November 4, 1999

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

Dear Ms. Salmonson:

Subject: Finding of No Significant Impact (FONSI) for Pumps and Controls for Puhi Well Nos. 5A and 5B and Modification to Puhi Well No. 1, TMK: (4)3-4-05:10&14, (4)3-4-07:3&6

The Department of Water has reviewed the comments received during the 30-day public comment period that began on April 23, 1999 for the subject Environmental Assessment. We have determined that this project will not have significant environmental effects and are issuing a FONSI. Please publish this notice in the December 8, 1999 OEQC Environmental Notice.

We have enclosed a completed OEQC Publication Form and four copies of the final EA. Please call the Project Engineer, William Eddy, at (808) 245-5412 if you have any questions.

Sincerely,

[Signature]
Ernest Y.W. Iau
Manager and Chief Engineer

c: Sato and Associates, Inc.
FINAL ENVIRONMENTAL ASSESSMENT

PUMPS AND CONTROLS

for

PUHI WELL NOS. 5A & 5B

and

MODIFICATION TO PUHI WELL NO. 1

This environmental document prepared pursuant to Chapter 343, HRS

Proposing Agency

Department of Water
County of Kauai
State of Hawaii

November 1999
FINAL
ENVIRONMENTAL ASSESSMENT

PUMPS AND CONTROLS
for
PUHI WELL NOS. 5A & 5B
and
MODIFICATION TO PUHI WELL NO. 1

Proposing Agency

Department of Water
County of Kauai
State of Hawaii

Prepared by

Sato & Associates, Inc.
2046 S. King Street
Honolulu, HI 96826

November 1999
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I. EXECUTIVE SUMMARY

The Department of Water is mandated to provide potable water for the Island of Kauai. The proposed action will increase the available source for both the Puhī and Līhūe Water Systems to meet projected water demands. According to the Kauai Water Use and Development Plan, February 1990, potable water uses within the Hanamaulū Aquifer would increase to 7.55 mgd by the year 2010. Current capacity of the existing potable water wells are 5.07 mgd. See Section VI.D. Ground Water Hydrology.

The Department of Water (DOW), County of Kauai, is proposing to develop two (2) deepwells into production and to modify piping, electrical and control systems, and to install a new radio controlled Supervisory Control and Data Acquisition (SCADA) System.

Four (4) separate sites are included in this project.

Existing Puhī 510 Reservoir Site

This site has been fully developed and includes two (2) concrete water storage reservoirs, and related piping, electrical and control systems.

The DOW has completed two (2) exploratory wells and obtained hydrological data for the wells located within the resources of the Līhūe Basin. Test data indicates that the well will produce water meeting the Department of Health safe drinking water standards.

DOW proposes to put into production the two (2) wells by installing deepwell pumps and related piping, electrical work, and construction of a control building.

Existing Puhī Well No. 1 Site

Since additional source is being provided for the Puhī 510 Water System, the DOW also proposes to transfer the Puhī Well No. 1 source to the Līhūe 393 Water System. DOW proposes to provide a connection to the Līhūe 393 system. The existing connection to the Puhī 510 Water System will be retained for emergency purposes.

The existing pump controls will be modified and a new radio system will be installed within the existing control building.

Existing Puhī 393 Reservoir Site

DOW proposes to activate the Puhī Well No. 1 pump from this reservoir. This will require modifying the existing valve controls. A new radio system will be installed in the existing control building.

Existing Puhī Well No. 3 Site

A new radio system will be installed within the existing control building.

All four (4) sites are fully developed and are located within the Puhī area on the Island of Kauai approximately two (2) miles west of Līhūe. See Figures 1, 2, 3 and 4 for location.
The proposed improvements noted above are anticipated to have limited environmental impacts.

Department of Water, County of Kauai, funds will be used for this development and is, therefore, subject to the Hawaii environmental process and Chapter 343 of the Hawaii Revised Statutes and Chapter 200 of Title 11, Department of Health Administrative Rules.
TAX MAP SITE LOCATION
SOURCE: TMK: 4-3-4-05

GRAPHIC SCALE

1" = 2000'

FIGURE 3
TAX MAP SITE LOCATION
SOURCE: TMK: 4-3-4-07

GRAPHIC SCALE

1" = 800'
II. SUMMARY INFORMATION

Pursuant to Chapter 343, Hawaii Revised Statutes, for Environmental Assessments:

Proposing Agency: Department of Water, County of Kauai
Accepting Agency: Department of Water, County of Kauai
Project Name: Pump and Controls for Puhi Well No. 5A and Puhi Well No. 5B, and Modifications to Puhi Well No. 1
Project Description: Deepwell pumps installation, modification of existing deepwell pump, and appurtenant piping, electrical and controls
Determination: Finding of No Significant Impact (FONSI)
Project Location: Puhi, Kauai, Hawaii
Tax Map Key (Landowner) 3-4-05: 10 & 14 (Department of Water) - Puhi 510 Reservoir
3-4-07: por 03 (University of Hawaii) - Puhi Well Nos. 1 & 3
3-4-07: por 06 (University of Hawaii) - Puhi 393 Reservoir
State Land Use Designation: Agricultural
County Zoning: Open and Agriculture
III. PERMITS AND APPROVALS REQUIRED

Conversion of the exploratory wells to development wells and modifications to the existing deepwell pump will require the following permits:

**County of Kauai Planning Department**: Use Permit for utility installations in agricultural and open space zoned areas.

**Commission on Water Resource Management**: Permanent Pump Installation Permit for the new pumps and pump modification and a Water Use Permit.

**Department of Health, Safe Drinking Water Branch**: Approval to develop a potable water source with connection to a public water system.

**Department of Health, Clean Water Branch**: National Pollutant Discharge Elimination System (NPDES) Permit if there are discharge of hydrotesting or well effluent into State waters through use of the county storm sewer system.

**County of Kauai, Department of Public Works, Building Division**: Building Permit.

Federal and state regulations define a public water system as a system that serves 25 or more individuals at least 60 days per year or has at least 15 service connections. All public water system owners and operators are required to comply with the Hawaii Administrative Rules, Title 11, Chapter 20, "Rules Relating to Potable Water Systems." The Department of Water intends to integrate two new wells, Puhii Well No. 5A and Puhii Well No. 5B into the existing Puhii Water System and accordingly, the Department will comply with the "Rules Relating to Potable Water Systems."

Section 11-20-29 of Chapter 20 requires that all new sources of potable water serving a public water system be approved by the Director of Health prior to its use. Such an approval is based primarily upon the submission of a satisfactory engineering report that addresses the requirements set in Section 11-20-29.
IV. LISTS OF INDIVIDUALS, COMMUNITY GROUPS AND AGENCIES CONTACTED

The following were contacted for information and consultation during the preparation of the draft EA.

State Agencies

Department of Health, Environmental Management Division, Safe Drinking Water Branch
Department of Health, Environmental Management Division, Solid and Hazardous Waste Branch
Department of Health, Environmental Management Division, Wastewater Branch
Department of Health, Environmental Health Administration, Hazard Evaluation & Emergency Response Office
Department of Land and Natural Resources, Commission on Water Resource Management

Kauai County Agencies

Department of Water Planning Department
V. PROJECT DESCRIPTION

A. Background

The Puhì Water System is a municipal system serving the Lihue District consisting of commercial, residential and open areas. The primary sources of potable water are from four (4) existing well sites. Puhì Well No. 1 currently operates at approximately 200 gpm, while Puhì Well No. 2 operates at approximately 300 gpm, Puhì Well No. 3 at approximately 300 gpm, and Puhì Well No. 4 at approximately 200 gpm. Ground water from these four (4) deep wells are pumped to the Puhì 510 Reservoirs. The Puhì 510 Reservoir site currently consist of one (1) 0.5 million gallon concrete reservoir and one (1) 1.0 million gallon concrete reservoir.

