM, the sustainable yield of the Waimanu Aquifer System (80102) is 110 mgd and that of the Mahukona Aquifer System (80103) is 17 mgd (see Fig. 5).

Current Estimated Installed Capacity and Water Use

CWRM maintains a database of wells that provides information on, among other aspects, the aquifer identity, user identity, installed capacity, chloride content, and function. The database does not provide information on current pumpage, which instead is logged in a separate database

3.1.2 Groundwater Hydrology

Existing Environment

Hydrogeological Setting

No aquifers designated as Principal or Sole-Source aquifers are located in or near the well pad (Source: *Designated Sole Source Aquifers in EPA Region IX*, www.epa.gov/safewater/swp/ssa/reg9.html. U.S. Environmental Protection Agency web page, checked April 2006). There are no State Wellhead Protection Plans in force in or near the project corridor.

The State Commission on Water Resources Management (CWRM) classification of aquifers locates this part of Waimea on the border between the Waimanu (80102) and Mahukona (80103) Aquifer Systems of the Kohala Hydrologic Sector, so both are discussed here. The surface boundaries of these aquifers are shown in Figure 5. The southern boundaries roughly follow the contact between lava flows and ash from Mauna Kea and the Kohala Mountains. The boundary between the two aquifer systems follows a northwest to southeast ridge line that forms the primary hydrologic divide for the Kohala Mountains.

Precipitation that is not lost through evapotranspiration or through streams into the ocean percolates into the ground to collect in the aquifers under the island before slowly making its way to the sea. As streams in Hawai`i are generally flashy or even ephemeral, underground water is the most reliable source of water supply, because there is less daily or seasonal change in water tables. Most water is maintained in the basal freshwater lens that "floats" on the salt-water permeated rock below, but in some locations, such as the Kohala Mountains, substantial quantities of water are trapped between dikes or perched above confining ash layers.

The recharge area for the Kohala and Mahukona Aquifer Systems is assumed to consist of essentially the surface area contained within the boundaries of the aquifer system. The extent of contribution from or leakage into adjacent aquifer systems is not known. Within these aquifer system, average annual rainfall ranges from about 10 inches on the leeward slopes to more than 160 inches near the summit. The windward side receives the great majority of precipitation, which is why the Waimanu Aquifer Sector, though roughly the same size as the Mahukona Aquifer Sector, is calculated to have more than 6 times the sustainable yield (Hawai`i State CWRM 1990). As determined by CWRM, the sustainable yield of the Waimanu Aquifer System (80102) is 110 mgd and that of the Mahukona Aquifer System (80103) is 17 mgd (see Fig. 5).

Current Estimated Installed Capacity and Water Use

CWRM maintains a database of wells that provides information on, among other aspects, the aquifer identity, user identity, installed capacity, chloride content, and function. The database does not provide information on current pumpage, which instead is logged in a separate database

and is derived from reports from individual well operators. Because not all well operators report their use in a timely manner, pumpage data may not be complete or up to date. Owing to security concerns after September 11, 2001, these databases are no longer accessible to the public and data must be requested from CWRM.

The well database has a register of 38 wells within the Mahukona Aquifer System. Of these, 3 are abandoned and sealed, 2 are used for observation, 5 are small diameter test holes, and 12 are unused. The installed capacity for the remainder of the wells is 3.560 mgd, if pumps run full capacity 24 hours a day. Actual reported pumpage is 0.691 mgd, per a 12-month moving average as of October 2005 (Hawai`i State CWRM 2006).

The database lists 22 wells within the Waimanu Aquifer System, of which perhaps three are significantly active, with a listed installed capacity of 1.440 mgd and unknown pumpage. A number of the listed "wells" are actually tunnels developed as part of the Kohala and Hamakua Ditch systems.

Existing Water Quality

The Hawai`i DWS regularly conducts microbiological analysis and contracts for extensive chemical testing in order to comply with U.S. Environmental Protection Agency (EPA) and Hawai`i State standards. Table 3-1 depicts the contaminants tested for and the frequency of testing.

Annual Water Quality reports from the Waimea system for the latest full year available, 2004, (see Appendix 3), indicate that the system was compliant with all current State of Hawai`i and U.S. Environmental Protection Agency drinking water standards. Specifically, no violations were recorded for radioactive, inorganic, organic or lead and copper contaminants, with all contaminants far below Maximum Contaminant Levels (MCLs). It should be noted, however, that most of the water is derived from surface sources and requires costly treatment for visual and odor characteristics.

Other Planned Uses in Aquifers and Issues of Concern

Aside from steady expansion of the DWS system, no major new wells are reported to be in planning in the near future in the area around the Pu`ukapu wells. There is continuing demand, however, for steady growth in potable and irrigation water.

The *State Water Projects Plan, Volume 2, Island of Hawai`i* (SWPP) (Hawai`i State CWRM 2003) provides a framework for the planning and implementation of water development strategy for future State projects. The SWPP recognizes the need for a number of projects involving potable and nonpotable water in the Waimea area, most of them involving Hawaiian Home lands and most involving the West Mauna Kea Aquifer, i.e., outside the aquifers utilized by the

Table 3-1
Summary of Current Water Quality Monitoring Requirements

CONSTITUENT		
Bacteriological	Distribution system	Monthly; number of samples dependent on population served within distribution system
Carbamate, Nitrate, Metals, Inorganic, THM / HAA5 VOC, SOC8, Glyphosate EDB / DBCP / TCP	Entry point to distribution AND/OR Well Head (Location is dependent on contaminant being sampled for. SDWB will specify.)	Quarterly.
Asbestos	Source/distribution along AC pipe	First 3-year compliance period of 9-year cycle
Nitrate EDB / DBCP / TCP Metals, SOC8, VOC	Entry point to distribution AND/OR Well Head (Location is dependent on contaminant being sampled for. SDWB will specify.)	Annually
Lead and copper	Customer taps	For systems that have passed, once every three years. For systems that have failed, then once every six months until system passes, then once every three years thereafter.
Reduced Monitoring for Populations<=3300: Metals / VOC (ALL Groundwater sources; ALL Populations) SOC8, EDB / DBCP / TCP Glyphosate, Carbamate Herbicides	Entry point to distribution AND/OR Well Head (Location is dependent on contaminant being sampled for. SDWB will specify.)	Once every 3 years (R1/1)
Reduced Monitoring for Populations >3300: SOC8, EDB / DBCP / TCP Glyphosate, Carbamate Herbicides	Entry point to distribution AND/OR Well Head (Location is dependent on contaminant being sampled for. SDWB will specify.)	Twice every 3 years.
Radionuclides	Source	Once every 5 years.

Source: Hawai'i County Department of Water Supply. SDWB = Hawai'i State Department of Health, Safe Drinking Water Branch.

proposed Waimea Production Well. All told, the demand of State projects till the year 2020 on sources within the Mahukona Sector of the Kohala Aquifer is 1.87 mgd, and demand for the Waimanu Sector is 1.825 mgd (demand in the adjacent Waimea Sector of the West Mauna Kea Aquifer section involve 15.66 mgd). As discussed in Section 1.4.2, the *DHHL Pu'ukapu Pasture Lots Water Strategy* (Hawai'i State DHHL 2002) would utilize roughly 0.120 mgd of potable water from the DWS Waimea system (drawing on the Waimanu/Mahukona Aquifer Systems) for some of DHHL's water needs.

Another major private user of the aquifer is Kohala Ranch, which operates wells on the leeward side of North Kohala. Current use is around 0.691 mgd, but future demand may increase greatly, to as much as 4.516 mgd (Hawai'i State CWRM 2006).

A petition to designate a portion of the Mahukona Aquifer System in leeward North Kohala as a Groundwater Management Area (GMA) is currently under consideration by the Commission on Water Resources Management. The Petition, filed by the North-South Kohala Boundary Water Group on December 12, 2005, request the GMA because of uncertainties in sustainable yield and future demand. The Final EA will provide updated information on the outcome of the Petition.

Impacts and Mitigation Measures

Hydrologic Impacts

There are two wells located nearby, the USGS Observation Well within 350 feet and the Parker Ranch Well about 1,500 feet away. Although drawdown response in the USGS well was immediately noted during pump tests, hydrologists determined that a pumping rate between 700 and 1,000 gallons per minute would provide a steady yield from the well and would not likely adversely affect nearby wells (see Appendix 4 for full report).

As noted above, the listed installed capacity, which reflects the total potential pumpage from existing production wells, is 3.560 mgd in the Mahukona Aquifer System (out of an estimated sustainable yield of 17 mgd and 1.440 mgd in the Waimanu Aquifer System (out of an estimated sustainable yield of 110 mgd). If pumped 24-hours a day at the maximum pump speed, the Waimea Production Well would be capable of yielding up to 1.440 mgd per day. This amount is not significant in terms of the sustainable yield of either aquifer (it bears repetition that hydrologists are uncertain which of these aquifer systems is most directly connected to the particular aquifer tapped by this well). Furthermore, pumping activity in Waimea, which on the edge of both systems, is unlikely to substantially affect yields in other parts of these aquifer systems – e.g., in populated area of North Kohala. Moreover, considering the current scale of usage and projected future usage, it is unlikely that significant withdrawals relative to the aquifer's estimated sustainable yield would occur even if several new wells are brought on line.

In any case, however, as each well is developed, analysis of the installed capacity, sustainable yield of the aquifer, and hydrologic impacts will be undertaken in accordance with requirements of the State Commission of Water Resources Management. The long-term records of salinity, pumpage and water levels that will be maintained by DWS will assist in protecting the long-term sustainability of the aquifer.

Water Quality

The area near the proposed well appears to be free of any major source of contaminants. No upslope properties are currently, or expected to be, used for agriculture, residences or industry.

The Underground Injection Control (UIC) line in the Kohala Mountains is located at the coast (Fig. 6). The well site and its recharge area are thus mauka of the UIC line, where underlying aquifers are considered drinking water sources and injection wells may be prohibited and are subject to stringent permit requirements to ensure they do not contaminate aquifers.

Considering the depth of the well and the lack of past or current potential sources of contamination, good water quality was expected from the exploratory well. Water quality data indicated that the well is suitable for incorporation in the DWS water system. The water from the production well will be tested by a qualified laboratory to ensure the water quality meets the potable water source requirements of the Hawai`i State Department of Health, which tests for a variety of organic and volatile compounds and total and fecal coliform, among other parameters. Because the well water will be mixed with surface water, it will be injected with ammonia and chlorine to "balance" with the treated surface water when mixed. The ammonia treatment will be deleted when the surface water treatment process is abandoned. In this setting, water quality will likely remain high, and no mitigation measures other than standard periodic testing are required. The project will be in full compliance with all requirements of the Safe Drinking Water Act, (42 U.S.C §300H-3[e]).

3.1.3 Floodplains and Surface Water Quality

Existing Environment

Annual rainfall in the area averages about 50 inches. Floodplain status for the area near the proposed well, reservoir and access road site is designated Zone X, or Special Flood Hazard areas identified in the community flood insurance study as areas of moderate or minimal hazard from the principal source of flood in the area. As such, the project is in compliance with all local, State and federal regulations related to floodplain management, including 42 U.S.C §4321.

Impacts and Mitigation Measures

The project will add very minimally to the area of impermeable surface and will not adversely affect drainage. In any project, uncontrolled excess sediment from soil erosion during and after excavation and construction has the potential to impact natural watercourses, water quality and flooding potential. Contaminants associated with heavy equipment and other sources during construction have the potential to impact ground water if not mitigated effectively.

Provisions will be made during the construction grading and earthwork to minimize soil erosion and off-site sediment transport. A Pollution Control Plan and a Stormwater Pollution Prevention Plan will be implemented to ensure that the proposed improvements do not cause drainage or water quality impacts. Best Management Practices (BMPs) such as standard soil erosion and sediment control shall be implemented. These may include measures such as the following:

- Limiting the amount of surface area graded at any given time to reduce the area subject to potential erosion;
- Utilizing soil erosion protective materials such as mulch or geotextiles on areas where soils have a high potential for erosion until permanent provisions such as lawns and grasses can be developed;
- Planting vegetation as soon as grading operations permit to minimize the amount of time soils are exposed to possible erosion; and
- Building sedimentation basins to collect sediment that might enter runoff waters.

The project will be regulated through review and approval by the Hawai`i County Department of Public Works (DPW) to ensure compliance with standards related to storm runoff containment.

3.1.4 Climate and Air Quality

Existing Environment

The project site is near the center of Waimea, which has a sharp contrast in weather conditions from dry and clear in the west to cool and wet in the east. Average annual rainfall at the project site is about 50 inches (Giambelucca et al 1986). Temperatures are generally cool (60-70°F.) and show definite but moderate seasonal variability. Northeast trades funnel through the saddle between the Kohala Mountains and Mauna Kea, often blowing at speeds exceeding 25 miles per hour. Regionally, trade winds with an east to northeast direction are present on up to 90 percent of summer days and 50 percent of winter days. Some of the most intense episodes of rainfall occur when the wind direction temporarily shifts from the northeast to the southwest. The strong and steady winds of Kohala contribute to excellent air quality by dispersing human-derived pollutants as well as the volcanic haze commonly called vog. In areas with bare surfaces, however, the strong winds may also exacerbate dust problems. The site is within an air quality attainment area as defined by the State of Hawai`i Department of Health in its EPA approved Air Quality program.

Impacts and Mitigation Measures

The proposed project will not produce any permanent substantial air quality impacts. Construction has the potential to produce very localized and temporary fugitive dust emissions, although the moist, highly vegetated landscape is not prone to production of dust. There are no dust-sensitive land uses nearby. Nevertheless, a dust control plan will be implemented for

construction activities with potential to generate substantial dust. The elements of the plan may include some or all of the following:

- Watering of active work areas;
- Cleaning adjacent paved roads affected by construction;
- Covering of open-bodied trucks carrying soil or rock;
- Limiting area to be disturbed at any given time;
- Mulching or stabilizing disturbed inactive areas with geotextile; and
- Paving and landscaping as soon as practical in the construction schedule.

3.1.5 Noise and Scenic Value

Existing Environment

Noise levels on the site are low and are derived mainly from the vehicle traffic on the private road servicing water supply equipment, along with distant sounds from residential areas below.

The well pad is essentially concealed from view from both uphill and downhill locations, and lacks any intrinsic scenic value.

Impacts and Mitigation Measures

Construction will elevate noise levels during short periods over the course of several months. The Department of Health (DOH) will be consulted, and if appropriate, the contractor will be required to obtain a permit per Title 11, Chapter 46, HAR (Community Noise Control) prior to construction. DOH would review the proposed activity, location, equipment, project purpose, and timetable in order to decide upon conditions and mitigation measures, such as restriction of equipment type or hours, maintenance requirements, and portable noise barriers. Because of the site's isolation from sensitive uses, few noise mitigation requirements are expected

As far as permanent impacts, the well will be outfitted with a submersible pump, which would be located within the well, over 2,000 feet below the ground surface, and thus barely audible on the site. The distance of the well from any sensitive uses will prevent any impacts from the minor noise produced by occasional maintenance activities. The control building with also be equipped with alarms that will be connected to the Department of Water Supply's SCADA system. Given that the well is about 1,000 from any noise-sensitive uses, there is little potential for ongoing noise impacts from any source.

The facilities would be barely visible from any adjacent sites, owing to the terrain, vegetation and the distance to any private land or public viewpoints. Structures will be 10 feet high or less, and no structures will protrude into views of the coast or mountains from nearby roads.

3.1.6 Hazardous Substances

Existing Environment

No known hazardous substances or conditions appear to be present near the proposed well and reservoir site. As discussed in Section 3.1.2, the area near the proposed well appears to be free of any major source of contaminants.

Impacts and Mitigation Measures

Water purification will involve disinfection with chlorine and injection with ammonia to "balance" with the treated surface water. Chlorine and ammonia, hazardous substances that are inventoried through a Tier-2 Reporting Form, will be stored in cylinders within a fire-rated enclosure in the control building. This information is filed with State and County Civil Defense Agencies and the County Fire Department. In order to ensure proper storage, use and monitoring of these substances, the project will be designed in accordance with the "Water System Standards, Department of Water Supply, County of Hawai`i, 2002". The design will be coordinated with the appropriate County and State agencies.

Given the proper design and appropriate agency coordination, as well as the extensive safety precautions for use of the chlorine and ammonia, there will be negligible hazard to the public or the natural environment.

3.2 Biological Environment

Existing Environment

The site of the proposed production well pad was partially cleared during construction of water infrastructure at some time in the last few decades and was fully graded as part of building the pad for the exploration well. The roughly quarter-acre site now supports alien vegetation, including black wattle acacia (*Acacia mearnsii*), guava (*Psidium guajava*), waiawi (*Psidium cattenianum*), guinea grass (*Panicum maximum*), molasses grass (*Melinis minutiflora*) sourbush (*Pluchea symphitifolia*), *Desmodium* sp., thimbleberry (*Rubus rosifolius*), castor bean (*Ricinus communis*), *Senecio madagascerinsis*, olive (*Olea* sp.), and kahili ginger (*Hedychium gardnerianum*). Few if any natives, and no rare, threatened or endangered plant species, are present on the well pad itself.