The Puhì 393 Reservoir is connected to the Lihue Water System and currently receives makeup water from the Puhì 510 Reservoirs. The site consists of one (1) 1.0 million gallon concrete reservoir.

B. Location

The Puhì wells and reservoirs sites are located within the Lihue District on the Island of Kauai, approximately two (2) miles west of Lihue.

The Puhì 510 Reservoir Site is on a 0.59 acre site identified as Tax Map Key (TMK) 3-4-05: 10 and 14 and is owned by the Department of Water. The site is approximately 5,700 feet north of Kaumuailii Highway and is situated within former cultivated cane lands.

The Puhì 393 Reservoir Site is on a 1.30 acre site identified as TMK 3-4-07:06. This site is approximately 4,000 feet north of Kaumuailii Highway, also surrounded by former cultivated cane lands. The land is owned by the University of Hawaii although the reservoirs are maintained by the Department of Water.

The Puhì Well No. 1 Site and Puhì Well No. 3 Site are located within the parcel identified as 4-3-07:03 owned by the University of Hawaii. The Puhì Well No. 1 site is approximately 1,700 feet north of Kaumuailii Highway adjacent to an open field used by the Kauai Community College. The closest building is approximately 500 feet away from the well site. The improvements for the well sites are maintained by the Department of Water.

C. Technical Characteristics

All four (4) of the sites noted below have been fully developed and are secured by chain link fencing. Access to the sites is by agricultural dirt roads now used mainly by DOW personnel for maintenance.

To upgrade system reliability, a new radio controlled Supervisory Control and Data Acquisition (SCADA) System will be installed at the various sites. This will provide a supervisory system capable of remote operation and data collection. The radio SCADA system is being included or added to other DOW water systems.
Existing Puhí 510 Reservoir Site

The Puhí No. 5A and 5B Wells are located within the Puhí 510 Reservoir Site. See Figure 5. The wells were drilled at the entrance to the site adjacent to the 1.0 million gallon reservoir and are approximately 21 feet apart. The expected yield from Well No. 5A is approximately 900,000 gallons per day and approximately 600,000 gallons per day from Well No. 5B. Although only one well pump will normally be utilized, both pumps can be operated at the same time when water demand is high. See Figure 6 for the sections of the existing wells.

The project will include installation of a vertical turbine deepwell pump, valves and piping, and electrical power and controls for each of the wells. The proposed rating for each pump are:

<table>
<thead>
<tr>
<th></th>
<th>Well 5A</th>
<th>Well 5B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated Capacity, gpm</td>
<td>600</td>
<td>400</td>
</tr>
<tr>
<td>Total Head, feet</td>
<td>520</td>
<td>500</td>
</tr>
<tr>
<td>Synchronous Speed, rpm</td>
<td>1800</td>
<td>1800</td>
</tr>
<tr>
<td>Rated Motor Horsepower</td>
<td>125</td>
<td>75</td>
</tr>
</tbody>
</table>

A control building constructed of concrete masonry units will be provided to house the electrical and control equipment, chlorination system, and well level air piping system. A new radio SCADA (System Command and Data Acquisition) system will be installed within the building with a wood pole mounted antenna, 15 feet high, located next to the control building. The building is proposed to be constructed with slab on grade, concrete masonry walls, and concrete roof. Kauai Electric Company is expected to bring electrical power to the site. The electrical power is likely to be pole mounted and extending from Puhí Well No.3 following the route of the existing power lines.

Additional asphalt concrete paving will also be included to provide easier maintenance access to the existing reservoirs and new deepwell pumps.

The actual quantity of water to be pumped from Wells 5A and 5B is difficult to accurately estimate because the Lihue, Puhí and Hanamaulu Water Systems are all interconnected and water is moved throughout the system as demanded. There are a total of 15 wells (including Wells 5A and 5B) within the Lihue/Puhí/Hanamaulu Water System and the time that each well is in operation will be balanced to prevent excessive pumping of any one well.

For water system planning purposes, the Department of Water uses the Water Systems Standards to determine total pump capacity. The Water System Standards criteria requires that the total system pump capacity meet the maximum daily demand on the water system with an operating time of 16 hours. Therefore, the Department anticipates pumping Well 5A and 5B a maximum of 16 hours per day, 365 days per year.

Based on the above, the maximum daily pumping rate estimates are as follows:

Well No. 5A: 600 gpm @ 16 hrs/day = 576,000 gals/day
Well No. 5B: 400 gpm @ 16 hrs/day = 384,000 gals/day

The Department recognizes the additional constraint on pumping posed by the near proximity of the two wells, which is expected to result in increased drawdown when both wells are in
operation. Therefore, under routine operations it is probable that only one of these wells will be in operation at any time.

**Existing Puhí Well No. 1 Site**

Puhí Well No. 1 currently pumps directly into Puhí 510 System. Since additional source is provided for the Puhí 510 System with the development of the Puhí 5 wells, modification will be made to allow the well to pump directly into the Lihue 393 System.

To allow the same pumping rate at the lower head, the deepwell pump will be modified by reducing the number of pump stages. This work will require the removal of the deepwell pump, inspection of the pump, removal of the pump stages and reinstallation. The proposed reduction in head will have the following characteristics.

<table>
<thead>
<tr>
<th></th>
<th>Existing</th>
<th>Proposed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated Capacity, gpm</td>
<td>200</td>
<td>200</td>
</tr>
<tr>
<td>Total Head, feet</td>
<td>544</td>
<td>450</td>
</tr>
<tr>
<td>Synchronous Speed, rpm</td>
<td>1800</td>
<td>1800</td>
</tr>
<tr>
<td>Rated Motor Horsepower</td>
<td>50</td>
<td>50</td>
</tr>
</tbody>
</table>

A new valved pipe connection will be made to the Lihue 393 System by connecting to the existing 16-inch line which runs adjacent to the well site. The existing connection to the Puhí 510 System will remain with the valve closed for emergency purposes.

The existing controls will be modified and a new radio SCADA system will be installed within the existing control building. A new wood pole mounted antenna, 15 feet high will be installed next to the existing control building.

See Figure 7 for the Puhí Well No. 1 Site Plan.

**Existing Puhí Well No. 3 Site**

The project will involve modifying the existing pump controls and providing a new radio SCADA system within the existing control building. A wood pole mounted antenna, 15 feet high, will be installed adjacent to the existing control building. See Figure 8.

**Existing Puhí 393 Reservoir Site**

The project will involve modifying the existing valve controls and providing a pad mounted radio SCADA system with a wood pole mounted antenna, 15 feet high. See Figure 9.

**D. Construction Schedule and Estimated Costs**

The project is expected to take approximately one (1) year for construction at an estimated construction cost of $900,000. Funding for this project will be provided entirely by the State of Hawaii and the DOW.