Immediately downhill from the well pad and away from the area of impact is a medium-stature forest dominated by native plants, especially `ohi`a (*Metrosideros polymorpha*), uluhe fern (*Dicranopteris linearis*), hapu`u (*Cibotium* sp.), neneleau (*Rhus sandwicensis*) and kolea lau nui (*Myrsine lessertiana*). The forest is also fairly heavily invaded by guava and kahili ginger.

Most birds found in Waimea are alien species, and those native birds found in the alien vegetation of the site are likely to be common. However, the endangered Hawaiian Hawk (*Buteo solitarius*) and Hawaiian Hoary Bat (*Lasiurus cinereus semotus*) are often found in alien as well as native vegetation in a variety of locations throughout the island of Hawai`i. It is unlikely that either species would find the weedy vegetation of the site useful habitat for nesting/roosting.

No streams, ponds or wetlands are present in the surface area that would be affected by the proposed project. Waikoloa Stream runs within a deep ravine just north of the well pad. Groundwater in the aquifers tapped by the wells in the Waimea area presumably makes its way to the Pacific Ocean via very slow pathways in the basal aquifer or through seeps and springs into springs or the faces of large canyons such as Waipi`o Valley.

Impacts and Mitigation Measures

As none are present, no impact upon rare, threatened or endangered plant species is expected. Care should be taken to avoid unnecessary impact to the semi-native forest adjacent to the well pad. Both hawks and bats may forage in the area, but neither would likely be impacted by any project activities, which would occur in a small area dominated by low-stature alien species adjacent to a heavily disturbed road corridor and reservoir.

Given the over 2,000 foot depth of the well and the distance of several miles between the bottom of the hole and any potential subaerial outlet, it is unlikely that distant streams, ponds or wetlands would be affected in any way by either surface activities or aquifer pumping. Despite the high flux of fresh groundwater into the coastal waters of Hawai`i, steep bathymetry and rough seas induce almost instantaneous mixing of fresh and salt water. No effects on aquatic biology of coastal waters would be expected from the absence in this flux of the relatively minor quantity of fresh water that would be withdrawn by the well.

The Draft EA will be reviewed by the Hawai`i State Department of Land and Natural Resources and the U.S. Fish and Wildlife Service to confirm conclusions about the lack of endangered species and loss or damage to wildlife resources, and to ensure compliance with the Fish and Wildlife Coordination Act (16 U.S.C. § 662[a]) and the Endangered Species Act (16 U.S.C. 1531-1544, 87 Stat. 884), as amended).

3.3 Socioeconomic

3.3.1 Land Use, Social Factors and Community Identity

Existing Environment

TMK 6-5-01:03 is a 36.95-acre State of Hawai`i property under Executive Order 2511 to the County of Hawai`i. According to a letter from the Hawai`i County Planning Department of

February 1, 2006 (see App. 2), the project site is within the State Land Use Agricultural District. The County Zoning on the property is Agricultural (A-1 and A-40). It is designated on the County General Plan Land Use Designation Maps (LUPAG) as Extensive Agriculture. The site is not within the Special Management Area.

Table 3-2 shows the population and socioeconomic characteristics of both Hawai'i County and the Waimea area, a region identified by the U.S. Census Bureau as a *Census Designated Place*.

Impacts and Mitigation Measures

The project would not cause relocation of residences, businesses, community facilities, farms or other activities. In the long term, all project impacts to the social environment may be regarded as beneficial, because it improves the quality, quantity, and reliability of potable water for residences and businesses. All water projects require consideration for the secondary effects of growth induction; this topic is covered in Section 3.4.

Table 3-2
Selected Socioeconomic Characteristics

CHARACTERISTIC	Hawai'i County	Waimea
Total Population	148,677	7,028
Percent White	31.5	30.6
Percent Asian	26.7	20.3
Percent Hawaiian	9.7	15.0
Minority	68.5	69.4
Percent Two or More Races	28.4	32.3
Median Age (Years)	38.6	36.5
Percent Under 18 Years	26.1	29.7
Percent Over 65 Years	13.5	10.1
Percent Households with Children	37.5	44.3
Average Household Size	2.75	2.95
Percent Graduated High School	84.6	88.6
Percent 19-64 Years with Disability	19.2	16.1
Percent Born in State of Hawai`i	63.3	64.1
Percent Housing Vacant	15.5	8.4
Percent Over Age 16 in Labor Force	61.7	68.5
Percent Households Earning Between $35,000 and $100,000	45.3	59.6
Median Household Income	$39,805	$51,150
Percent Below Poverty Level	15.7	6.0

Source: U.S. Bureau of the Census. May 2001. U.S. Census Bureau Web Page.

3.3.2 Public Services, Facilities and Utilities

Utilities

The well and supporting facilities will require electrical power. This will be provided via existing overhead lines adjacent to the access road. The power demands of the well pump, control building and reservoir will be minor, and no adverse affect to the utility will occur.

Roadways

Access to all sites for construction and maintenance will be via the existing private service road Very few trips will be necessary for maintenance of the facility, and there will be no adverse impacts to public roads, either individually or cumulatively.

Police, Fire, Emergency Medical, Recreation, Schools, and Other Public Facilities and Services

All such facilities and services are present in the Waimea area. No such facilities or services would be affected in any adverse way.

3.3.3 Cultural and Historic Resources

Cultural Background and Resources

The traditional cultural value of the quarter acre of land on which the well pad is sited was assessed by determining whether it supports any traditional gathering uses, is vital for access to traditional cultural sites, or has other important symbolic associations for native Hawaiians or other cultural groups. The land in many parts of Waimea, including much of the lower slopes of the Kohala Mountains, has a long history of exclusive dedication to ranching.

The well pad is located in the Kohala *moku* (district) of Hawai'i Island, within Waimea, usually considered an *ahupua'a* (traditional Hawaiian land area). Pukui et al. (1974:226) indicate that the name Waimea refers to "reddish water." According to an archaeological study by IARII (1997), there is little information on traditional Hawaiian settlement patterns and land use in Waimea prior to the major changes wrought by Western introduction of goods, diseases, animals and cultigens. Kamehameha I gave management rights of much of Waimea to Isaac Davis, who later passed it to his son Hueu Davis. Early historical sources chronicle scattered settlement along lower parts of Waikoloa Stream. Even as late as 1823, after disease had likely decimated the population, as many as 1,200 people lived in the three miles between `Ouli and Pu`u Kapu, with perhaps 300 in Waimea town itself (Ibid: 11). With a network of irrigation canals *('auwai)* and relatively good soil, irrigated agriculture of taro, sweet potatoes and sugar cane was successfully practiced. Hundreds of parcels were claimed in Waimea as part of the Land Commission Awards (LCAs) associated with the Mahele in the mid-19th century, many near Waikoloa Stream.

Although there were evidently many Hawaiian residents of Waimea who possessed land capable of supporting traditional Hawaiian land use, the institution of a Western monetary system undermined the traditional economic basis and dramatically altered society. The harvest of wild sandalwood in the early 19th century and of *pulu* (the fluffy orange coating around tree fern shoots, which served as a stuffing for mattresses and pillows) later in the century were both economically and environmentally disastrous. Chinese immigrants began growing and milling sugar cane in Waimea in the early 1830s. This production tapped into the existing *`auwai* system. Plantation leases and mills were bought and sold, and the net result was to displace many Hawaiians who had lived in areas desired for fields. Cotton farming and ginning, sawmills, and various other economic ventures had their day on the landscape of Waimea, but the venture that brought lasting change was cattle.

The cattle brought by Captain Vancouver in 1793 and 1794, protected by a kapu placed on them by Kamehameha, multiplied rapidly. By the time the kapu was lifted a few years later, wild cattle had become rampant throughout the island, disturbing native gardens and damaging streams, grasslands and forests. Foreign bullock hunters were then employed to keep the herds under control. Although the meat was eaten, the main economic products were the hides. John Parker worked for Governor Kuakini as a bullock hunter in 1831, and before long had founded the famous ranch that still bears his name. By 1847, as Reverend Lorenzo Lyons noted, "two thirds of Waimea has been converted into a government pasture land" (quoted from Doyle 1945:48 in IARII 1997:19). Cattle ranching profoundly changed life in Waimea by displacing native agriculture, firmly establishing a monetary economy, altering the landscape and forests through direct and indirect means, and bringing in foreigners. During the 19th and 20th centuries, the well pad area was likely used for cattle ranching and harvesting wood for fuel.

As part of the early consultation process, the Honolulu and West Hawai`i offices of the Office of Hawaiian Affairs, Department of Hawaiian Home Lands, and the Waimea Hawaiian Homesteaders Association were contacted about the project. These agencies did not identify natural, cultural or historical resources of concern in the specific quarter-acre well pad or areas adjacent. Visual inspection of the graded well pad revealed no evidence of structures, unique natural features or activities that would be valuable for gathering, ceremonial, or access purposes.

Cultural Resources: Impacts and Mitigation Measures

It is reasonable to conclude that based upon the lack of resources, the exercise of native Hawaiian rights related to gathering, access or other customary activities will not be affected, and there will be no adverse effect upon cultural practices or beliefs.

Historic Resources: Existing Environment

An earlier Environmental Assessment of the site associated with the exploratory well included coordination with the State Historic Preservation Division, which indicated that no known

historic sites were present at the site or nearby. Visual inspection of the well pad and adjacent areas in 2006 indicated recent and relatively complete disturbance of the area, confirming the earlier conclusion. The State Historic Preservation Division and the Office of Hawaiian Affairs have been contacted by letter, and will furthermore review the Draft EA, pursuant to Section 106 of the National Historic Preservation Act (16 U.S.C. §470[f[). These agencies are expected to concur that there will be no adverse effect to historic properties.

Historic Resources: Impacts and Mitigation Measures

In the unlikely event that archaeological resources are encountered during future development activities within the project site, work in the immediate area of the discovery should be halted and DLNR-SHPD contacted as outlined in Hawai'i Administrative Rules 13§13-275-12.

3.3.4 Agricultural Land

Federal agencies must identify and consider the adverse effects of their programs on the preservation of farmland, under the Farmland Protection Policy Act (FPPA – Public Law 97-98). Agencies must consider alternative actions that could reduce adverse effects and ensure that their programs, to the extent practicable, are compatible with State, local government and private programs and policies to protect farmland.

Farmland, as used in the FPPA, includes primate farmland, unique farmland, and land of statewide or local importance. Farmland subject to FPPA requirements does not have to be currently used for cropland.

Consultation of maps of important farmland from the U.S. Natural Resources Conservation Service (USNRCS) (as displayed in the Hawai`i State Geographic Information System) determined that the small well pad area is not classified as important agricultural lands in *Agricultural Lands of Importance to the State of Hawai`i* (ALISH) map series. No farming is occurring on or adjacent to the well pad.

No adverse impacts to farmland or farming would occur, and the project is in compliance with the FPPA. One of the project's ultimate effects, the ability to release the surface water now used for the potable water system for exclusively agricultural use, will be beneficial for farm families and farming in Waimea.

3.4 Growth-Inducing, Cumulative and Secondary Impacts

Growth-Inducing Impacts

Analysis of growth-inducing impacts examines the potential for a project to induce unplanned development, substantially accelerate planned development, encourage shifts in growth from other areas in the region, or intensify growth beyond the levels anticipated and planned for without the project. Provision of needed infrastructure such as roads, water supply, sewer facilities, etc., is often seen as growth-inducing. Of key importance is whether infrastructure fulfills existing demands/needs of planned growth, or whether it instead enables unplanned growth and/or diverts growth away from planned areas.

The proposed increase to the water supply is in response to a need to replace surface water with groundwater to better conform with EPA regulations and eliminate the expensive treatment process required for surface water. Water in the system will also be available for planned growth (i.e., as expressed in the Hawai`i County General Plan) within existing service areas. Water is a necessary condition for this planned growth, but it has not acted as a constraining factor. Regarding unplanned growth, it is important to note that when planning for service expansion, DWS has taken a conservative approach in defining service areas, in effect limiting them to areas that have appropriate planning and zoning approvals in place. As a result, DWS is servicing the orderly development of planned growth, and not inducing unplanned growth or accelerating planned growth.

Cumulative Impacts

Cumulative impacts result when implementation of several projects that individually have minor impacts combine to produce more severe impacts or conflicts among mitigation measures.

All adverse impacts of the current project related to most categories of effect, including hydrology, native species/habitat, water quality, erosion, historic sites, and other areas of concern, are either non-existent or extremely restricted in geographic scale, negligible, and capable of mitigation through proper enforcement of permit conditions. The aquifers are not Groundwater Management Areas and no adverse cumulative impacts related to the sustainable yield of the aquifer would occur. There are thus no appreciable adverse impacts that might accumulate with those of other past, present and future actions to produce more severe impacts.

Secondary Impacts

Construction projects may induce secondary physical and social impacts that are only indirectly related to project. For example, construction of a new recreation facility can lead to changes in traffic patterns that produce impacts to noise and air quality for a previously unimpacted

neighborhood. In this case, the proposed project's impacts are limited to direct impacts at the quarter-acre site itself, and there does not appear to be any potential for secondary impacts.

3.5 Required Permits and Approvals

Several permits and approvals would be required to implement this project. They are listed here under their granting agencies.

Hawai`i State Commission on Water Resources
1. Well Construction Permit 2. Pump Installation Permit

Hawai`i State Department of Health
1. Approval of Preliminary Engineering Report

Hawai`i Planning Department
1. Plan Approval

4 COMMENTS AND COORDINATION

4.1 Agencies and Organizations Contacted

The following agencies received a letter inviting their participation in the preparation of the Environmental Assessment.

County of Hawai`i

- Planning Department
- Public Works Department
- County Council

State of Hawai`i

- Department of Agriculture
- Department of Health
- Department of Land and Natural Resources, Director
- Department of Land and Natural Resources, Historic Preservation Division
- Department of Land and Natural Resources, Aquatic Resources Division
- Hawai`i State Commission on Water Resource Management
- Hawaiian Homes Commission
- Office of Hawaiian Affairs

The following organizations/individuals received a letter and/or personal invitation soliciting their participation in the preparation of the Environmental Assessment:

- Sierra Club
- Waimea Hawaiian Homesteaders Assoc, Inc
- Waimea Outdoor Circle

Copies of correspondence from agencies with substantive comments during the preparation of the EA are included in Appendix 2A and are cited in appropriate sections of the text of this EA.

A total of three letters was received in response to the Draft EA. The letters and the response by the consultant to the project to them are contained in Appendix 2B.

5 LIST OF DOCUMENT PREPARERS

This Environmental Assessment was prepared for the County of Hawai`i, Department of Water Supply by Ron Terry, Ph.D., of Geometrician Associates, with assistance from Akinaka and Associates, Ltd., the engineering contractor for the well project.

6 STATE OF HAWAI`I ENVIRONMENTAL ASSESSMENT FINDINGS

Section 11-200-12 of the State Administrative Rules sets forth the criteria by which the significance of environmental impacts shall be evaluated. The following discussion paraphrases these criteria individually and evaluates the project's relation to each.

1. *The project will not involve an irrevocable commitment or loss or destruction of any natural or cultural resources.* The well pad supports alien species, and no significant natural resources will be irrevocably committed or lost. The State Historic Preservation Division is expected to concur with the determination that no effect to historic properties will occur.

2. *The project will not curtail the range of beneficial uses of the environment.* No future beneficial use of the environment will be affected in any way by the proposed project. Sufficient water will remain, well within the sustainable yield of the aquifer, to promote other beneficial uses of groundwater in the Waimea region.

3. *The project will not conflict with the State's long-term environmental policies.* The State's long term environmental policies are set forth in Chapter 344, HRS. The broad goals of this policy are to conserve natural resources and enhance the quality of life. A number of specific guidelines support these goals. No aspect of the proposed project conflicts with these guidelines. The project's goals of providing potable water to support adequate supply and orderly development of planned growth while conserving natural resources satisfies the State's environmental policies.

4. *The project will not substantially affect the economic or social welfare of the community or State.* The improvements will benefit the social and economic welfare of Hawai`i by improving the potable water supply system in Waimea and freeing up surface water for agricultural uses.

5. *The project does not substantially affect public health in any detrimental way.* No adverse effects to public health are anticipated. Public health will be benefited by improving the potable water supply system for Waimea.

6. *The project will not involve substantial secondary impacts, such as population changes or effects on public facilities.* No adverse secondary effects are expected. The project will not enable development, but will instead assure adequate supply of an improved source of water to existing customers and serve planned growth.

7. *The project will not involve a substantial degradation of environmental quality.* The implementation of best management practices for all construction will ensure that the project will not degrade environmental quality in any substantial way.

8. *The project will not substantially affect any rare, threatened or endangered species of flora or fauna or habitat.* No endangered species of flora or fauna are known to exist on the project site or would be affected in any way by the project.

9. *The project is not one which is individually limited but cumulatively may have considerable effect upon the environment or involves a commitment for larger actions.* Cumulative impacts result when implementation of several projects that individually have minor impacts combine to produce more severe impacts or conflicts among mitigation measures. All adverse impacts, including to the sustainable yield of the aquifer, will either not occur or will be reduced to negligible levels through mitigation measures, and will therefore not tend to accumulate in relation to this or other projects.

10. *The project will not detrimentally affect air or water quality or ambient noise levels.* The project will have negligible effects in terms of water quality, air quality and noise.

11. *The project will not affect or will likely be damaged as a result of being located within an environmentally sensitive area such as flood plains, tsunami zones, erosion-prone areas, geologically hazardous lands, estuaries, fresh waters or coastal waters.* No floodplains, tsunami zones, geologically hazardous areas, or other such sensitive land is involved in the area planned for development.

12. *The project will not substantially affect scenic vistas and viewplanes identified in county or state plans or studies.* No protected viewplanes will be impacted by the project, which will have no adverse scenic effects.

13. *The project will not require substantial energy consumption.* Some, but not substantial, input of energy is required for the construction of the facilities and the operation of the pump.

For the reasons above, and in consideration of comment letters on the Draft EA, the County of Hawai`i, Department of Water Supply, has determined that the proposed project will not have any significant effect in the context of Chapter 343, Hawai`i Revised Statues and section 11-200-12 of the State Administrative Rules. and has thus issued a Finding of No Significant Impact (FONSI).

REFERENCES

Cuddihy, L. W., and C. P. Stone. 1990. *Alteration of Native Hawaiian Vegetation, Effects of Humans, their Activities and Introductions*. University of Hawai'i Cooperative National Park Resources Studies Unit, Honolulu.

Hawai`i County Department of Water Supply (DWS). 1989. *Hawai`i County Water Use and Development Plan*. Prep. for DWS and Hawai`i State Commission on Water Resources Management by Megumi Kon, Inc., Hilo.

Hawai`i County DWS. 1991. *Hawai`i County Water Use and Development Plan, Plan Review Draft*. Prep. for DWS and Hawai`i State Commission on Water Resources Management by Megumi Kon, Inc., Hilo.

Hawai'i County Planning Department. 2005. *The General Plan, County of Hawai'i*. Hilo. http://www.hawaii-county.com/la/gp/toc.html

Hawai`i State Commission on Water Resources Management (CWRM). 1980. *State Water Resources Development Plan*. Honolulu.

Hawai`i State CWRM. 1990. *Draft Hawai`i Stream Assessment: A Preliminary Appraisal of Hawai`i's Stream Resources*. Prep. for CWRM by Hawai`i Cooperative Park Service Unit. Honolulu: National Park Service.

Hawai`i State CWRM. 1992. *Water Resources Protection Plan*. Prep. for CWRM by George A.L. Yuen & Associates. Honolulu.

Hawai`i State CWRM. 2003. *State Water Projects, Hawai`i Water Plan*. Vol. 2, SWPP for Island of Hawai`i. Prep. By Fukunaga and Associates, Inc., for CWRM.

Hawai`i State CWRM. 2006. "Staff Submittal for the meeting of the Commission on Water Resources Management, February 15, 2006, Petition for Groundwater Management Designation, Mahukona Aquifer System Area, Kohala Aquifer Sector Area, Island of Hawaii." Honolulu.

Hawai`i State Department of Business, Economic Development and Tourism (DBEDT). 1997. *Hawai`i State Data Book*. Honolulu: DBEDT

Hawai`i State DHHL. 2002. *Hawai`i Island Plan: Final Report*. Prep. By PBR Hawaii, Inc. Honolulu.

Heliker, C. 1990. *Volcanic and Seismic Hazards on the Island of Hawaii*. Washington: U.S. GPO.

International Archaeological Research Institute, Inc. (IARII). 1997. *The Kuleana Lots at Pukalani, Waimea Town Center Project Area, Waimea, Hawai`i Island.* Prep. for Parker Ranch. Honolulu: IARI.

International Archaeological Research Institute, Inc. (IARII). 2001. *A Preservation Plan for Waimea Town Center, Waimea, Hawai`i Island.* Prep. for Parker Ranch. Honolulu: IARII.

Macdonald, G.A., A.T. Abbott, and F.L. Peterson. 1986. *Volcanoes in the Sea: The Geology of* Hawai`i. 2nd ed. Honolulu: University of Hawai`i Press.

Pukui, M.K., Elbert, S.H., and E.T. Mookini. 1974 *Place Names of Hawaii.* 2nd ed.. Honolulu: University of Hawai`i Press.

Sato, H.H. et al. 1973. *Soil Survey of Island of Hawaii, State of Hawaii.* Washington: U.S.D.A. Soil Conservation Service.

U.S. Bureau of the Census. 2002. U.S. Census of Population, 2000. American Fact Finder web page (http/factfinder/census.gov)

U.S. Fish and Wildlife Service (USFWS). 2000. *Threatened and endangered plants in Hawai`i* Washington: GPO.

University of Hawai`i at Hilo, Dept. of Geography. 1998. *Atlas of* Hawai`i. 3rd ed. Honolulu: University of Hawai`i Press.

WAIMEA PRODUCTION WELL

ENVIRONMENTAL ASSESSMENT

APPENDIX 1

FIGURES

Figure 1 Location Map

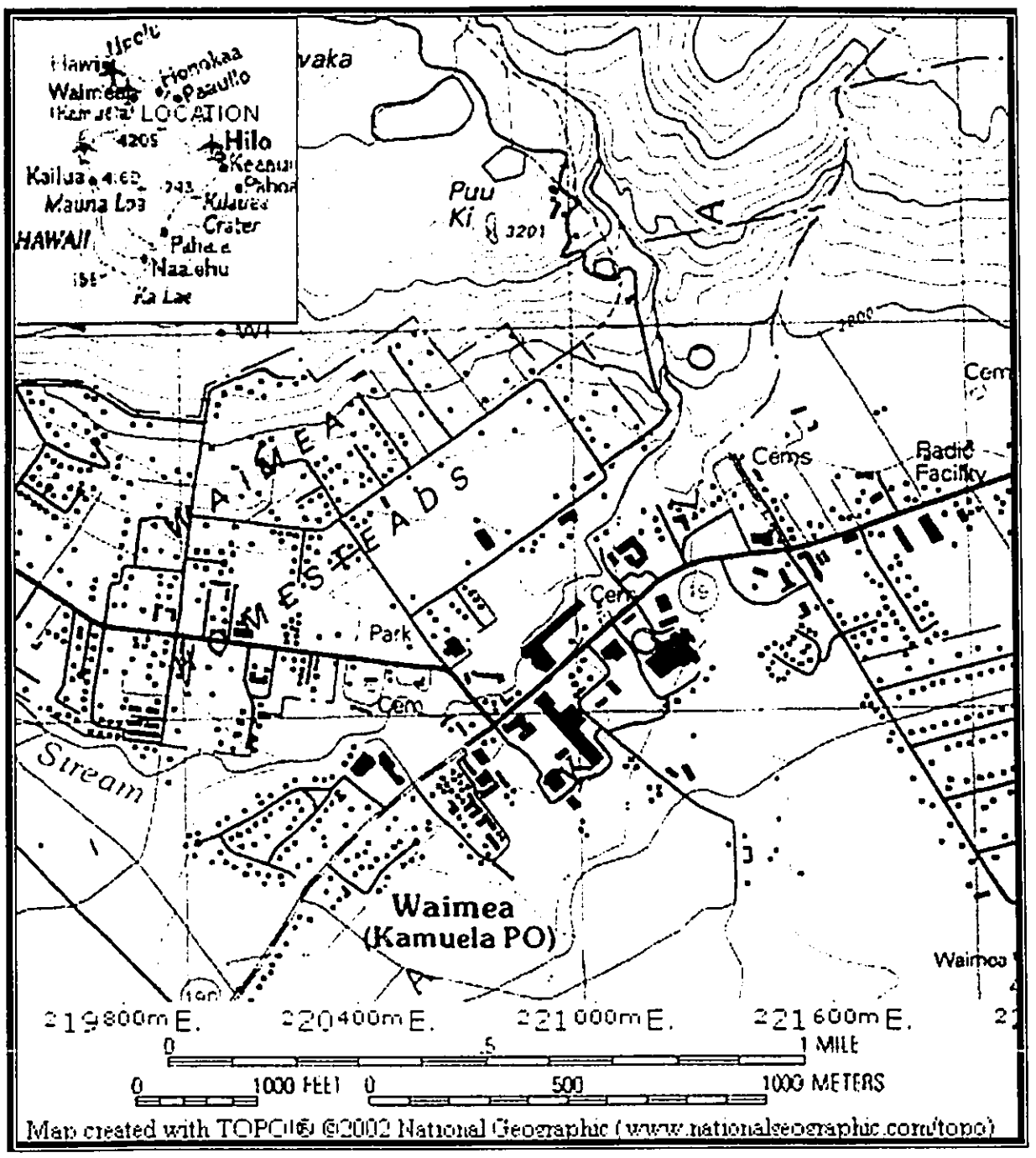


Figure 2 TMK Map

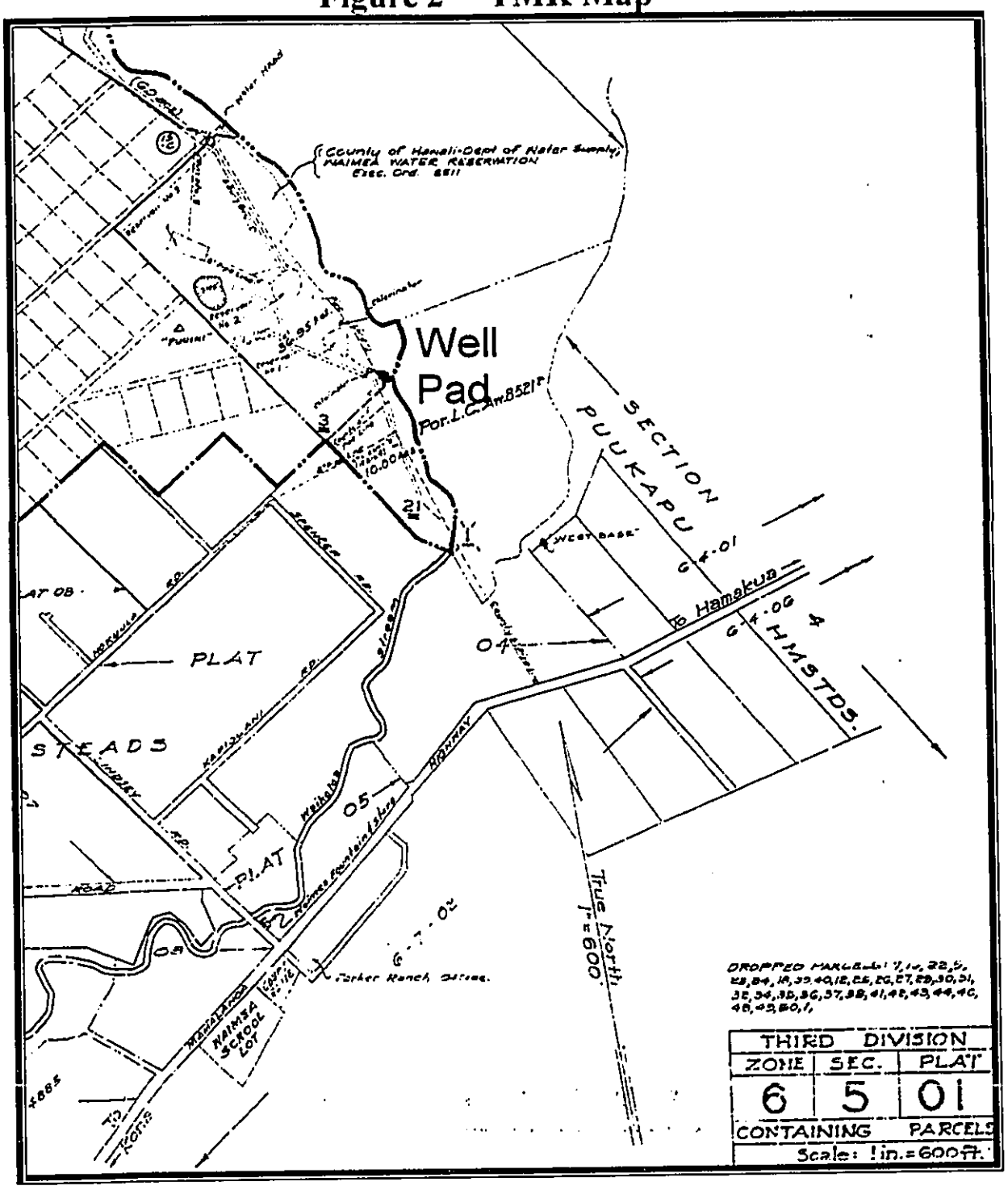
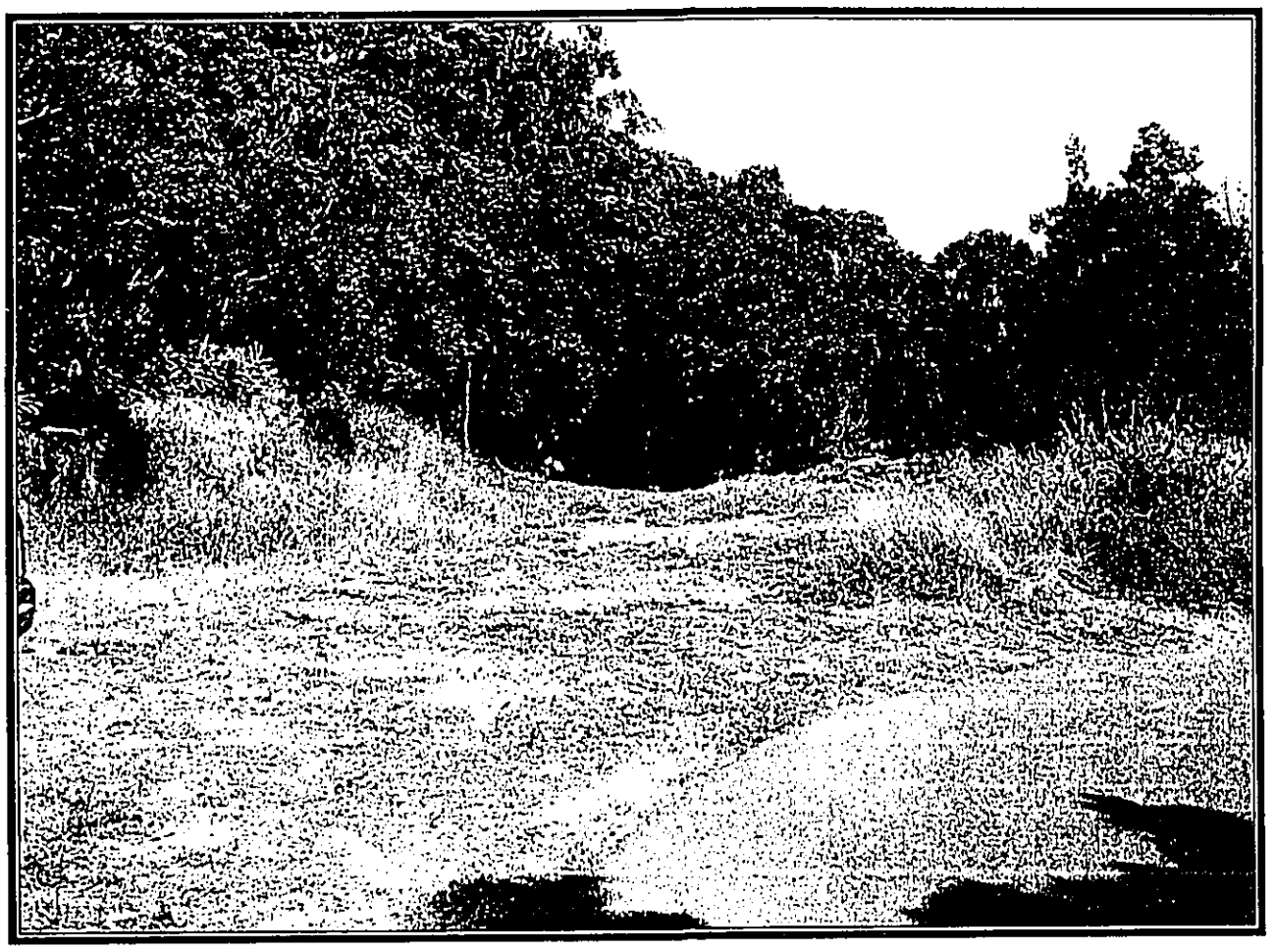