**E. Financial and Institutional Arrangements**

The well development project is funded jointly by the State of Hawaii and the County of Kauai, Department of Water. The limits of the project are entirely within property owned by either the
State of Hawaii or the County of Kauai, Department of Water with the exception of the new power transmission line that will be property of Kauai Electric Co. and will cross private property. The project does not involve any institutional, financial or land use arrangements or commitments with other public or private entities, with the exception of the power provided by Kauai Electric Co.

F. Watershed and Land Use Analysis

The State of Hawaii Constitution mandates that "the State has an obligation to protect, control and regulate the use of Hawaii's water resource for the benefit of its people". The State Water Code is the enforcement tool of the state constitution and the Hawaii Water Plan is one of the primary policies of the State Water Code. The Hawaii Water Plan is intended to fulfill a comprehensive planning requirement through four components parts: a water resource protection plan, water use and development plans for each County, a water project plan, and a water quality plan. The proposed project is fully consistent with the Hawaii State Water Plan and its four components.

The County of Kauai General Plan as updated in 1981 lists its goal as follows:

- To maintain the concept of Kauai as "The Garden Isle"; thus, insisting any growth be in consonance with the unique landscape and environmental character of the island
- To insure that all physical growth is consistent with the overall ecology of the island
- To manage growth according to established population growth targets
- To create opportunities for a greater fulfillment of life through the development of a broad spectrum of educational and cultural pursuits
- To promote and protect the health, safety and welfare of all residents and visitors
- To provide opportunities for suitable living quarters for all residents in all income levels
- To provide for a maximum variety of outdoor recreational activities
- To recognize those aspects of the island and its people which are historically and culturally significant and to maintain and enhance such aspects as a continuing expression of the island's physical and social structure
- To promote the improvement and expansion of the island's economy, by recognizing and carefully utilizing land and water resources
- To guide and control development to take full advantage of the island's form, beauty and climate and preserve the opportunity for an improved quality of life
- To guide physical growth so that island and visitor communities will develop in social and economic concert with each other
- To manage implementation through development of social and physical infrastructure based on growth targets, priorities and efficient utilization of facilities and services
- To provide workable planning tools to meet the changing needs of the community
- To create, develop and sustain an economy and a population composition that will encourage the youth of Kauai to live in the County and contribute to society
- To encourage and support efforts to approach self sufficiency in food production and energy
The proposed project is fully consistent with the goals of the County of Kauai General Plan as updated in 1981.

As indicated in Section VI, Part D, the project involves further development of the Hanamaulu Aquifer, which has an estimated sustainable yield of 40 million gallons per day (mgd). Current pumpage, based on data from the State of Hawaii Commission on Water Resource Management, is estimated at a maximum of approximately 10.8 mgd, or approximately 27% of the sustainable yield of the aquifer. The additional ground water production from the proposed well will not be significant relative to the aquifer sustainable yield.

The DOW is planning to develop additional wells in the Hanamaulu area that will also produce from the same aquifer, at a considerable distance from the Puhi area. The combined pumping from all known current or proposed wells is expected to remain considerably below the sustainable yield of 40 mgd estimated for the Hanamaulu aquifer.

The proposed project does not promote land uses that will significantly alter the hydrogeology of the source or end-use area. The project will provide additional water supplies and address current source water deficiencies within the existing water systems. The project does not involve any land use arrangements or commitments with other public or private entities.

It is anticipated that the project will have no impact on nearby landowners or water users, including farmers or kuleana residents. The majority of the developed property in the vicinity of the project is agricultural land that uses surface water from the irrigation ditch system for irrigation purposes. The project does not involve ceded lands.
EXISTING WELL SECTIONS
VI. DESCRIPTION OF THE AFFECTED ENVIRONMENT, POTENTIAL IMPACTS AND MITIGATION MEASURES

A. Land Use and Ownership

The proposed projects are located within the Lihue District approximately two (2) miles west of Lihue and north of Kaumualii Highway. The area is mixed County zones agriculture and open and currently is undeveloped except for Kauai Community College and the DOW facilities. A plantation camp previously occupied the site west of the College. The State Land Use is agriculture and the County General Plan is open. See Figures 10, 11 and 12.

Both the open and agriculture county zoning will require a County Use Permit for the installation of the deepwell pumps and related work.

Mitigation measures are not proposed or required other than to obtain a County Use Permit.

B. Topography and Climate

The project areas are located north of Kaumualii Highway in a relatively flat area with ground slopes between 2 and 4 percent. There are numerous gulles within the area originating from Kiloohana Crater. Although some of the gulles are identified as streams, such as Puhí Stream and Nawiliwili Stream, source of water is basically from rainfall at the crater area. Elevations range from 360 feet msl at the highway to 490' msl at the Puhi 510 Reservoir site. The four sites lie within lands that actively under agricultural cultivation. Access for maintenance to the various DOW sites are by dirt roads previously used for agricultural purposes.

At Lihue Airport, approximately four miles east of the project areas, average temperatures range from 71 deg. F to 79 deg. F and an annual average precipitation 44 inches. The project areas would experience the same variation in temperatures. Average annual rainfall at the project site is 60 inches with the increase due to the higher elevations.

The proposed improvements are not expected to have a long or short term impacts to the topography or climate. Grading and trenching required are being done within areas that have been fully developed.

No mitigation measures are proposed or required.

C. Geology and Soils

The Island of Kauai is the oldest of the major islands in the Hawaiian Chain. The Geological and Topographical Map of the Island of Kauai, a supplement to Bulletin 13 "Geology and Ground-water Resources of the Island of Kauai", by G. A. McDonald, D. A. Davis and D. C. Cox shows that the sites are underlain with basalt from lava flows of the Koloa Volcanic series. Lava of the Koloa Volcanic series are for the most part poorly to moderately permeable. Basal water occurs in the rocks where they extend below sea level.
According to the United States Department of Agriculture, Soil Conservation Service Soil Survey, and shown on Figure 13, the soils at the various sites are classified as follows:

Puhi 510 Reservoir Site: Kapaa Silty Clay, 8 to 15 percent slopes (KkC)
Puhi Well No. 3 Site: Puhi Silty Clay Loam, 15 to 25 percent slopes (PnD)
Puhi 393 Reservoir Site: Puhi Silty Clay Loam, 15 to 25 percent slopes (PnD)
Puhi Well No. 1 Site: Puhi Silty Clay Loam, 3 to 8 percent slopes (PnB)

The Kapaa silty clay (KkC) is part of Kapaa series found in elevations ranging from 200 to 800 feet and used for agriculture and water supply. On this Soil runoff is slow to medium and the erosion hazard is slight to moderate. Permeability is moderately rapid.

The Puhi silty clay loam (PnB and PnD) is part of the Puhi series found in elevations ranging from 175 feet to 500 feet and used for agriculture, water supply and home sites. On this Soil runoff is slow and erosion is slight on the flatter slopes (PnB). On the steeper slopes (PnD) runoff is medium and the erosion hazard is moderate. Permeability is moderately rapid.

D. Ground Water Hydrology

The project sites are located within the Hanamaulu Aquifer (Code 20102) as described in the Hawaii Water Plan, Water Resources Protection Plan, Volumes I and II (Water Plan), by the Department of Land and Natural Resources, Commission on Water Resource Management, review draft dated March 1992. The Hanamaulu Aquifer which has an area of 55.22 square miles is located within the Southern Lihue Basin as described in the U.S. Geological Survey Water-Resources Investigations Report 98-4031 Ground Water in the Southern Lihue Basin, Kauai, Hawaii, 1988 (USGS Report).