Figure 3 Photo of Well Pad



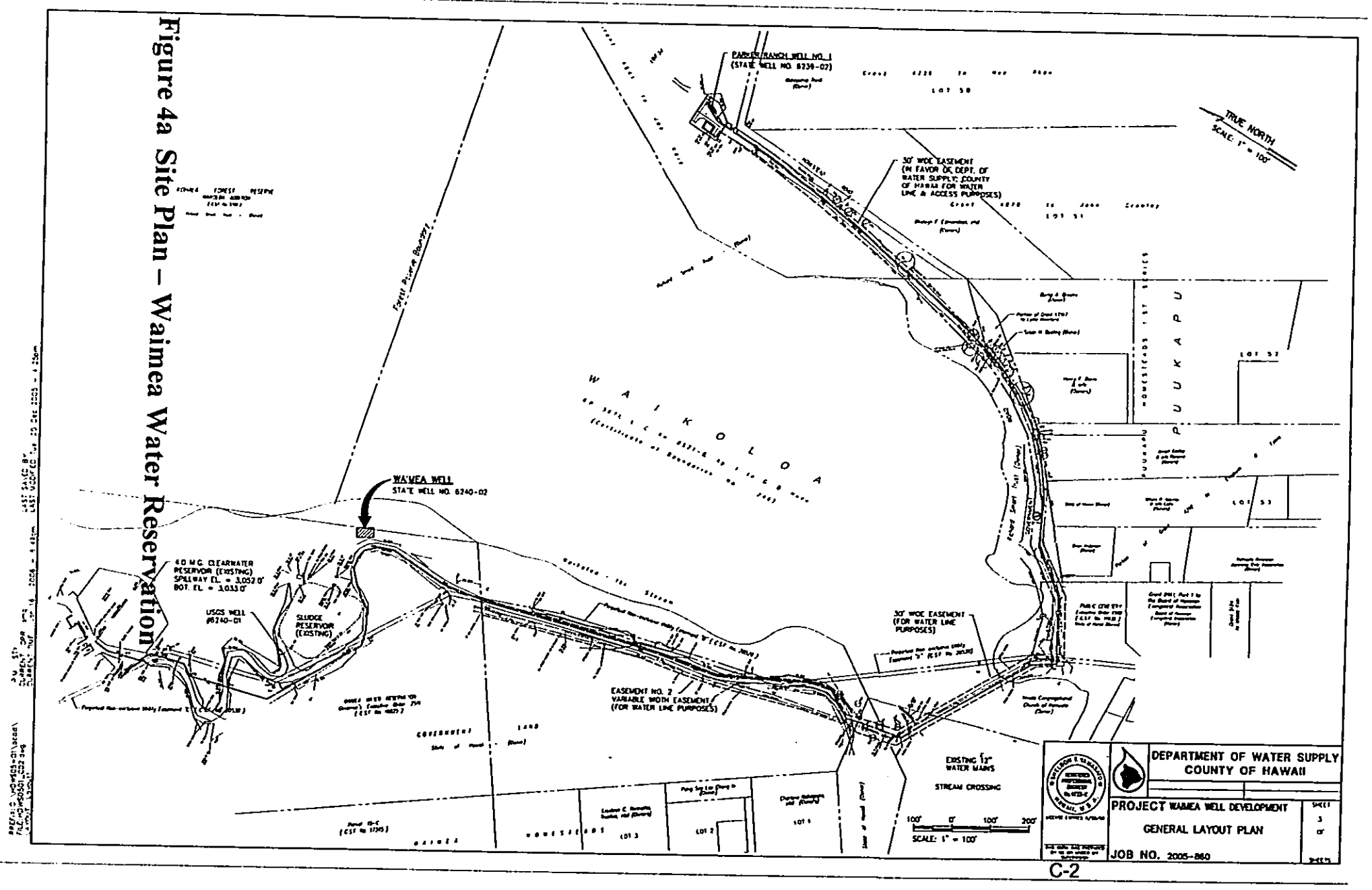
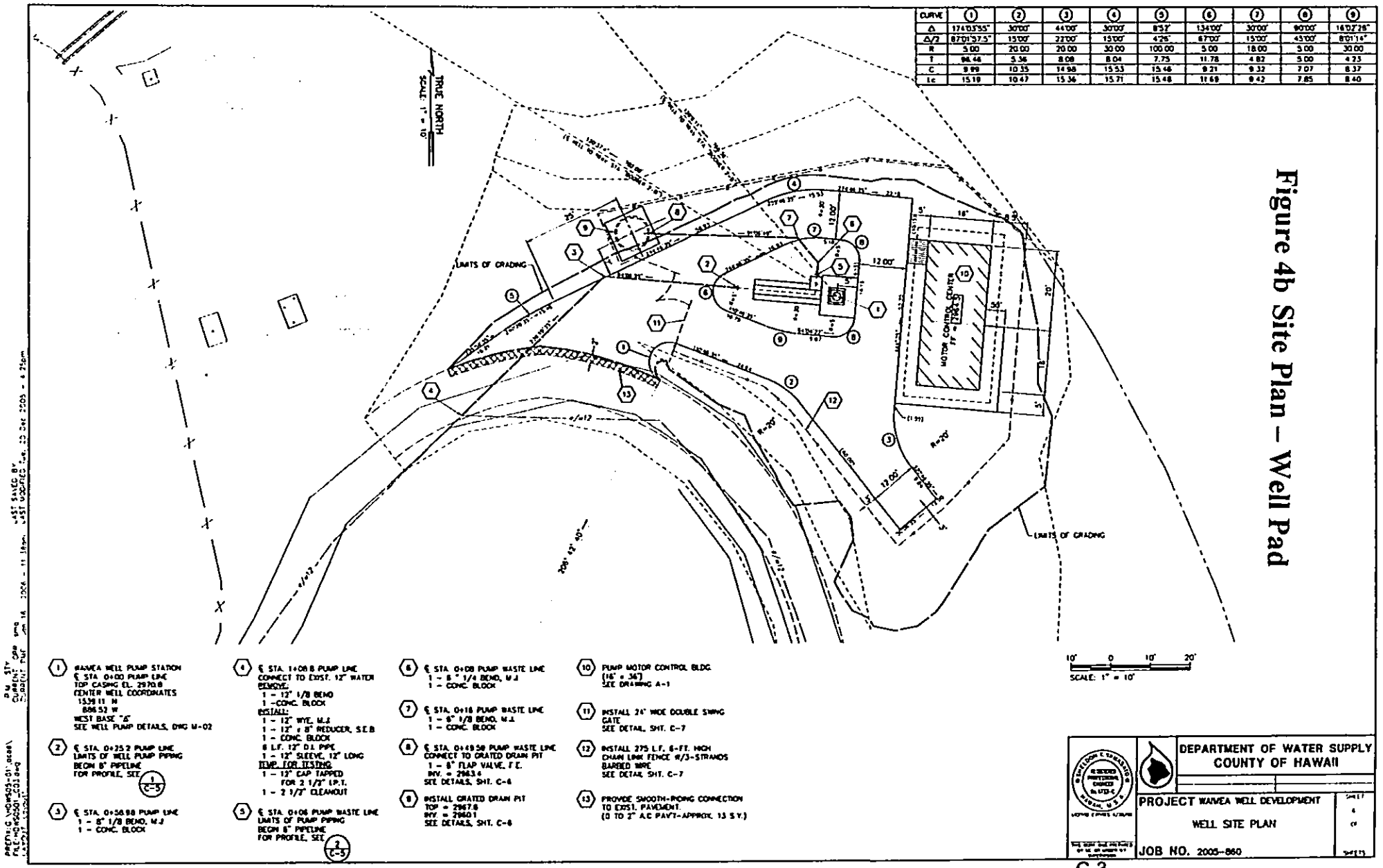


Figure 4a Site Plan – Waimea Water Reservation



CURVE	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Δ	174°03'55"	30°00'	44°00'	30°00'	8°53'	134°00'	30°00'	90°00'	161°27'28"
Δ/2	87°01'57.5"	15°00'	22°00'	15°00'	4°26'	67°00'	15°00'	45°00'	80°13'44"
R	5.00	20.00	20.00	30.00	100.00	5.00	18.00	5.00	30.00
T	96.46	5.36	8.08	8.04	7.75	11.78	4.82	5.00	4.73
C	9.99	10.35	14.98	15.53	15.46	9.21	9.32	7.07	8.37
Lc	15.19	10.47	15.36	15.71	15.48	11.69	9.42	7.85	8.40

Figure 4b Site Plan – Well Pad

Figure 5 Aquifer Sectors and Systems

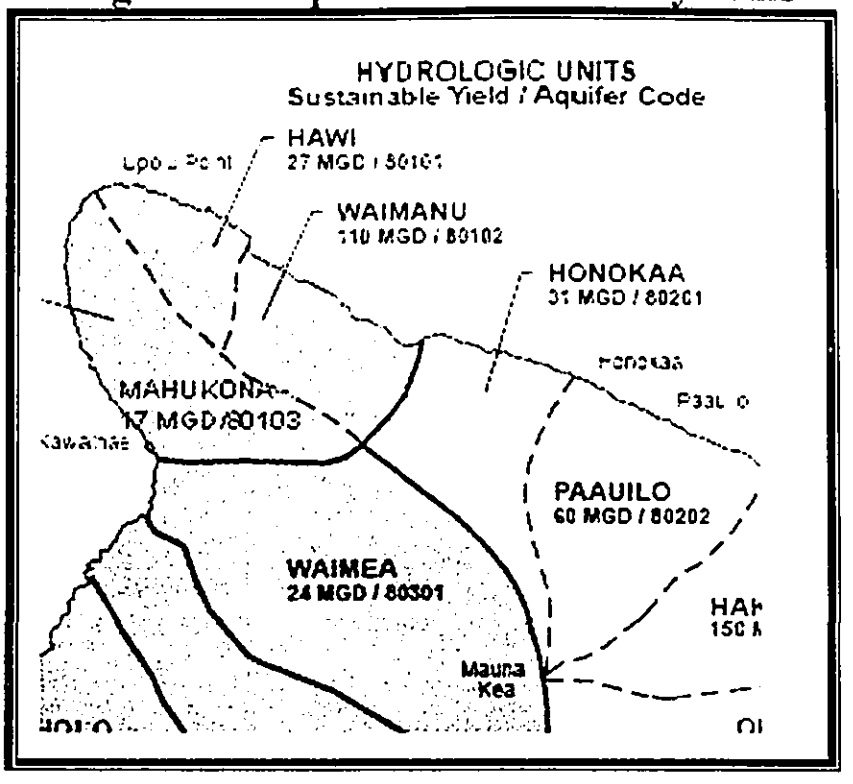
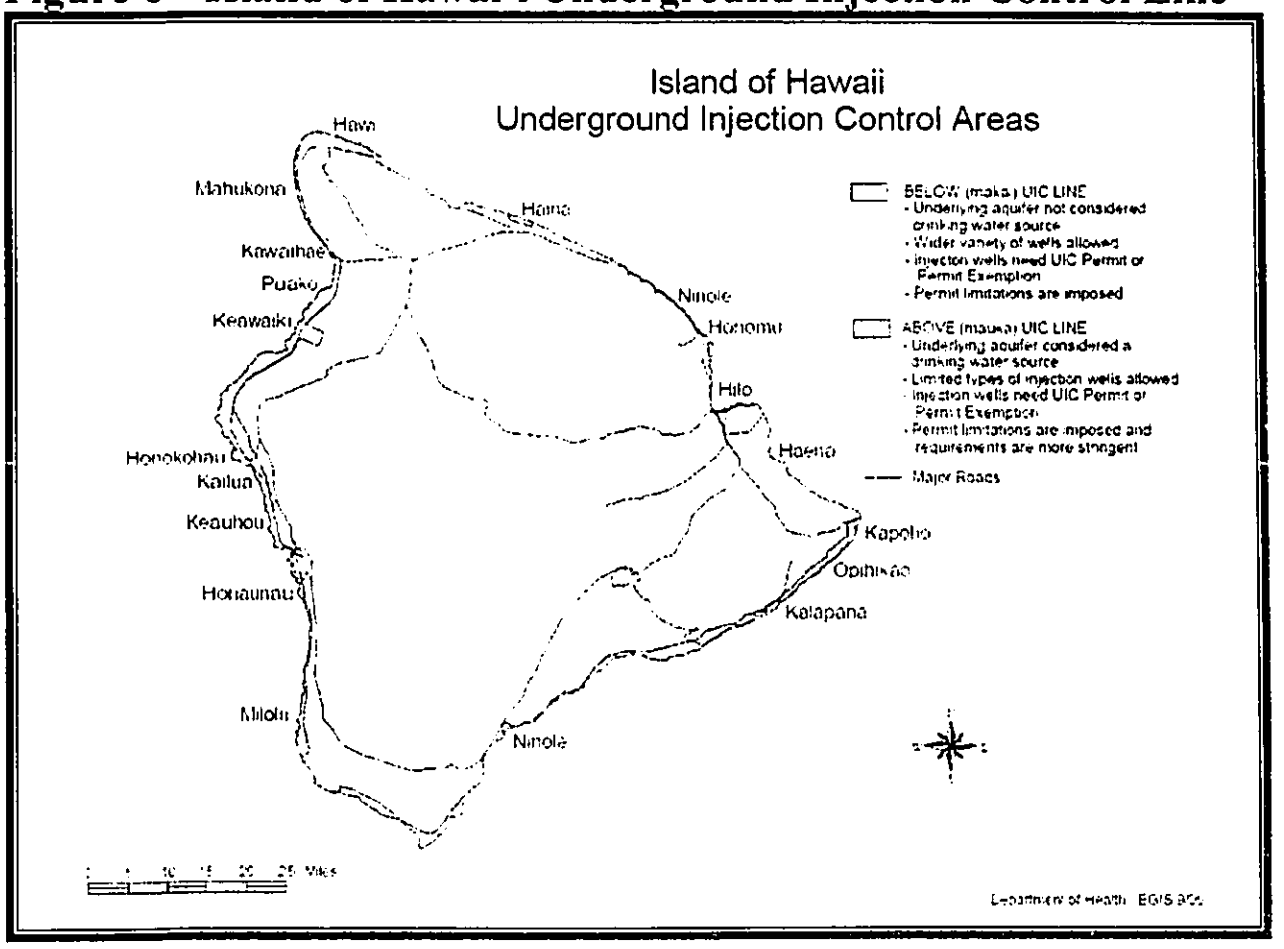


Figure 6 Island of Hawai`i Underground Injection Control Line



WAIMEA PRODUCTION WELL

ENVIRONMENTAL ASSESSMENT

APPENDIX 2

AGENCY COORDINATION LETTERS

AND PUBLIC INVOLVEMENT

LINDA LINGLE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
ENGINEERING DIVISION
PO BOX 373
HONOLULU, HAWAII 96809

PETER T. YOUNG
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

ROBERT K. MASUDA
DEPUTY DIRECTOR - LAND

DEAN NAKANO
ACTING DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

JAN 25 2006

Mr. Ron Terry, Principal
Geometrician Associates
HC 2 Box 9575
Keaau, Hawaii 96749

Dear Mr. Terry:

Environmental Assessment (EA) for Waimea Production Well
South Kohala, Hawaii, TMK:6-5-01:03

We reviewed the subject assessment and according to Federal Emergency Management Agency, Panel Number 155166 159 C (not printed) dated June 2, 1995 Revised, the project site is located in Zone X, areas determined to be outside 500-year flood plain. The National Flood Insurance Program does not have any regulations for developments within Zone X.

We wish to receive a copy of the EA once completed.

Should you have any questions, please call Ms. Alyson Yim, Planning Branch in Honolulu at (808) 587-0259.

Sincerely,

ERIC T. HIRANO
Chief Engineer

SA:ek
c: Land Division

Via e-mail, February 1, 2006

Dear Mr. Terry:

Thank you for allowing us to review the subject project [Waimea Well]. We offer Standard Comments at http://www.state.hi.us/health/environmental/env-planning/landuse/landuse.html for pre-assessment consultation. We are looking forward to reviewing the DEA and please send the document to our office at:

Environmental Planning Office
919 Ala Moana Blvd., Room 312
Honolulu, Hawaii 96814

Thank you.

Jiacai Liu
Land Use Review Coordinator
Environmental Planning Office
Department of Health
(808) 586-4346

Harry Kim
Mayor

County of Hawaii
PLANNING DEPARTMENT
101 Aupuni Street, Suite 3 • Hilo, Hawaii 96720-3043
(808) 961-8288 • FAX (808) 961-8742

Christopher J. Yuen
Director
Brad Kurokawa, ASLA
LEED™ AP
Deputy Director

February 1, 2006

Mr. Ron Terry
Geometrician Associates, LLC
HC 2 Box 9575
Keaau HI 96749

Dear Mr. Terry:

Subject: Pre-Consultation on Draft Environmental Assessment
Applicant: County of Hawaii, Department of Water Supply
Project: Conversion of the Waimea Exploratory Well to a Production Well
Tax Map Key: 6-5-1:3, Waimea, South Kohala, Hawaii

This is in response to your January 11, 2006 letter requesting our comments on the above-referenced project.

According to your submittal, the Department of Water Supply plans to convert the Waimea Exploratory Well to a production well. The project involves constructing a well pad, production pump and appurtenances, pump control building and other site improvements.

The subject parcel is designated Agricultural by the State Land Use Commission and is zoned Agricultural (A-1a and A-40a) by the County. The General Plan designation is Extensive Agriculture and the subject parcel is not located within the County's Special Management Area.

According to Hawaii Revised Statutes, Section 205-4.5(a)(7), permitted uses within the agricultural districts includes "Public, private, and quasi-public utility lines and roadways, transformer stations, communications equipment buildings, solid waste transfer stations, major water storage tanks, and appurtenant small buildings such as booster pumping stations, but not including offices or yards for equipment, material, vehicle storage, repair or maintenance, or treatment plants, or corporation yards, or other like structures." Therefore, the conversion of the Waimea Exploratory Well to a production well is considered to be a permitted use on the subject parcel.

However, the Hawaii County Code, Chapter 25, Section 25-4-11(b) states that *"Any substation used by a public utility for the purpose of furnishing telephone, gas, electricity, water, radio, or television shall be a permitted use in any district provided that the use is not hazardous or dangerous to the surrounding area and the director has issued plan approval for such use."* Therefore, Plan Approval is required from the Planning Director prior to obtaining a building permit for the proposed improvements.

Please provide us with a copy of the Draft Environmental Assessment for our review and file.

If you have questions, please feel free to contact Esther Imamura or Larry Brown of this office at 961-8288, extension 257 or 258, respectively.

Sincerely,

CHRISTOPHER J. YUEN
Planning Department

ETI:cd
P:\WPWIN60\ETI\EAdraftPre-consul\Terry WaimeaPrWell.doc

xc: Planning Department - Kona

PHONE (808) 594-1888

FAX (808) 594-1865

STATE OF HAWAI'I
OFFICE OF HAWAIIAN AFFAIRS
711 KAPI'OLANI BOULEVARD, SUITE 500
HONOLULU, HAWAI'I 96813

HRD05/2232

February 27, 2006

Ron Terry
Geometrician Associates
HC 2 Box 9575
Keaau, HI 96749

RE: Pre-Environmental Assessment for the Waimea Production Well, South Kohala, Hawai'i Island, TMK 6-5-01: 03.

Dear Mr. Terry

The Office of Hawaiian Affairs (OHA) is in receipt of your January 11, 2006 request for comment on the above listed proposed project. OHA offers the following comments:

Our staff has no comment specific to the above-listed project. Thank you for your continued correspondence.

OHA asks that, In accordance with Section 6E-46.6, Hawaii Revised Statutes and Chapter 13-300, Hawaii Administrative Rules, if any significant cultural deposits or human skeletal remains are encountered, work shall stop in the immediate vicinity and the State Historic Preservation Division (SHPD/DLNR) shall be contacted.

Thank you for the opportunity to comment. If you have further questions or concerns, please contact Jesse Yorck, Native Rights Policy Advocate, at (808) 594-0239 or jessey@oha.org.

'O wau iho nō,

Clyde W. Nāmu'o
Administrator

CC: Ruby McDonald
OHA Community Affairs Coordinator (Kailua-Kona)
75-5706 Hanama Pl., Suite 107
Kailua-Kona, HI 96740

WAIMEA PRODUCTION WELL

ENVIRONMENTAL ASSESSMENT

APPENDIX 2

AGENCY COORDINATION LETTERS

AND PUBLIC INVOLVEMENT

Part B: Comments to Draft EA and Responses

LINDA LINGLE
GOVERNOR OF HAWAI'I

235 S BERETANIA ST. SUITE 702
HONOLULU, HAWAI'I 96813

STATE OF HAWAI'I
OFFICE OF ENVIRONMENTAL QUALITY CONTROL

GENEVIEVE SALMONSON
DIRECTOR

Telephone (808) 586-4185
Facsimile (808) 586-4186
Email: oeqc@doh.hawaii.gov

June 13, 2006

Milton Pavao
Department of Water Supply
345 Kekuanaoa Street, #20
Hilo, Hawaii 96720

Attn: Owen Nishioka

Dear Mr. Pavao:

Subject: Draft environmental assessment (EA), **Waimea Production Well**

We have the following comments to offer:

Water well guidance document: Please consider the assessment points raised in this guidance document and in the final EA enclose any information not already included in the draft. You may access it at http://www.state.hi.us/health/oeqc/guidance/wells.html.

If you have any questions call Nancy Heinrich at 586-4185.

Sincerely,

Genevieve Salmonson

GENEVIEVE SALMONSON
Director

Ron Terry

geometrician

ASSOCIATES, LLC

integrating geographic science and planning

phone: (808) 982-5831 fax: (808) 966-7593 HC 2 Box 9575 Kea'au Hawai'i 96749

ronterry@hawaiiantel.net

July 9, 2006

Genevieve Salmonson, Director
Office of Environmental Quality Control
235 South Beretania Street, Suite 702
Honolulu HI 96813

Dear Ms. Salmonson:

Subject: **Draft Environmental Assessment for Replacement of Waimea Production Well, TMK 6-5-01:03**

Thank you for your comment letter dated June 13, 2006, on the Draft EA. In answer to your specific comment:

1. *OEQC Water Well Assessment Guidelines.* This document was consulted during the preparation of the EA, and all relevant points of the guidance were adequately considered, given the nature and location of the project. In particular, discussions about effects to aquifer sustainability, effects on streams, potential contaminants, and cultural effects were fully addressed.

Again, thank you for your comment. If you have any questions about the project, please contact Owen Nishioka of DWS at 961-8070, Ext. 259.

Sincerely,

Ron Terry

Ron Terry, Principal
Geometrician Associates

Harry Kim
Mayor

Christopher J. Yuen
Director
Brad Kurokawa, ASLA
LEED® AP
Deputy Director

County of Hawaii
PLANNING DEPARTMENT
101 Pauahi Street, Suite 3 • Hilo, Hawaii 96720-3043
(808) 961-8288 • FAX (808) 961-8742

June 16, 2006

Mr. Ron Terry
Geometrician Associates
HC 2 Box 9575
Keaau HI 96749

Dear Mr. Terry:

Draft Environmental Assessment
Subject: Waimea Production Well
Tax Map Key: 6-5-1:3

This is to acknowledge receipt of the Draft Environmental Assessment for the aforementioned project.

After reviewing the document, we have no additional comments to offer.

If you have questions, please feel free to contact Esther Imamura or Larry Brown of this office at 961-8288, extension 257 or 258, respectively.

Sincerely,

CHRISTOPHER J. YUEN
Planning Director

ETI:cd
P:\WPWIN60\ETI\EAdraft\Pre-consul\Terry Waimea Well 6-5-1-3.rtf

xc: Director
Office of Environmental Quality Control
235 South Beretania Street, Suite 702
Honolulu HI 96813

Mr. Owen Nishioka, DWS

geometrician

ASSOCIATES, LLC

integrating geographic science and planning

phone: (808) 982-5831 fax: (808) 966-7593 HC 2 Box 9575 Kea'au Hawai'i 96749

ronterry@hawaiiantel.net

July 9, 2006

Christoper J. Yuen, Director
Hawai'i County Planning Department
101 Pauahi Street, Suite 3
Hilo HI 96720-3043

Dear Mr. Yuen:

Subject: **Draft Environmental Assessment for Replacement of Waimea Production Well, TMK 6-5-01:03**

Thank you for your comment letter on the Draft EA dated June 16, 2006, in which you stated that you had no additional comments. We appreciate your review of the document. If you have any questions about the project, please contact Owen Nishioka of DWS at 961-8070, Ext. 259.

Sincerely,

Ron Terry

Ron Terry, Principal
Geometrician Associates

LINDA LINGLE
GOVERNOR OF HAWAII

CHIYOME L. FUKINO, M.D.
DIRECTOR OF HEALTH

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

In reply, please refer to:

EPO-06-076

June 26, 2006

Mr. Ron Terry
Geometrician Associates
HC 2 Box 9575
Keaau, Hawaii 96749

Dear Mr. Terry:

SUBJECT: Draft Environmental Assessment for Waimea Production Well
South Kohala, Island of Hawaii, Hawaii
TMK: (3) 6-5-01:03

Thank you for allowing us to review and comment on the subject document. The document was routed to the various branches of the Environmental Health Administration. We have no comments at this time. We strongly recommend that you review all of the Standard Comments on our website: www.state.hi.us/health/environmental/env-planning/landuse/landuse.html. Any comments specifically applicable to this project should be adhered to.

If there are any questions about these comments please contact Jiacai Liu with the Environmental Planning Office at 586-4346.

Sincerely,

KELVIN H. SUNADA, MANAGER
Environmental Planning Office

C: EPO

geometrician

ASSOCIATES, LLC

integrating geographic science and planning

phone: (808) 982-5831 fax: (808) 966-7593 HC 2 Box 9575 Kea'au Hawai'i 96749

ronterry@hawaiiantel.net

July 9, 2006

Kelvin H. Sunada, Manager
Environmental Planning Office
Hawai'i State Department of Health
P.O. Box 3378
Honolulu HI 96801-3378

Dear Mr. Sunada:

Subject: Draft Environmental Assessment for Replacement of Waimea Production Well, TMK 6-5-01:03

Thank you for your comment letter on the Draft EA dated June 26, 2006, in which you advised reviewing DOH-EPO's Standard Comments on the DOH website. We reviewed these comments in the preparation of the EA and included relevant discussion in various sections, including water quality and need for permits. Thank you for your review of the document. If you have any questions about the project, please contact Owen Nishioka of DWS at 961-8070, Ext. 259.

Sincerely,

Ron Terry

Ron Terry, Principal
Geometrician Associates

WAIMEA PRODUCTION WELL

ENVIRONMENTAL ASSESSMENT

APPENDIX 3

ANNUAL WATER QUALITY REPORT

South Kohala Water System, Year 2004

Is my water safe?

Yes it is. Last year, as in years past, your tap water met all U.S. Environmental Protection Agency (EPA) and State drinking water health standards. The Department of Water Supply vigilantly safeguards its water supplies and once again we are proud to report that your system has complied with all drinking water standards.

Why are there contaminants in my drinking water?

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the Environmental Protection Agency's Safe Drinking Water Hotline at 1-(800) 426-4791. If you have any questions regarding this Water Quality Report, call Keith Okamoto, P.E., at 961-8670.

Do I need to take special precautions?

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. EPA/CDC guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium* and other microbial contaminants are available from the Safe Drinking Water Hotline at 1-(800) 426-4791 .

Source Water Assessment Program

In 2004, the preliminary source water assessment report was released. The purpose of the source water assessment report is to enable the public and decision-makers to make well-founded decisions for the protection and preservation of our drinking water. The source water assessment report identifies the potential contaminating activities for each source of water.

In the report, South Kohala Water System sources are potentially vulnerable to contaminants associated with the following activities: feral animals, grazing, cultivated agriculture, and cesspools. Atrazine has been detected in this system which is attibuted to runoff from herbicide used on row crops. Carbon tetrachloride, which is attributed to discharge from chemical plants and other industrial activities has also been detected in this system. For more information, please contact Keith Okamoto, P.E., at 961-8670.

How can I get more information?

The Water Board meets the fourth Tuesday of every month. Call for the time and location of the meeting.

You Can Contact Us at the Following Numbers:

Administration/Finance/General	**(808) 961-8050**
Billing/Customer Service	**(808) 961-8060**
Engineering	**(808) 961-8070**
Emergencies & Field Operations	**(808) 961-8790**
Water Quality	**(808) 961-8670**

You can find us on the web at www.hawaiidws.org

PRSRT STD
U.S. POSTAGE
PAID
PERMIT NO. 56
HILO, HI 96720

Department of Water Supply
345 Kekuanao'a Street, Suite #20
Hilo, Hawai'i 96720

... Water brings progress...

The Department of Water Supply is an equal opportunity provider and employer.

2004 South Kohala Water System Annual Water Quality Report

County of Hawai'i

Department of Water Supply

South Kohala System Water Quality Data Table

The table below lists the drinking water contaminants that we detected during the calendar year of this report. The presence of contaminants in the water does not necessarily indicate that the water poses a health risk. Unless otherwise noted, the data presented in this table is from testing done in the calendar year of the report. The EPA or the State requires us to monitor for certain contaminants less than once per year because the concentrations of these contaminants do not change frequently. Some of our data, though representative, are more than one year old.

Regulated Contaminants

				Waimea Treatment Plant			Parker Ranch Well 1				
Contaminants	MCL	MCLG	AL	Level Found	Range of Detections	Sample Date	Level Found	Range of Detections	Sample Date	Violation	Typical Source of Contaminant
Microbiological Contaminants											
Turbidity	TT = 5 NTU		n/a	1.00	n/a	2004	n/a	n/a	n/a	No	Soil runoff.
Turbidity (NTU)	TT = percentage of samples < 0.5 NTU in at least 95% of measurements taken each month	0	n/a	98.8%	n/a	2004	n/a	n/a	n/a	No	Soil runoff.
Turbidity is a measure of the cloudiness of the water. We monitor it because it is a good indicator of the effectivienss of our filtration system.											
Inorganic Contaminants											
Chromium (ppb)	100	100	n/a	ND	n/a	2004	1.9	n/a	2004	No	Erosion of natural deposits.
Copper (ppm)	n/a	n/a	1.3	ND	n/a	2004	0.0023	n/a	2004	No	Corrosion of household plumbing systems; erosion of natural deposits.
Fluoride (ppm)	4	4	n/a	ND	n/a	2004	0.14	ND - 0.08	2004	No	Erosion of natural deposits.
Lead (ppb)	n/a	n/a	15	ND	n/a	2004	0.93	n/a	2004	No	Corrosion of household plumbing systems; erosion of natural deposits
Nitrate (ppm)	10	10	n/a	ND	n/a	2004	0.37	ND - 0.43	2004	No	Runoff from fertilizer use. Leaching from septic tanks. Erosion of natural deposits.
Disinfection By-Products											
Haloacetic acids (ppb)	60		n/a	n/a	12.94	9.7 - 14.1	2004	11.4	10.9 - 11.9	2004	No	Byproduct of drinking water disinfection.
Total Trihalomethanes (TTHMs) (ppb)	80		n/a	n/a	9.20	4.6 - 13.3	2004	10.65	6.3 - 13.3	2004	No	Byproduct of drinking water disinfection.

Haloacetic Acids or "HAA5" means the sum of the concentration of the haloacetic acids (monochloroacetic acid, dichloroacetic acid, trichloroacetic acid, monobromoacetic acid, and dibromoacetic acid)
Total Trihalomethanes or "TTHM" means the sum of the concentration of the trihalomethane compounds [trichloromethane (chloroform), dibromochloromethane, bromodichloromethane, and tribromomethane (bromoform)]

Sodium (Not Regulated by State or Federal Government)

			Waimea Treatment Plant							
Contaminants	MCL	MCLG	Level Found	Range of Detections	Sample Date	Level Found	Range of Detections	Sample Date	Violation	Typical Source of Contaminant
Inorganic Contaminants										
Sodium (ppm)	n/a	none	7.0	n/a	2004	n/a	n/a	2004	No	Erosion of naturally occurring deposits; additive used for corrosion control.

Lead and Copper Rule Compliance

			South Kohala Water System					
Contaminant	AL	MCLG	Level Found	Range of Detections	# of Sites > AL	Sample Date	Violation	Typical Source of Contaminant
Lead (ppb)	15	0	9.8	n/a	3/48	2004	No	Corrosion of household plumbing systems; erosion of natural deposits.
Copper (ppm)	1.3	1.3	0.082	n/a	0/48	2004	No	Corrosion of household plumbing systems; erosion of natural deposits.

Key definitions of terms used in this report

- MCLG = Maximum Contaminant Level Goal: The level of a contaminant in drinking water below which there is no known or expected risk for health. MCLGs allow for a margin of safety.
- MCL = Maximum Contaminant Level: The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology
- AL = Action Level: The concentration of a contaminant which, if exceeded, triggers treatment or other requirements which a water system must follow.
- TT = Treatment Technique: A required process intended to reduce the level of a contaminant in drinking water.
- ppm = Parts per million. One ppm corresponds to a single penny in $10,000 or about one minute in two years.
- ppb = Parts per billion. One ppb corresponds to a single penny in $10,000,000 or about one minute in two thousand years.
- NTU = Nephelometric Turbidity Units: This is a measure of the suspended material in water.
- ND = Not Detected: If a contaminant is not measured at or above its minimum detection limit, it is reported as Not Detected - detection limits are available upon request.
- n/a = not applicable

Where does my water come from?

The sources of water for South Kohala Water System are Waikoloa and Kohakohau Streams (which are surface water sources). The water is collected and stored in three (3) fifty million-gallon reservoirs. The water is then transmitted to Waimea Treatment Plant where it is processed. The Parker Ranch Well is utilized to supplement the water for South Kohala, when needed.
In previous years we have included a map of the distribution system. However, because we are taking measures to safeguard your water supply, we are not including the map in this year's water quality report. Thank you for your understanding.

Sodium in drinking water

There is no State or Federal maximum contaminant level for sodium. Although required, monitoring for sodium is performed primarily to gather information for the consumers, the Safe Drinking Water Branch, and the Department of Water Supply.
The EPA Drinking Water Advisory recommends that the sodium concentration in drinking water not exceed a range of 30 to 60 mg/L because of the possible adverse effects on taste at higher concentrations. For persons on a sodium-restricted diet, sodium concentrations greater than 120 mg/L could be problematic. If you are on a sodium-restricted diet, you should consult your physician about the level of sodium in the drinking water.

Sources of drinking water

The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally-occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity. Contaminants that may be present in source water include:

- Microbial contaminants, such as viruses and bacteria, which may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife.
- Inorganic contaminants, such as salts and metals, which can be naturally-occurring or result from urban stormwater runoff, industrial or domestic wastewater discharges, oil and gas production, mining, or farming.
- Pesticides and herbicides, which may come from a variety of sources such as agriculture, urban stormwater runoff, and residential uses
- Organic chemical contaminants, including synthetic and volatile organic chemicals, which are byproducts of industrial processes and petroleum production, and can also come from gas stations, urban stormwater runoff, and septic systems.
- Radioactive contaminants, which can be naturally-occurring or be the result of oil and gas production and mining activities.