The groundwater system is characterized by low permeability rocks and water levels range from sea level at the coast line to hundreds of feet elevation inland. Figure 14 shows a generalized water-table map and profile and Figure 15 has a diagrammatic representation of ground water flow in the Southern Lihue Basin. According to the USGS Report, a larger volume of water is discharged to streams than to the ocean. Streams include Hanamaulu, Nawiliwili and Huleia Streams. The Water Plan estimates the sustainable yield for the Hanamaulu Aquifer as 40 mgd. The sustainable yield is defined as the estimated amount of water that can be safely withdrawn.

The impact of the Wells 5A and 5B on streamflow in the area has been analyzed by both the United States Geological Survey (USGS) and the project's hydrogeologist consulting firm, Water Resource Associates. The USGS estimates that pumping of Wells 5A and 5B may reduce the streamflow in Huleia, Hanamaulu and Nawiliwili Streams by as much as 2%. The USGS estimate is based on a comparison of the measured average stream baseflow and the well pumping rates. A copy of the USGS findings are contained in the USGS letter dated June 24, 1999, which may be found in the section of this EA regarding responses to the Draft EA.

Water Resource Associates, however, assert that Well 5A and 5B will have no measurable short-or-long term effect on Huleia, Hanamaulu and Nawiliwili Streams. The analysis by Water Resource Associates is based on the premise that Wells 5A and 5B will pump water from a
basal aquifer with a head of approximately 64 ft msl which hypothetically cannot contribute to streamflow above an elevation of 64 ft. msl. A copy of the Water Resource Associates findings are contained in a letter report dated October 4, 1999, which may also be found in the section of this EA regarding responses to the Draft EA.

The Huleia and Hanamau lu Streams are gauged by USGS in an ongoing program. It may be possible to evaluate in the future whether any long-term effects on streams in the area have been observed, however a 2% change in streamflow rate may not be discernable with current monitoring techniques. Because of the existing USGS monitoring program and the relatively small potential impact on streamflow, the Department of Water does not propose to include any new stream-monitoring program.

The following table extracted from information provided by the Department of Land and Natural Resources, Commission on Water Resource Management, there are 53 wells and tunnels tapping into the Hanamauli Aquifer. See Figure 16 for locations of the major wells. This total includes the Puali 5A and 5B wells. Of this total, 18 of the wells are in production totaling 10.62 mgd maximum withdrawal per day. This total does not include Puali Wells Nos. 5A and 5B. According to the Commission on Water Resource Management, the thirteen (13) wells that the Department of Water operates totals 7.28 mgd for domestic use. However, according to current DOW records, the maximum pumping rate of all DOW wells within the Hanamauli Aquifer is 5.07 mgd.
<table>
<thead>
<tr>
<th>STATE WELL NO</th>
<th>WELL NAME/DRILL</th>
<th>YEAR</th>
<th>OWNER/USER</th>
<th>ELEV</th>
<th>GND WELL</th>
<th>PUMP</th>
</tr>
</thead>
<tbody>
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<td>0020-01</td>
<td>HANAMALU SHAFT</td>
<td>1981</td>
<td>LIHUE PLTN</td>
<td>10</td>
<td>12</td>
<td>UNU</td>
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<td>200</td>
<td>OTH</td>
</tr>
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<td>STATE DOWALD</td>
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<td>276</td>
<td>UNU</td>
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<tr>
<td>0022-01</td>
<td>HANAMALU 1</td>
<td>1955</td>
<td>KAUAI DWS</td>
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Total 10.82 mgd
DOW Total 7.28 mgd
The proposed development of the Puhi Wells 5A and 5B and the modification of the Puhi Well No. 1 deepwell pumps will not adversely impact the ground water in the Hanamaulu Aquifer. According to Water Resource Associates’ reports included in Appendix C, Puhi Well 5A has a sustainable yield of 700 gpm (1.01 mgd) and Puhi Well 5B has a sustainable yield of 400 gpm (0.58 mgd). The existing Puhi Well No. 1 capacity is not being changed. With the additional pumping from the Puhi 5 wells the total withdrawal will still be considerably lower than the sustained yield of 40 mgd. Pumping tests have also been done and the results are shown in the appendix.

No mitigation measures are proposed nor required.

E. Flood Zone

According to the Flood Insurance Rate Map the project areas are located within Zone 'X'. Areas within Zone 'X' are determined to be outside the 500 year flood plain. The area generally slopes toward Kaumualii Highway and is outside of any drainage course or gullies which would carry storm water away to the site.

The potential for flooding is not anticipated to impact the proposed actions.

No mitigation measures are proposed or required for flooding.

F. Flora and Fauna Resources

The project areas were previously cultivated for sugar cane replacing all natural vegetation. The adjacent gulch area includes introduced species such as guava, javaplu, eucalyptus, Christmas berry, pangoalgrass, California grass, and Hilo grass.

No threatened or endangered birds are known to inhabit the area. Common urban birds, such as mynah, doves, cardinals, and sparrows are typical visitors to the project sites. Wildlife inhabiting the area include stray cats and rats. These sites are not adjacent to any residential areas.

G. Cultural Resources

There are no identified historic or archaeologically significant locations at the sites or immediate vicinity. The sites are immediate areas have been cultivated for sugar cane for more than 50 years. Access to the sites will be on existing unpaved roads and improvements done within fully developed and fenced in sites. Should any unanticipated sites, artifacts, or remains, such as shell, bone or charcoal deposits, be discovered during construction, the work will be stopped and the State Historic Preservation Office will be contacted.

H. Site Access and Traffic

Main access to the sites is through dirt roads from Kaumualii Highway. Kaumualii Highway is the major roadway extending from Lihue to extreme west end of the island. Kaumualii Highway is a two lane highway under the State jurisdiction. Unpaved (dirt) roads leads from the highway to the project sites. The unpaved roads previously used for agricultural purposes are now primarily used by DOW personnel for maintenance purposes. The proposed improvements will generate construction related traffic for the duration of
construction for the project. Traffic will be nominal consisting of a minimum number of heavy construction equipment and supply trucks. The existing roadways will be able to accommodate the project related traffic.

Periodic access for maintenance by the DOW is not expected to increase due to the improvements made by this project.

No mitigation measures are proposed nor required for roadway traffic.

I. Air Quality

Air quality on the Island of Kauai is generally good. Puhi Well No. 1 is 1,700 feet from Kaumualii Highway and 500 feet from the closest Kauai Community College building. The other sites are further away and in open undeveloped areas.

Air quality will be degraded only to a minimum degree as a result of the proposed project. The construction contractor will be required to comply with State Department of Health regulations governing air quality (HAR, Title 11, Chapters 59 and 60, Air pollution control.) This will include proper maintenance of internal combustion equipment and related use.

Clearing, grading and trenching for the proposed improvements are minimal. Mitigation measures for dust control would include watering on the access roads and project sites and areas to be graded landscaped.

Chlorine will be used for disinfection. Potential of chlorine gas escaping from the chlorination system is low due to the proven techniques and devices used.

No long term impacts or mitigation measures are required or proposed.

J. Noise

Existing noise levels at the various sites are relatively low. The closest residents are across Kaumualii Highway approximately 1,700 feet away from the closest proposed improvements. The closest Kauai Community College building is 500 feet away.

Audible construction noise will probably be unavoidable during the duration of the construction. Noise generated by construction activity will probably be limited to periods required for delivery of materials and movement of heavy equipment to the sites. The construction noise levels anticipated are not expected to be in the public health and welfare category due to the temporary nature of the work and administrative controls available.

Only improvements at the Puhi 510 Reservoir site would have any long term impacts. Deepwell pumps being installed at this site would create sound. However the site is more than 4,000 feet from the closest building and sound would not be any problem.

No long term impacts or mitigation measures are required or proposed.
K. Surrounding Land Uses

Land uses surrounding the sites include open space and the Kauai Community College. Surrounding areas are zoned open and agricultural and no large residential subdivisions are anticipated.

The 15 feet high wood poles installed at each of the four separated sites would be indistinguishable from Kaumuali Highway.

Kauai Community College and the residents on the opposite side of the highway are not expected to be affected by the proposed project. No long term impacts or mitigation measures are required or proposed.

L. Population

The proposed project located in Puhi is within the Lihue District, County of Kauai. The 1990 resident population of Puhi is 1,910 representing approximately 11.3 percent of the Lihue District resident population of 10,663. The Island of Kauai with 50, 947 resident population had an average household population of 3.09. (The State of Hawaii Data Book, 1997)

Employment centers include the Kukui Grove Shopping Center, Kauai Community College, and the Lihue Town business and commercial shops. State and County employment is located in Lihue.

The proposed project is not expected to result in adverse impacts to employment resources in the area. Construction of the project will require employment for the duration of the project. Most of the workers would commute from other areas in the County and State.

M. Contamination Sources

Approval from the Department of Health, Safe Water Drinking Branch, to develop a potable water source with connection to a public water system is required. Water quality issues will be addressed in detail during the Department of Health permit process.

According to the Department of Health's The Groundwater Contamination Maps for the State of Hawaii, 1997, there are three (3) drinking water sources within the Southern Lihue Basin that have traces of contaminants. These wells are approximately 4,000 feet from the Puhi wells as shown on Figure 17.

<table>
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<tr>
<th>Name</th>
<th>Contaminant</th>
<th>Detected Level</th>
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<td>Kilohana G (5923-05)</td>
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<td>Garlinghouse Tunnel (5823-01)</td>
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<td>0.10 ppb</td>
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The atrazine levels detected are considerably lower than the maximum contamination level (mcl) of 3.0 ppb and is not considered significant. The probable source of the atrazine is from herbicides used in association with the cultivation of sugar cane.
One potential source of well contamination is at the Kauai Community College (KCC) where chemicals are used at the Natural Science Department and the Autobody Shop. Waste contaminants include reactive solids, phosphorous, oxidizing solids, mercury corrosive and flammable liquids. The State Department of Health, Solid and Hazardous Waste Branch, identifies the College located at 3-1901 Kaumualii Highway as a registered "Small Quantity Generator" of hazardous waste. The Environmental Protection Agency identification number for this facility is H1081633563. According to the Department of Health, Hazard Evaluation and Emergency Response Branch, there are no records of contamination release since 1988. Contamination from KCC should not pose a problem to Wells Nos. 5A and 5B. These wells are up grade and approximately 4,000 feet from KCC.

Existing records for the Southern Lihue Basin do not indicate a contamination problem. The deepwell pumps are standard water tube pumps used by the Department of Water. The proposed project is not expected to result in adverse impacts to the municipal potable water source.

No mitigation measures are proposed or required.
SOIL SURVEY MAP


FIGURE 12
Figure 15. Generalized water-table map and profile for data from 1910 through 1966 for the southern Lihue Basin, Kauai, Hawaii.

WATER TABLE MAP AND PROFILE

EXPLANATION

KOLOA VOLCANICS

WAIMEA CANYON BASALT

LINE OF EQUAL FRESHWATER HEAD

WATER TABLE

DIRECTION OF GROUND-WATER MOVEMENT

Seepage to streams

Seepage to ocean

Not to scale

Figure 16. Diagrammatic representation of ground-water flow in the southern Lihue Basin, Kauai, Hawaii.

GROUND WATER FLOW

WELLS AND WELL FIELDS


FIGURE 15
# Groundwater Contamination on the Island of Kauai

![Map of the Island of Kauai with project site identified.](map.png)

## This map contains the latest confirmed results from contaminated groundwater wells

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<tr>
<th>NO.</th>
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<th>DETECTED LEVEL (in ppb)</th>
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* - DOA Immunoassay analysis

VII. ALTERNATIVES CONSIDERED

A. No Action

The no action alternative would be counterproductive to the objectives of the Kauai Water Use and Development Plan. Production of the Puhi 5 Wells is an integral part of increasing source for future domestic water demands. The proposed radio SCADA system is an integral part of improving system reliability.

B. Alternative Site

The two Puhi 5 Wells have being drilled and tested. Tests results indicate that the wells provide an ample and safe water source. The site is developed and would require a minimum amount of site work to put the wells into production. Locating to another site would require drilling and testing and abandoning of these two wells.

C. Alternative Sources

Surface Waters

Currently, safe drinking water regulations require monitoring, treatment and disinfection of all surface waters utilized for potable water. The operation and maintenance cost necessary to run a surface water treatment facility is significantly higher than groundwater sources. Furthermore, source waters are needed immediately and development of surface water treatment facilities would take a great amount of time to plan and construct. DOW is considering surface water options for the future, should ground water become unavailable or should the costs become competitive.

Desalination

According the Oahu Management Plan, the demonstration desalination plant on Oahu produces approximately 0.5 million gallons of water per day of potable water from brackish water sources. Capital costs for a large scale desalination facility are comparable to developing groundwater in rural areas. However, the operation and maintenance of the facility is approximately ten times the cost of pumping groundwater.

Wastewater Effluent Reuse

The reuse of wastewater effluent for irrigation and industrial usage would reduce the quantity of potable water used for non-potable purposes. This alternative would also provide a viable means of disposing of wastewater effluent. Public health concern and the high cost for installation of the necessary infrastructure, including dual water lines, limit the feasibility of this system. Wastewater reuse does not replace the immediate need for potable water. The Lihue Wastewater Treatment Plants, County and Grove Farm, already reuse their effluent to irrigate golf courses.
Water Conservation

Extensive water conservation programs can be implemented. These include water system and consumer conservation. Water system conservation would include monitoring of all water usage and determine discrepancies within the system to institute conservation measures, including a leak detection program.

Consumer conservation will require long range public information and awareness campaigns to educate the public.

While conservation would have a positive effect of lowering demands for water, development of high quality groundwater sources or other alternatives should not be neglected because water demand fluctuates and the need for reserve supplies will be necessary during peak demand periods.

Among the alternatives considered, the proposed action is recommended because it is an integral part of the overall water resource development and management program of the State and the Department of Water to meet current and future water demands.
VIII. DETERMINATION, FINDINGS, AND REASONS SUPPORTING THE DETERMINATION

In accordance with the provisions of Chapter 343, Hawaii Revised Statutes, and the significance criteria on Section 11-200-12 of Title 11, Chapter 200, this environmental assessment has determined that the project will have no significant impact on the environment.