In order to ensure that tap water is safe to drink, EPA prescribes regulations which limit the amount of certain contaminants in water provided by public water systems. Food and Drug Administration regulations establish limits for contaminants in bottled water which must provide the same protection for public health.

Lead in your water

Some homes in South Kohala Water System have levels of lead that have exceeded the action level. The lead leaches from the home plumbing system.
Infants and young children are typically more vulnerable to lead in drinking water than the general population. Infants and children who drink water containing lead in excess of the action level could experience delays in their physical or mental development. Children could show slight deficits in attention span and learning abilities. Adults who drink this water over many years could develop kidney problems or high blood pressure. It is possible that lead levels at your home may be higher than at other homes in the community as a result of materials used in your home's plumbing. If you are concerned about elevated lead levels in your home's water, you may wish to have your water tested and you could flush your tap for 30 seconds to 2 minutes before using the water. For additional information, call the Safe Drinking Water Hotline at 1-(800)-426-4791.
Due to the elevated lead levels, the Department of Water Supply (DWS) has implemented corrosion control treatment at Waimea Treatment Plant. This treatment involves adjusting the chemistry of the water to lessen its corrosiveness, which in turn will minimize the leaching of the lead. The DWS continually monitors the effectiveness of the corrosion control treatment. During the interim, the Department recommends that whenever the faucet has gone unused for more than six hours, customers flush their taps before using the water for drinking or cooking. Flushing the tap means running the cold water until the water gets noticeably colder, (usually for about a minute).

WAIMEA PRODUCTION WELL

ENVIRONMENTAL ASSESSMENT

APPENDIX 4

PUMP TEST RESULTS FOR EXPLORATORY WELL

Pump Test Results and Development Recommendations for the Waimea Exploratory Well Job No. 43-HW-A Waimea, Hawaii

Prepared for:

State of Hawaii
Department of Land and Natural Resources
Land Division - Engineering Branch
1151 Punchbowl Street - Room 221
Honolulu, Hawaii 96813

Prepared by:

Tom Nance Water Resource Engineering
680 Ala Moana Boulevard - Suite 406
Honolulu, Hawaii 96813

February 2000

Table of Contents

List of Figures

List of Tables

Introduction

should be 6240-02

This report summarizes information compiled during pump testing of the Waimea Exploratory Well (State No. 6140-01) and provides recommendations on development of the well as a new source of water supply. The well is located above Waimea Town at a ground elevation of 2970 feet (refer to Figure 1). Two other wells have been completed in near proximity, the U.S. Geological Survey's test well (No. 6240-01) which is about 350 feet to the west and the Parker Ranch Well (No. 6239-02) about 1500 feet to the east. All three wells tap high level groundwater which stands 1255 to 1260 feet above sea level.

Construction and Pump Testing of the Well

The well was drilled, cased, and pump tested by Waieli Drilling & Development. The 12-1/4 inch pilot hole was started December 16, 1998 and finished on January 27, 1999. Reaming to 23 inches in two passes was done from February 2 to April 19, 1999. Total depth of the well is 2000 feet, ending approximately 970 feet above sea level. Its completed construction consists of 1730 feet of solid 16-inch casing, 120 feet of Full-Flow perforated casing, and 150 feet of 15-inch diameter open hole (Figure 2). A log of the geologic strata penetrated during drilling prepared by Glenn Bauer of the Commission on Water Resource Management is included as Appendix A.

Pump testing was done using a Johnston line shaft vertical turbine pump, a 1:1 right-angle drive, and a diesel engine rated at 1000 horsepower. The step-drawdown portion of pump testing was done on December 8, 1999. The constant rate pump tested was initially started on December 9th. However, a gradual loss of power of the diesel engine required the test to be aborted after less than 24 hours. After the contractor completed repairs to the engine, a seven-day pump test at an overall average of approximately 1450 GPM was completed from January 8 to 15, 2000.

Step-Drawdown Pump Test Results

The December 8th step-test consisted of measuring the drawdown at four increasing rates of pumping between 645 and 1435 gallons per minute (GPM). Each rate was run for approximately one hour, starting at 9:00 a.m. and completing the test at 1:00 p.m. Drawdown at the end of each hour-long step is shown in the tabulation below. Using the fitted curve derived from these four performance points, the well's expected hydraulic performance over a range of pumping rates is shown on Figure 3.

December 8, 1999 Step-Drawdown Performance Points

Flowrate (GPM)	Drawdown (Feet)
645	3.0
1043	5.5
1286	7.1
1435	8.2

Fitted Curve:

$S = AQ^2 + BQ$ where: S = Drawdown (Ft)
Q = Flowrate (GPM)
$A = 1.335 \times 10^{-6}$
$B = 3.818 \times 10^{-3}$
$r^2 = 0.99$

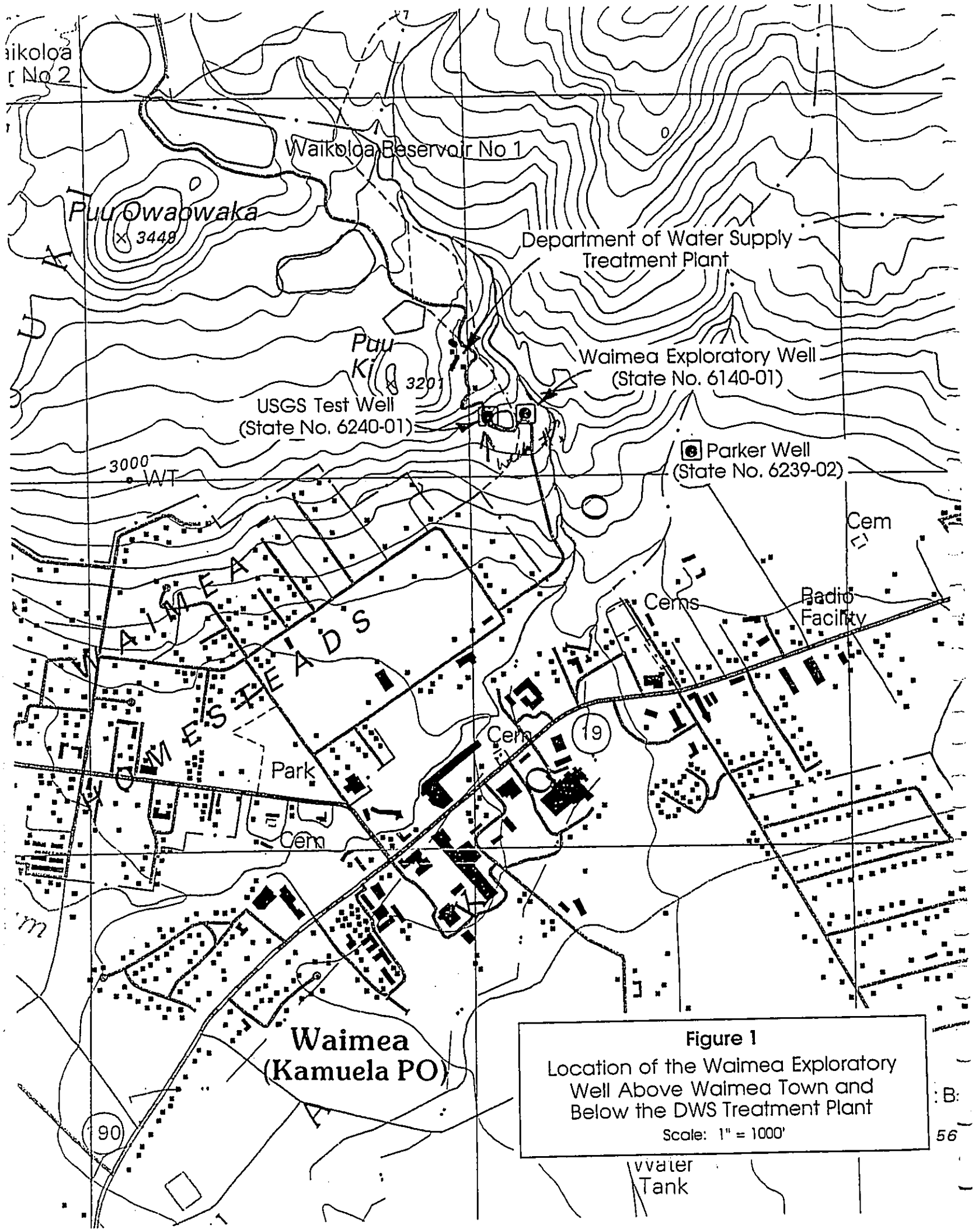


Figure 1

Location of the Waimea Exploratory Well Above Waimea Town and Below the DWS Treatment Plant

Scale: 1" = 1000'

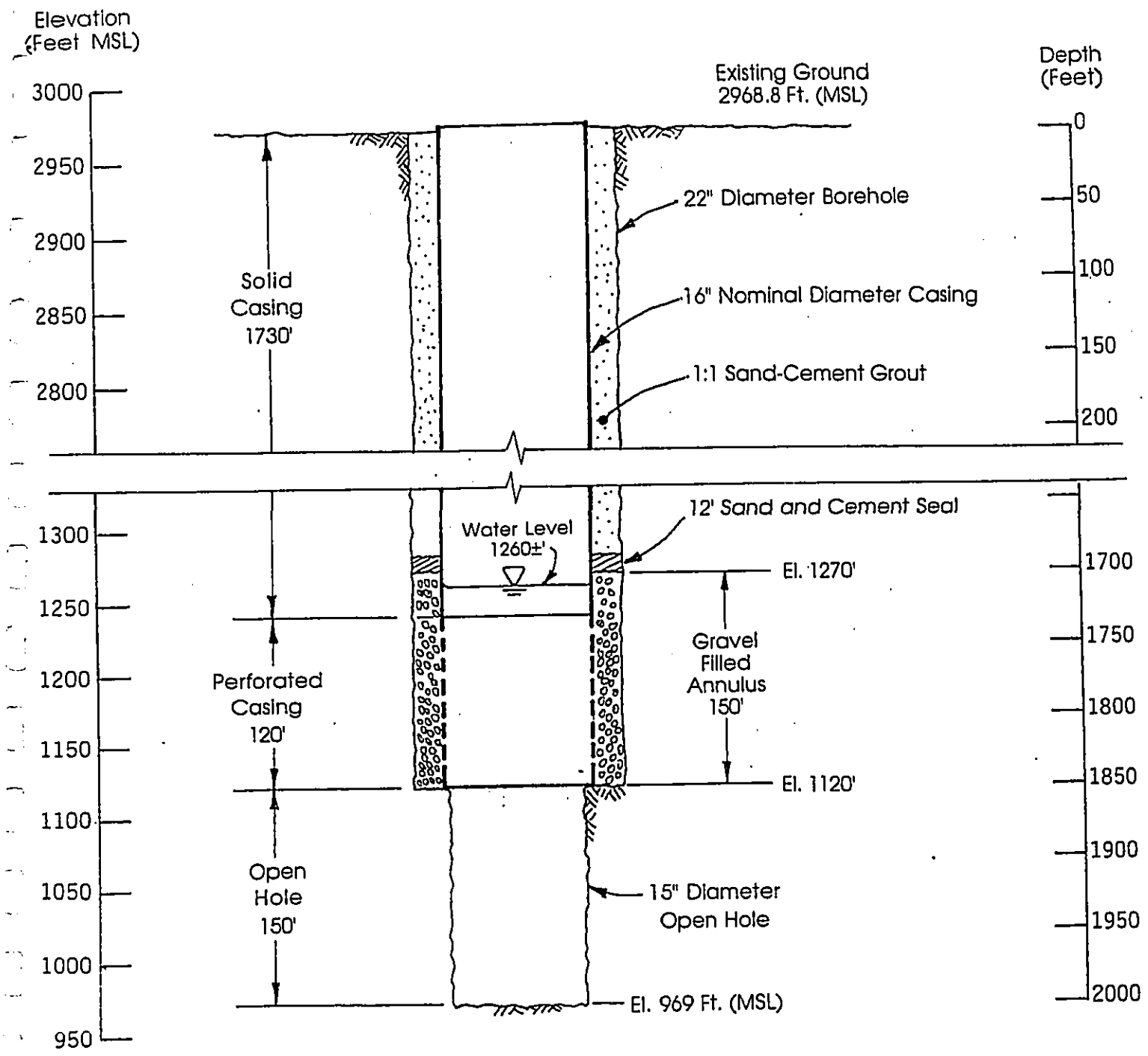
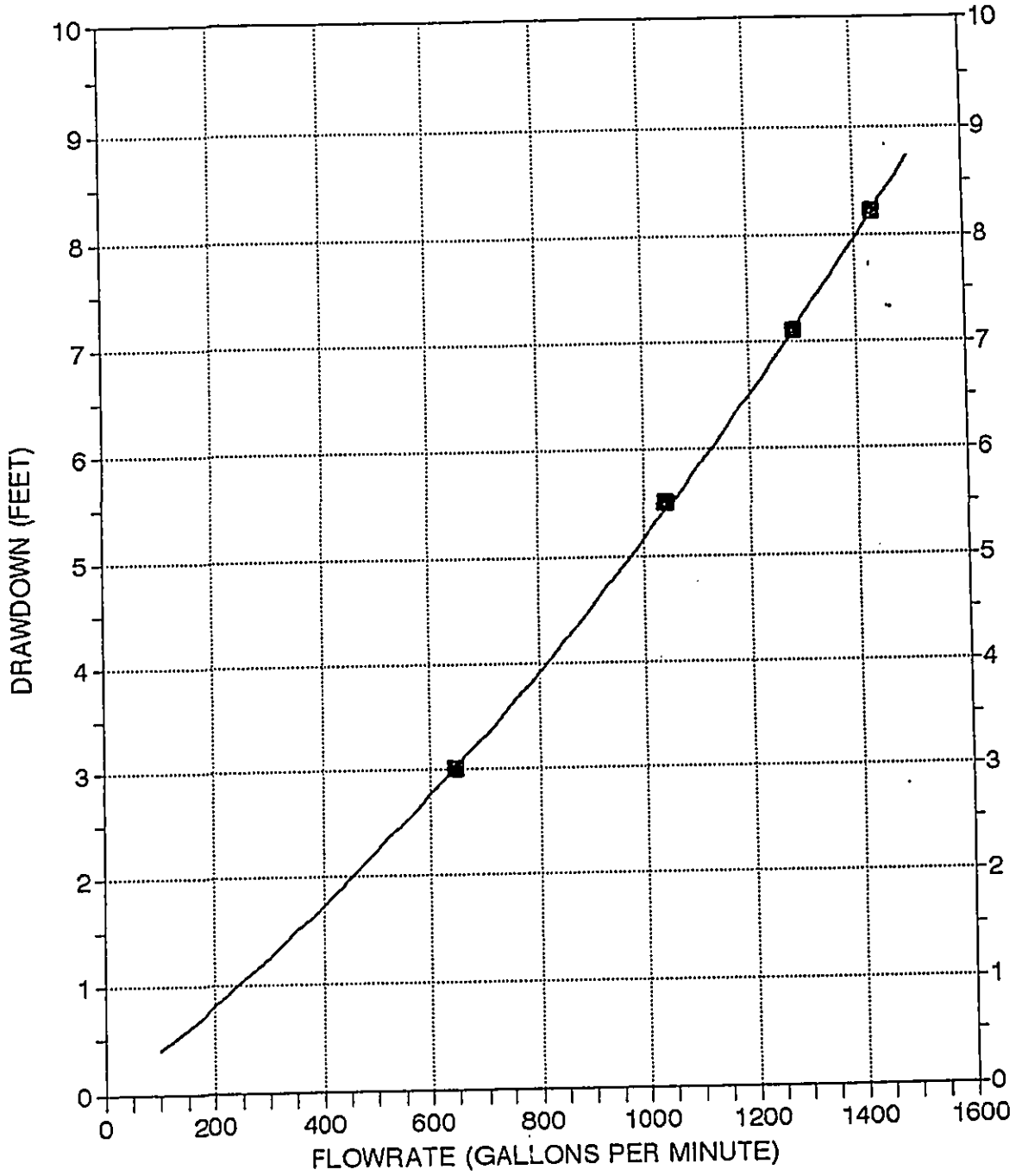


Figure 2
As-Built Schematic of the
Waimea Exploratory Well
(Not to Scale)

FIGURE 3. STEP-DRAWDOWN PERFORMANCE
OF THE WAIMEA EXPLORATORY WELL



Constant Rate Pump Test Results

The constant rate pump test was run for seven days, starting at 12:05 p.m. on January 8th and ending at 12:23 p.m. on January 15th. There were two outages for mechanical problems during this seven-day period. The first occurred on January 9th from 3:10 p.m. to 8:30 p.m., an interval of five hours and 20 minutes. The second, on January 12th, was only for 20 minutes from 4:30 to 4:50 p.m. A total of 14.607 million gallons was pumped over the seven-day test for a gross average of 1447 GPM including outages. The average pumping rate was 1497 GPM if the two pumping interruptions are excluded.

The recorded water level in the well before, during, and following the pump test is shown on Figure 4. The recording was made using a Solinst Type F100 Levelogger installed the 1-1/4 inch chase tube strapped to the pump column. The recording interval over the period shown was five minutes, except during the first two hours of recovery when data were taken at one-minute intervals. Water level resolution of this logger is approximately 1/1000th of full scale or 0.1 feet, a contributing factor to the "noise" in the recording. However, downhole vibration when the pump is operating caused most of the water level variability during that portion of the record.

The water level in USGS Well 6240-01 and at Marine Dam on Waikoloa Stream were also monitored during the pump test. The recording in the USGS well is shown on Figure 5, plotted at a different vertical scale than the pumping well. There was an almost immediate drawdown response in the USGS well. The initial drawdown response at the start of pumping and start of recovery when pumping stopped were quite rapid. Attempts were also made to install a water level recorder in Parker Well 6239-02 located 1500 to the east. However, its chase tube is sufficiently deformed or partially collapsed about 400 feet below ground, preventing the 7/8-inch diameter Solinst logger from moving past that point.

Water samples were collected at 12-hour intervals throughout the seven-day test and analyzed for chlorides and conductivity. These results are compiled on Table 1. The well produced water of consistently excellent quality, with chlorides in the range of 4 to 6 milligrams per liter, conductivity of 137 to 139 micromhos, and a field temperature of 69° F. Waieli personnel recorded the flowrate, airline reading, and water temperature at one-hour intervals throughout the test. A copy of Waieli's data can be found in Appendix B.

Longer-Term Water Level Recordings

Water level recording was started in USGS Well 6240-01 in August 1999 and at Marine Dam in early September, months in advance of the January 2000 pump test of the Waimea Exploratory Well. The 6-month records at these two locations are presented on Figure 6. The water level variation over six months in USGS Well 6240-01, exclusive of its drawdown during the pump test, was 0.9 feet (from a high of 1257.1 in August 1999 to a low of 1256.2 in December). At Marine Dam, there was an unusually high number of short period runoff events in October to December 1999 and again in January 2000 during the pump test.

FIGURE 4. WATER LEVEL IN WELL 6140-01
DURING THE CONSTANT RATE PUMP TEST

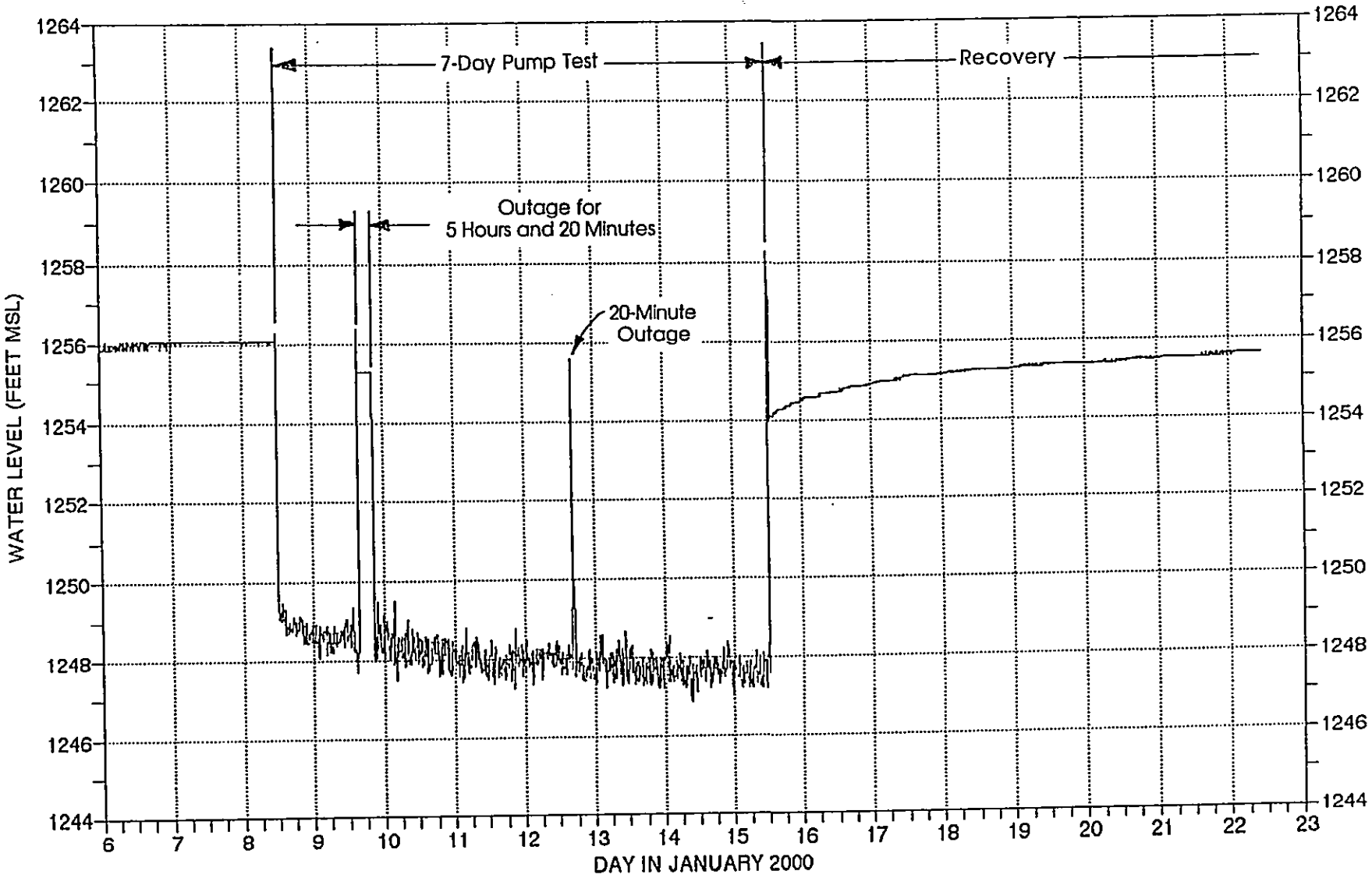
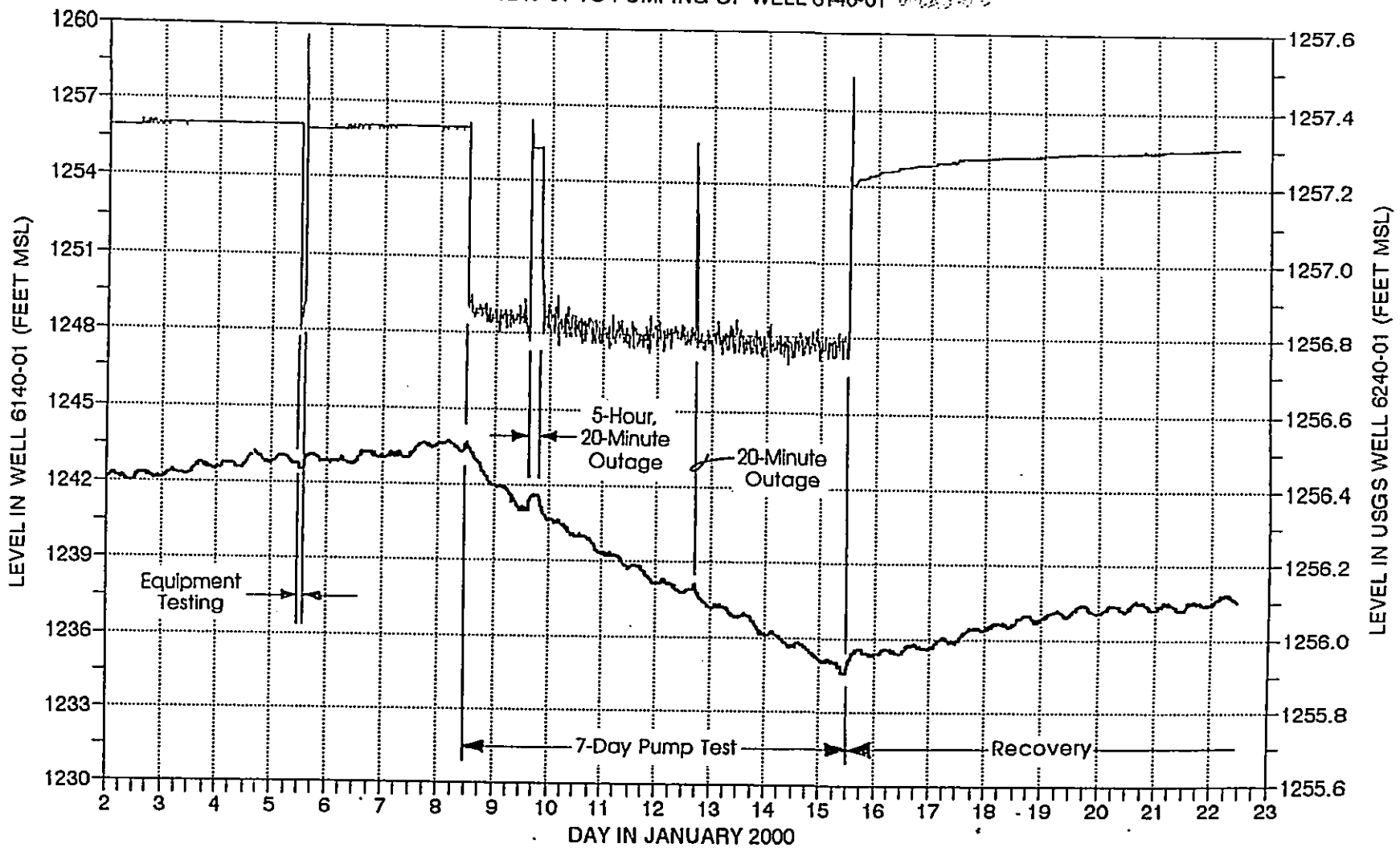


FIGURE 5. RESPONSE IN USGS TEST WELL
6240-01 TO PUMPING OF WELL 6140-01 6240-02



6240-02

Table 1

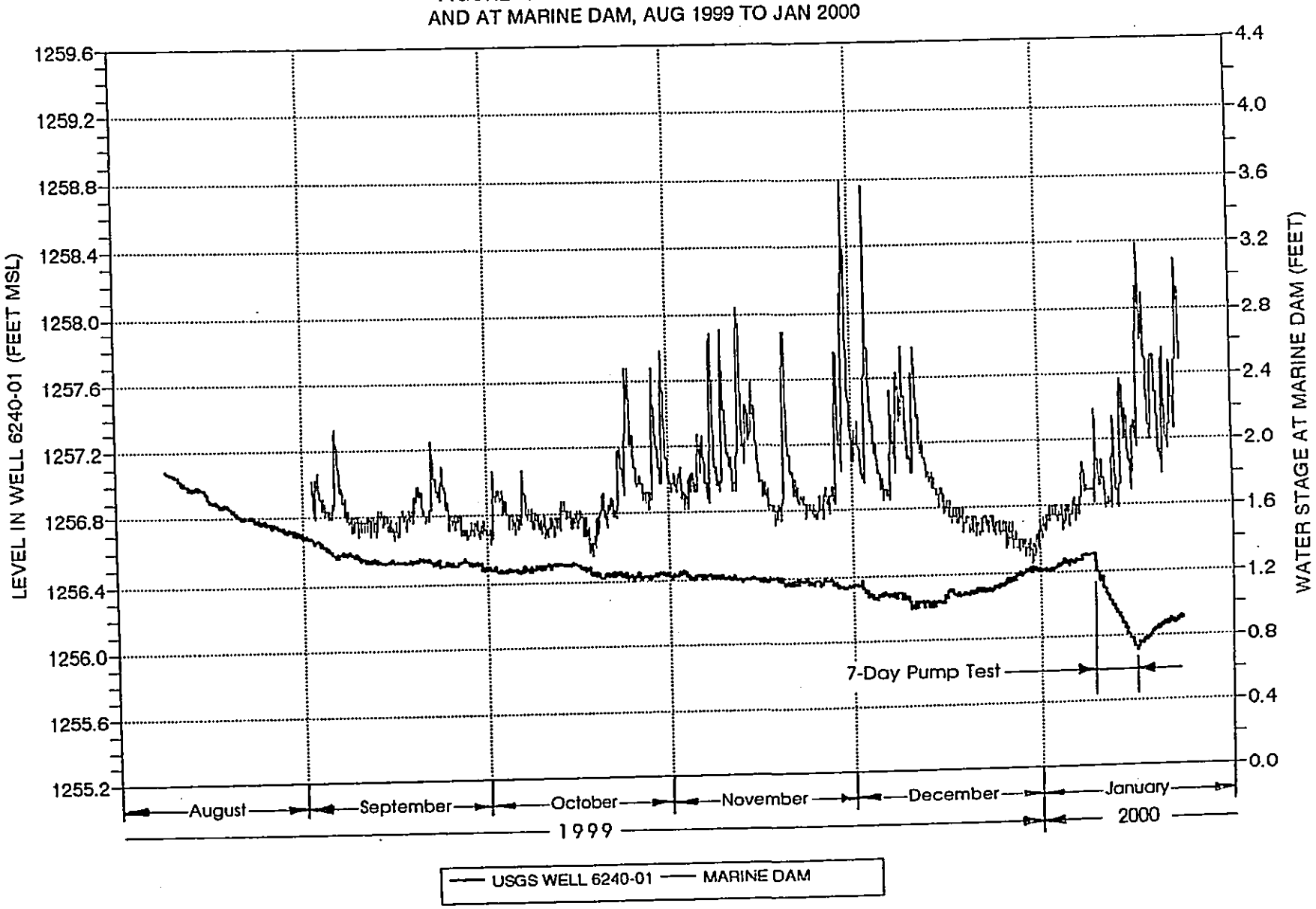
Conductivity, Chlorides, and Field Temperature of Samples Taken During the January 8 to 15, 2000 Pump Test

Sample		Conductivity (Micromhos at 25° C.)	Chlorides (MG/L)	Field Temperature (° F.)
Day in January	Time			
8	13:00	139	6	69
9	1:00	139	5	69
	13:00	138	6	68
10	1:00	138	5	69
	13:00	138	5	69
11	1:00	138	5	68
	13:00	138	5	69
12	1:00	138	5	69
	13:00	137	5	69
13	1:00	137	6	68
	13:00	138	6	69
14	1:00	137	5	69
	13:00	138	5	69
15	1:00	137	5	69
	12:00	138	4	69

Notes: 1. Conductivity measured with an Orion Model 130 meter calibrated at 100 micromhos.

2. Chlorides analyzed by mercuric nitrate titration in the office of Tom Nance Water Resource Engineering.

FIGURE 6. WATER LEVELS IN WELL 6240-01
AND AT MARINE DAM, AUG 1999 TO JAN 2000



Semi-Log Plots of Drawdown and Recovery

Figure 7 is a semi-log plot of drawdown and recovery in the Waimea Exploratory Well. On this graph, recovery is plotted on the horizontal scale as the time since pumping started divided by the time pumping stopped. As such, the recovery data plots from right to left across the graph. It should be noted that the early recovery (right-hand side of the graph) is distorted by the backspin of the pump, or more specifically by the water draining back down the pump column during the backspin. The backspin itself took 5 minutes and 25 seconds. Distortion of the recovery data extended for the first 13 minutes after the pump was shut down.

To create a similar semi-log plot of drawdown and recovery in the USGS Well 6240-01, an accounting for its gradually rising water level prior to the start of the pump test is appropriate (refer to Figure 8). Figure 9 is a semi-log plot without such a correction and Figure 10 is a similar plot with drawdown and recovery calculated as the difference between recorded level and the linearly extrapolated rising water level.

Conclusions Based on the Pump Test Results

1. The Waimea Exploratory Well taps the same high level compartment as USGS Well located approximately 350 feet to the west. The response in the USGS well to the start and stop of the pump in DLNR's well occurs within minutes.

2. Based on the semi-log plot (Figure 7), a slope break in the drawdown curve occurred approximately 1700 minutes into the test (coinciding, unfortunately, with the 5-hour, 20-minute outage for mechanical problems). The change to a steeper slope on the semi-log plot for the remainder of the test is indicative of an aquifer boundary influencing the rate of drawdown.

3. Recovery data were collected for approximately seven days following the end of pumping. At the end of this period, the recovered water level in the Waimea Exploratory Well was 2.6 feet below the starting static level (also on Figure 7). Recovery in the USGS Well was 0.4 to 0.6 feet less than its starting water level (Figures 9 and 10).

4. Although a continuous water level recording in Parker Well 6239-01 was not possible, the comparison of measured water levels listed below shows the level in the Parker Well to be consistently five to six feet higher than in the USGS and Waimea Exploratory wells.

Parameter	USGS Test Well No. 6240-01	Parker Well No. 6239-02
Measuring Point Elevation (Ft. MSL)	2971.7	2827.9
Water Levels : August 23, 1999	1256.8	1262.1
: January 22, 2000	1256.2	1262.2
: July 19, 1994	1259.5	1264.4

Notes: 1. Measuring point elevations are top of casing of the respective wells.
2. July 19, 1994 measurements by Waimea Water Services. The other level measurements by Tom Nance Water Resource Engineering.