Significant criteria supporting the anticipation of a Finding of No Significant Impact (FONSI) are presented below:

The project will not involve an irrevocable commitment to loss or destruction of any natural or cultural resource.

The proposed actions are intended to increase domestic water source and to provide a more reliable system to meet future water demands. Pump tests have been made and no adverse effect on the environment was found.

The site has been previously disturbed and it is unlikely that significant cultural resources are evident in the area.

The project will not curtail the range of beneficial use of the environment.

The proposed sites for the project are in areas already developed. The development of the wells are permanent and is classified as a public utility under the County Comprehensive Zoning Ordinance and are permitted uses requiring a Use Permit.

The project will not conflict with the State’s long-term environmental policies or goals and guidelines as expressed in Chapter 343, HRS, and any revisions thereof and amendments thereto, court decisions, or executive orders.

The proposed project is consistent with the environmental policies, goals, and guidelines defined in Chapter 343, HRS. This proposed actions are consistent with long range plans to meet future water demands for the island.

The project will not substantially affect the economic or social welfare of the community or State.

The proposed project is part of the overall plan for providing an adequate long-term water supply for the community and State. The rural character of the Puhi community is not expected to undergo major transformation as a result of the proposed action in the short-term nor in the long-term if the wells are put into production. Available infrastructure in the area will allow excess water to be transmitted to other areas. How long term use of the water is distributed will be up to policy makers of the Water Commission and DOW.
The project will not substantially affect public health.

The proposed project will be performed in accordance with all federal, state, and local regulations to ensure the protection of human health and the environment. Potential impacts on public health are considered insignificant and temporary. Any impacts from the project, which affects public health, will be mitigated by measures defined in this report. Additional electrical power production facilities will not have to be constructed to provide power for the deepwell pump motors.

The project will not involve substantial secondary impacts, such as population change or effects on public facilities.

The proposed action is part of the Department of Water program designed to ensure that high quality drinking water is available and to meet present and future demands. The project in itself, however will not generate new population growth but is only a part of a larger picture.

The project will not involve a substantial degradation of environmental quality.

The proposed actions will be in accordance with the environmental policies of Chapter 343, Hawaii Revised Statues, and the National Environmental Policy Act. The project sites were previously developed and located within open areas.

Is individually limited, but cumulatively has considerable effect upon the environment or involves a commitment for larger actions.

The proposed action is only one component of the larger Statewide plan to manage the state water resources. The action will have a positive cumulative effect on the environment as water resources are developed. Future development of water resources will in an organized and rational manner with precautions in place to protect groundwater aquifers and stream flow conditions. The action in itself will not lead to a commitment for larger actions, as it is only one part of the larger picture.

This project will not affect any rare, threatened, or endangered species, or its habitat.

The proposed project sites have been previously disturbed. Surrounding areas were previously used for agricultural purposes.

This project will not detrimentally affect air or water quality or ambient noise levels.

The potential impacts on air, water, and noise levels will be insignificant and limited to the short duration for construction. Any potential impacts from the project will be mitigated by measures defined in this report.
This project will not affect nor is it likely to suffer damage by being located in an environmentally sensitive area.

The proposed project site is not located in an environmentally sensitive area.

This project will not substantially affect scenic vistas and view planes identified in county or State plans or studies.

The proposed action sites are not located in any scenic vistas or view planes identified by county or State plans or studies. The sites are located in a visually unobtrusive area of the agricultural area and screened from view by the existing vegetation in the area.

This project will not require substantial energy consumption.

Energy will be used for the construction of the various actions including transport of equipment and personnel. The installed pumps and accessory units will require long term energy uses. None of the uses are expected to result in use of energy significantly greater than similar projects.
### IX. COMMENT AND RESPONSE LETTERS

Notice of availability of the Draft EA (DEA) was published in the Office of Environmental Quality Control Bulletin on April 23, 1999. The DEA was sent to the following listed below. Comment letters are included with response letters, as required in this section.

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June 24, 1999

Mr. Ernest Lau
Staunsper and Chief Engineer
Department of Water
City of Honolulu
P.O. Box 1706
Honolulu, HI 96802

Dear Mr. Lau:

This letter is in response to a request from Sani and Associates, Inc., to review the draft environmental assessment (DEA) for the Pali Water System 5A and 5B and its proposed modification to Pali Water Plan 1A. Our review focused on the hydrologic aspects of the DEA; our comments are as follows:

The proposed pumping rates of 600 gpm and 400 gpm for Pali 5A and 5B, respectively, seemed optimistically high for long-term production considering what has been learned from recent hydrologic studies in the Pali Basin. However, after our discussion with you and your staff, we understand that under many conditions, only the 600 gpm well will be used, and the well will normally be pumped for no more than 10 hours per day, and that the 400 gpm well will only be pumped for emergencies. If the 400 gpm well is used, say, only 10 percent of the time, the combined long-term pumping rate from the wells amounts to an average long-term pumping rate of about 440 gpm. This amount is less than half the pumping rate one might assume from the pump capacity alone. For assessment of long-term impacts, it would be helpful to add to the DEA some estimates of how much water is expected to be pumped on an average over the long term. Without the additional information, we would have been compelled to make the conservative assumption that the wells would be pumped at the pump capacity.

A long-term average rate of 440 gpm rate may still be somewhat high, however. Although the 7-day pump test indicates that the permeability in the Pali 5 area is high, our recent studies of the Pali Basin indicate that such high-permeability areas are of limited extent. Long-term drawdowns are more likely to reflect the regional low permeability in the basin than the local high permeability. The long-term drawdown rate may therefore be greater than anticipated from the 7-day pump tests. The DEA indicates, however, that water levels will be monitored during pumping.

The effect of the proposed pumping on nearby streams was not addressed in the DEA. Although "no adverse effect on the environment was found" (DEA, p. 34) during the pump tests, the likelihood of stream effects still remains. Rainy can the effects of pumping on streamflow be detected during a short-term pumping test because the effects tend to develop slowly. As we have learned in recent ground-water studies, most streams in the Pali Basin gain from ground-water discharge. Considering the proximity of the Pali 5 wells to Haiku, Naunwilii, and Hanamoku Streams, we expect pumping to cause a reduction in baseflow in these streams. However, according to our Pali Basin study, Haiku and Hanamoku Streams combined have an estimated average annual flow of 36 mgd and an average annual baseflow of 25 mgd. At most, the 440 gpm (or 0.6 mgd) pumped from the Pali 5 wells would reduce the combined average annual flow of these streams by only 1%, and the combined average annual baseflow of these streams by about 2%.

This computation does not include Naunwilii Stream because there are no gage data for this stream; consideration of Naunwilii would lessen the relative impact on the combined flow of the three streams. The effects may not be distributed equally between the three streams and may take several years or more to develop fully.

We hope these comments are helpful for the completion and acceptance of the final environmental assessment. If you have any questions, please feel free to call me at 322-2290.

Sincerely,

[Signature]

William Meyer
District Chief

United States Department of the Interior
U.S. GEOLOGICAL SURVEY
Water Resources Division
677 Ala Moana Blvd., Suite 415
Honolulu, HI 96813
DEPARTMENT OF WATER
County of Kauai

October 29, 1999

Mr. Gordon Tribble, Acting District Chief
United States Geological Survey
Water Resources Division
671 Ala Moana Blvd., Suite 415
Honolulu, HI 96813

Dear Mr. Tribble:

Subject: Comments on the Draft Environmental Assessment, Pumps and Controls for Pilih Well Nos. 5A and 5B and Modification to Pilih Well No. 1
TMRC: (808) 440-1084; FAX: (808) 440-5366

Thank you for the review and comments of the subject Draft Environmental Assessment (EA) prepared by your staff. We have made some modifications in the text of the EA to clarify the issues raised in your response letter. The following specific responses indicate how your comments have been incorporated into the EA.

1. The following text has been added to Section V, Part C. of the EA to indicate the long term pumping rates anticipated for Wells 5A and 5B:

   "The actual quantity of water to be pumped from Wells 5A and 5B is difficult to accurately estimate because the Lihue, Pah, and Hanamoku Water Systems are all interconnected and water is moved throughout the system as demanded. There are a total of 73 wells (including Wells 5A and 5B) within the Lihue/Pah/Hanamoku Water System and the time that each well is in operation will be balanced to prevent excessive pumping of any one well."

   For water system planning purposes, the Department of Water uses the Water System Standards to determine total pump capacity. The Water System Standards criteria requires that the total system pump capacity meet the maximum daily demand on the water system with an operating time of 16 hours. Therefore, the Department anticipates pumping Well 5A and 5B a maximum of 16 hours per day, 365 days per year.

   Based on the above, the maximum daily pumping rate estimates are as follows:

   Well No. 5A: 600 gpm @ 16 braday = $14,000/gal/day
   Well No. 5B: 400 gpm @ 16 braday = $8,000/gal/day

   The Department recognizes the additional consumptive on pumping posed by the near proximity of the two wells, which is expected to result in increased drawdown when both wells are in operation. Therefore, under routine operations it is probable that only one of these wells will be in operation at any time.

2. Your comment that the long-term drawdown may exceed projections based on the seven-day pump test results due to lower regional hydraulic conductivity has been noted. This has practical consequences with respect to the depth of the pump setting and may eventually influence the productivity of the wells. We

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Mr. Gordon Tribble, Acting District Chief
Page 2
October 29, 1999

are aware of these considerations, and the pump setting has been designed accordingly. We will routinely monitor well water levels during the operation of these wells and will gladly share this information with the USGS.

3. We have consulted with Water Resource Associates, a reputable hydrogeologic consulting firm, regarding the potential impact of the new wells to stream flow in the area. Water Resource Associates concludes that Wells 5A and 5B will have no measurable short- or long-term effect on Hanamoku, Nawaiwai, and Ho'opili Streams. A copy of the their letter report is attached.

In light of your comments and the analysis by Water Resource Associates, the EA has been modified to incorporate discussion on impact stream flow due to Wells 5A and 5B. The following text has been added to Section VI, Part D:

   "The impact of the Wells 5A and 5B on streamflow in the area has been analyzed by both the United States Geological Survey (USGS) and the project's hydrogeologist consulting firm, Water Resource Associates. The USGS estimates that pumping of Wells 5A and 5B may reduce the streamflow in Hanamoku, Nawaiwai, and Ho'opili Streams by as much as 2%. The USGS estimate is based on a comparison of the measured average stream baseflow and the well pumping rates. A copy of the USGS findings are contained in the USGS letter dated June 24, 1999, which may be found in the section of this EA regarding responses to the Draft EA."

Water Resource Associates, however, states that Wells 5A and 5B will have no measurable short- or long-term effect on Hanamoku, Nawaiwai, and Ho'opili Streams. The analysis by Water Resource Associates is based on the premise that Wells 5A and 5B will pump water from a basin aquifer with a head of approximately 65 ft and which hypothetically cannot contribute to streamflow above an elevation of 64 ft. mol. A copy of the Water Resource Associates findings are contained in a letter report dated October 4, 1999, which may also be found in this section of the EA regarding responses to the Draft EA."

The Hanamoku and Nawaiwai Streams are gauged by USGS in an ongoing program. It may be possible to evaluate the future whether any long-term effects on streams in the area have been observed, however a 2% change in streamflow rate may not be discernable with current monitoring techniques. Because of the existing USGS monitoring program and the relatively small potential impact on streamflow, the Department of Water does not propose to include any new stream monitoring program.

Once again, we appreciate your comments on this project. If you have any questions, please do not hesitate to call the Project Engineer, William Eddy, at (808) 224-5102.

Sincerely,

[signature]

Ms. Emerick, C.E.
Manager and Chief Engineer
Attachment
C: State & Associates, Inc.
Mr. Clifford Arakawa  
Sain & Associates, Inc.  
2046 S. King Street  
Honolulu, Hawaii 96826

October 4, 1999

Dear Mr. Arakawa:

Pului Wells 5A and 5B, Kualai

Following up on your request of August 2nd and September 12, 1999, we offer the following written response to comments on the D.E.A. for "Pump and Controls for Pului Wells Nos. 5A and 5B and Modifications to Pului Well Nos. 1, Kualai."

Item 1: DOE/GCO letter dated 5/1/99—Hydrologic Impact Analysis

Pului Wells 5A and 5B will develop basal ground water from an aquifer having a head of approximately 64 feet above mean sea level (msl). Specifically, Pului Well 5A has been cased and grouted to a depth of 565 feet, or 88 feet below msl. Therefore, the Pului Well 5A will develop ground water 855 feet below mean sea level from the well's 20-inch diameter open hole which extends 335 feet below the ground casing.

Pului Well 5B has been cased and grouted to a depth of 500 feet, or 88 feet below msl. Thus, Well 5B will similarly develop basal ground water 118 feet below mean sea level from the well's perforated casing section which extends 400 feet below the ground casing.

Although no adverse effect on the environment was found during the pump tests (D.E.A., p. 34), the USGS states in their letter to Mr. Emer Lui, dated June 24, 1999 that "the likelihood of stream effects still remains" and that "consisting the prosys of the Pului 5 wells to Hula, Naviluu" and Hanamolu Streams we expect pumpage to cause a reduction in base flow to these streams." The USGS, in their June 24, 1999 letter further states that at most the 440 gpm (0.6 meq) (based upon 24 hour/day pumping) pumped from the Pului 5 wells would reduce the 56 mgd average annual flow of Hula and Hanamolu Streams by only 1%. However, the above statements by the USGS oversimplify their analysis of impacts on the streams and omit pertinent facts about the Pului Wells and their relationship to the groundwater hydrology.

Because Pului Wells 5A and 5B will pump from a basal aquifer with a head of 64 ft. which hypothetically cannot contribute to streamflow above an elevation of 64 ft., the Pului Wells are expected to have no measurable short- or long-term effect on Hanamolu, Naviluu, and Hula Streams based upon the following reasons:

1. Pului Wells 5A and 5B, as constructed, will develop only basal water from an aquifer having a water table of only 64 ft. above mean sea level. Above this elevation, the basal aquifer to be pumped hypothetically cannot contribute to and, therefore, affect the flow occurring above elevation 64 ft. in the above-mentioned streams. Basal ground water lies hundreds of feet below a major portion of the stream profiles.

2. Although no surface water study was conducted, based upon the known regional geology and hydrology it is plausible that virtually all of the flows in the streams originate from direct and residual runoff from high-level groundwater percolation in a deeply weathered, moderately permeable basaltic terrain.