FIGURE 7. SEMI-LOG PLOT OF DRAWDOWN
AND RECOVERY IN WELL 6140-01

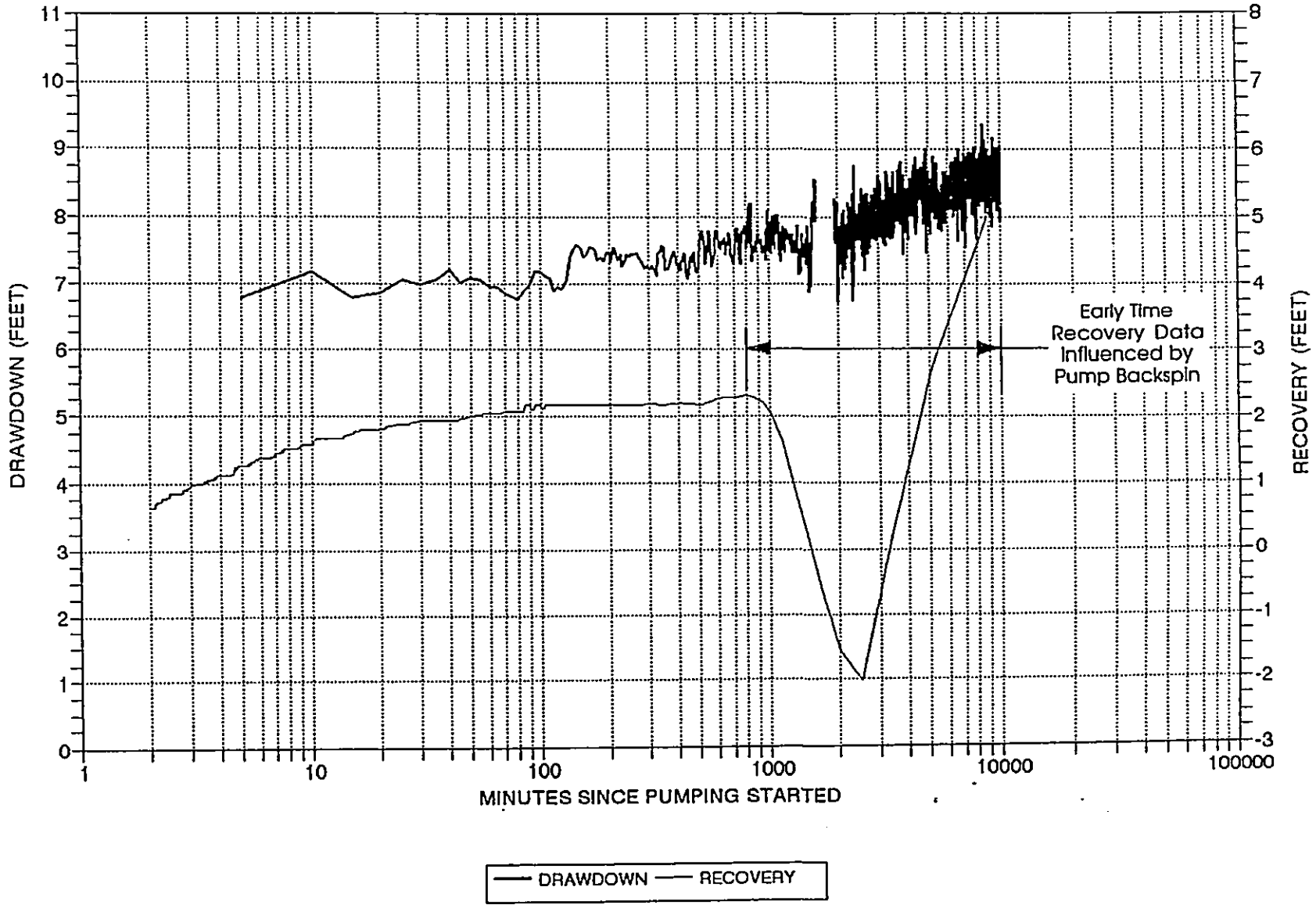


FIGURE 8. LINEAR PLOT OF USGS
WELL 6240-01, JAN. 1 TO 23, 2000

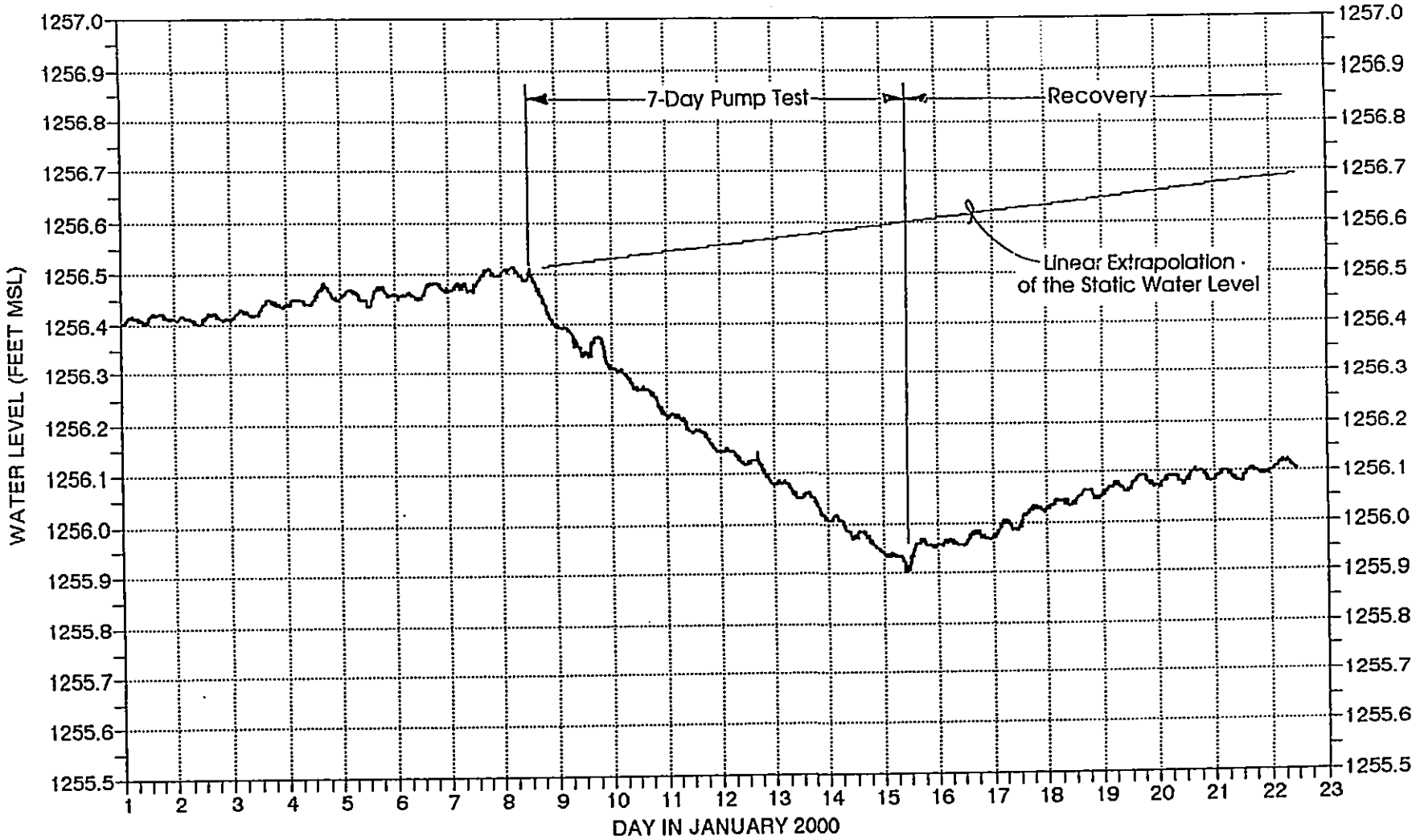


FIGURE 9. SEMI-LOG PLOT OF DRAWDOWN
AND RECOVERY IN USGS WELL 6240-01

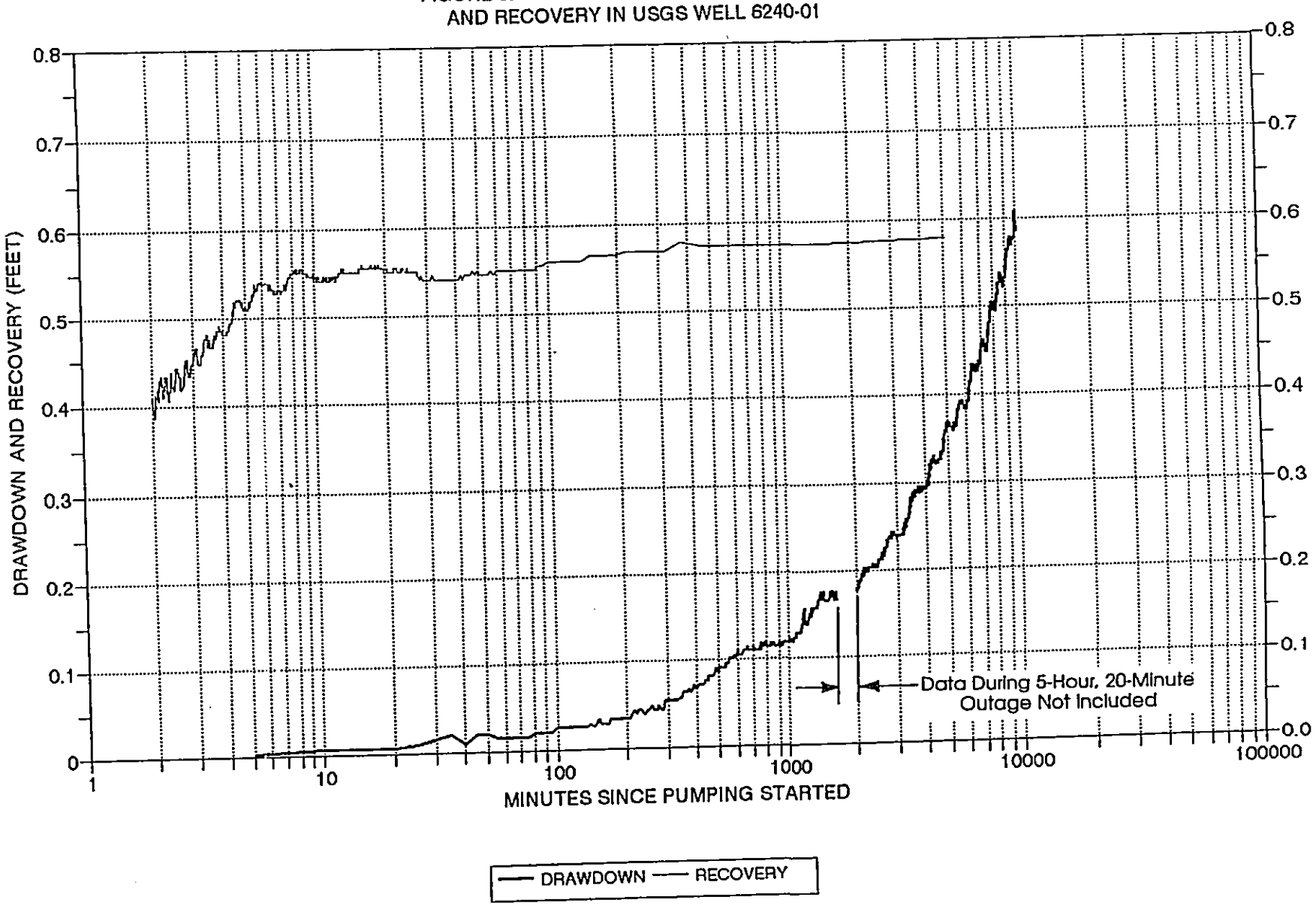
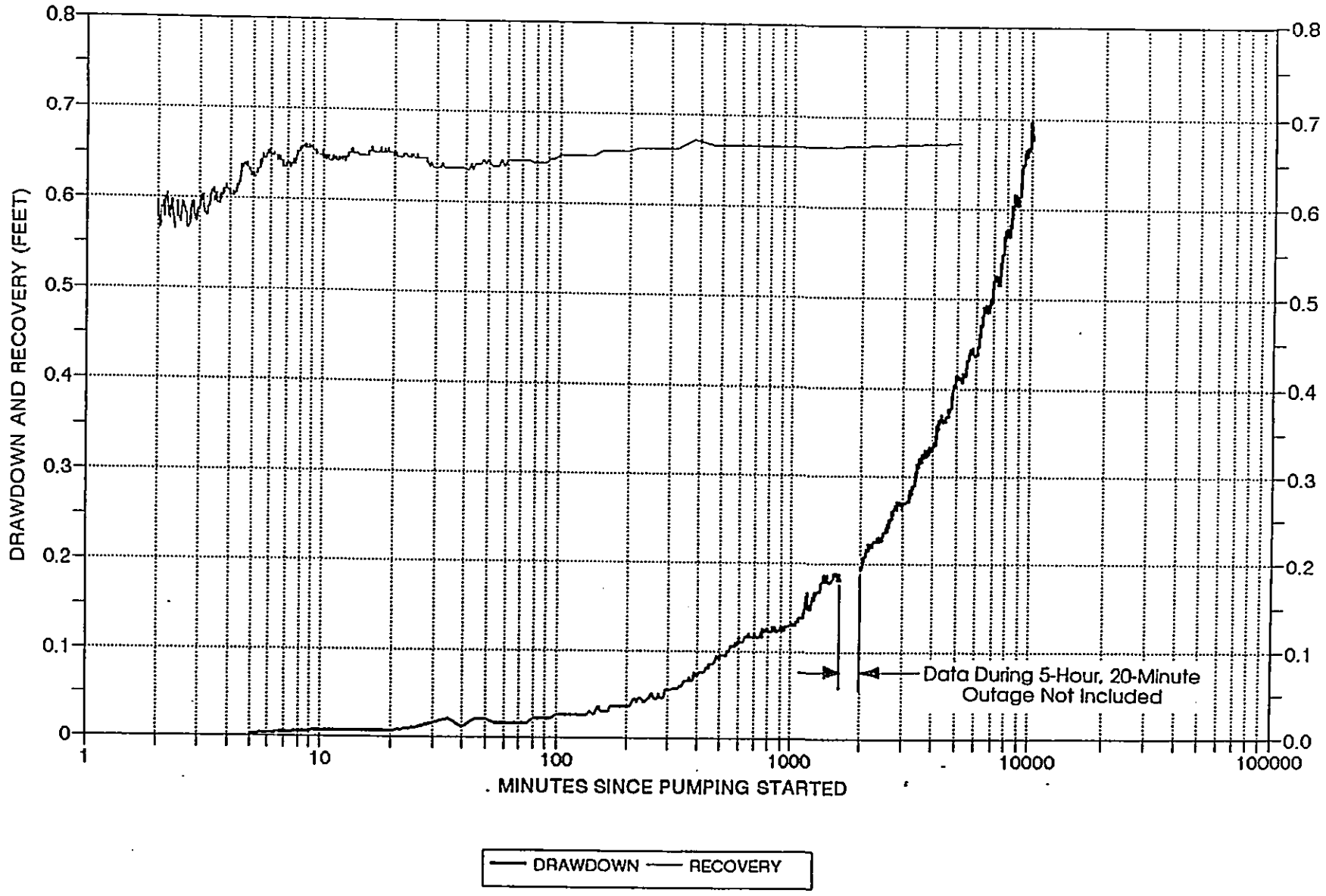


FIGURE 10. ADJUSTED SEMI-LOG PLOT FOR
USGS WELL 6240-01



Recommendations for the Permanent Pump

1. The logical delivery point for water pumped from the well is the Department of Water Supply's nearby Waimea Treatment Plant Clearwater Reservoir. It has a 4 MG storage volume, and bottom and overflow elevations of 3036 and 3052 feet (MSL). The transmission pipeline distance would be approximately 600 feet if it is routed directly upslope behind the treatment plant's (open) wastewater reservoir. An alternative route following the treatment plant's access road would be almost twice as long.

2. The pump intake should be set a minimum of 1775 feet below ground or approximately 60 feet into water. This will provide adequate submergence for seasonal water level variations and drawdown due to pumping.

3. For the 1715-foot depth to water, a submersible pump is the appropriate choice. Although test pumping was done with a line shaft pump, the depth of setting is too great to use this type of pump for permanent water production.

4. Since specific supply requirements for the well have not yet been established, sizing requirements for a range of pumping rates between 700 and 1400 GPM have been calculated (refer to the tally below). Due to the substantial pumping lift, motor horsepowers range from 415 to 826. For the 16-inch (OD), 15.25-inch (ID) casing, a 4-pole (1760 RPM) submersible motor would have too large a diameter. The motor will have to be 2-pole (3500 RPM).

Pumping Rate (GPM)	Recommended Sizes		Total Dynamic Head (Feet)	Required Motor Horsepower
	Riser Pipe Diameter (Inches)	Transmission Pipe Size (Inches)		
700	8	8	1833	415
800	8	8	1842	477
900	10	8	1850	539
1000	10	8	1833	593
1200	10	12	1829	711
1400	12	12	1822	826

Assumptions:
1. Hazen Williams friction factor, C, is 100.
2. Pump bowl efficiency is 78%.
3. Transmission pipe length is 600 feet.