3. The basal aquifer to be pumped by the Pului Wells presumably discharges to the ocean chiefly along the coastline east of Libea and Naviluu, rather than through a limited area of poorly permeable alluvial sediments seaward of the lower reaches of the above-mentioned streams, as evidenced by the regional seaward basal water gradient inferred from a limited number of wells located east, or seaward, of Libea and Naviluu.

4. Finally, flows in these streams are derived from a drainage area many times greater than the drainage area affected by the Pului Wells.

Based upon the above and the existing USGS stream gauging in the area, establishment of additional streamflow monitoring would not be appropriate.

Item 2: DOE/GCO letter dated 5/1/99—Watershed and Land Use Analysis

Secondary or Cumulative Impact

No secondary or cumulative impacts, caused by promoting land uses that alter the hydrology of the source area, are expected to occur because the source area of the Pului wells consists of inland areas of undevelopable rugged terrain on the slopes of Kilauea Crater and the island's interior mountain regions.

The Pului wells will serve as supplementary and standby sources for the County's Pului-Libea Water System. Consequently, any secondary or cumulative impacts caused by
promoting land uses that may alter the hydrology of the end-use area are expected to be minimal. This is because the end-use area is the same as the area served by the water system, which includes the existing urban areas of Pilih and Libue. The Pilih and Libue areas are severed and the underlying groundwater aquifer is partly non-potable and is not the primary source of potable water for municipal use by the County Department of Water. The major potential impact on hydrology in the end-use area will be an increase in surface runoff from resultant new residential development which under existing zoning and building requirements must be appropriately mitigated by existing or new infrastructure capacity, such as storm basins in park areas and by other best management practices.

- Assessment of Well's Impact on Land Owners, Water Users Including Farmers...

Because the Pilih wells will develop basal groundwater and will not affect any streams or springs, they will not affect any land owners or water users, including farmers and any Kalama residents, who may utilize surface water or spring sources.

If you have any questions, please call.

Sincerely,

DAN LUM
November 1, 1999

Ms. Gwendolyn Barlow
State of Hawaii
Department of Accounting and General Services
State Office Building
1175 Punchbowl St.
Honolulu, HI 96814

Subject: Thank you for your review of the Draft Environmental Assessment (EA) and of the public hearings held in connection with the Project Explorer, which is planned to be located at Keaau, Hawaii.


Mr. Ernest L. Lang
Manager, Planning and Permitting Branch
Department of Water
State Office Building
1175 Punchbowl St.
Honolulu, HI 96814

Dear Mr. Lang:

Thank you for the opportunity to present the preliminary comments on the subject Draft Environmental Assessment.

As you are aware, this project is currently in the planning stage. It is anticipated that the project will be completed within the next five years. The purpose of this letter is to provide you with a summary of the comments that were received during the public hearings held in connection with the project.

It is important to note that the project has the potential to significantly impact the environment. Therefore, it is crucial that all possible measures are taken to ensure that the project is conducted in an environmentally responsible manner.

If there are any questions or concern regarding the project, please do not hesitate to contact me. I would be happy to discuss the matter in further detail.

Thank you for your time and consideration.

Sincerely,

[Signature]

Deputy Manager, Planning and Permitting Branch

[Printed Name]
Mr. Ernest Y. W. Lau
Manager and Chief Engineer
Department of Water
P. O. Box 1706
Lihue, Hawaii 96766

May 14, 1999

Mr. Lau:

Subject: Draft Environmental Assessment
Pumps and Controls for Puhui Wells Nos. 5A & 5B
and Modification to Puhui Well No. 1

Dear Mr. Lau:

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

Drinking Water:

1. Federal and state regulations define a public water system as a system that serves 25 or more individuals at least 60 days per year or has at least 15 service connections. All public water systems owners and operators are required to comply with Hawaii Administrative Rules, Title 13, Chapter 20, ‘Rules Relating to Potable Water Systems.’

2. As stated on page 8, Section III, Permits and Approvals Required, Puhui Well Nos. 5A and 5B will need to receive approval prior to use. Section 11-20-19 of Chapter 20 requires that all new sources of potable water serving a public water system be approved by the Director of Health prior to its use. Such an approval is based primarily upon the submission of a satisfactory engineering report which satisfies the requirements set in Section 11-20-22.

3. The engineering report must identify all potential sources of contamination and evaluate alternative control measures which could be implemented to reduce or eliminate the potential for contamination, including treatment of the water source.

It is unclear to us whether Appendix D, Laboratory Report, above analyses done for Puhui Well 5A or Puhui Well 5B. Water quality analyses are required for each proposed well and the results must identify the well name and State well number. In addition, water quality analyses performed by a laboratory certified in the State of Hawaii, must be submitted as part of the report to demonstrate compliance with all drinking water standards. Additional tests may be required by the Director upon his review of the information submitted.

4. Since this water system is under the jurisdiction of the County of Kauai, the Kauai Department of Water Supply will be responsible for the review and approval of the plans.

If you should have any questions, please contact Mr. Queenia Kanori of the Safe Drinking Water Branch, Engineering Section, at 586-4258.

Sincerely,

Gary Villo
Deputy Director for
Environmental Health

Copy to:

Ms. Sumi
Deputy Director for
Environmental Health
DEPARTMENT OF WATER
County of Kauai

November 1, 1999

"water has no substitute - conserve it"

Mr. Gary Gill
Deputy Director for Environmental Health
State of Hawaii
Department of Health
P.O. Box 3378
Honolulu, HI 96801

Dear Mr. Gill:

Subject: Comments on the Draft Environmental Assessment, Pumps and Controls for Puhu Well Nos. 5A and 5B and Modification to Puhu Well No. 1
TMRC (43) 4-05; (46) 4-07; (38) 6

Thank you for the review and comments of the subject Draft Environmental Assessment (EA) prepared by your staff. We have made some modifications in the text of the EA to clarify the issues raised in your response letter. The following specific responses indicate how your comments have been incorporated into the EA.

DOW Response to Comments #1 and #2

The following text has been added to the EA, Section III, "Permits and Approvals."

2b. Federal and state regulations define a public water system as a system that serves 25 or more individuals at least 60 days per year or has at least 15 service connections. All public water system owners and operators are required to comply with the Hawaii Administrative Rules, Title 11, Chapter 20, "Rules Relating to Public Water Systems." The Department of Water intends to integrate two new wells, Puhu Well No. 3a and Puhu Well No. 3b into the existing Puhu Water System and accordingly, the Department will comply with the "Rules Relating to Public Water Systems."

Section 11-20-29 of Chapter 20 requires that all new sources of public water serving a public water system be approved by the Director of Health prior to its use. Such an approval is based primarily upon the submission of a satisfactory engineering report that addresses the requirements set in Section 11-20-29.

DOW Response to Comment #3

The Department of Water will submit an engineering report identifying all potential sources of contamination and will evaluate control measures that could be implemented to reduce or eliminate the potential for contamination.

The Laboratory Report in Appendix D is a water quality analysis for Puhu Well No. 3A. A separate test will be conducted on Puhu Well No. 3b and submitted in the engineering report. It is understood that additional tests may be required by the Director for Environmental Health upon his review of the information submitted.

---

Department of Water
P.O. Box 3378
Honolulu, HI 96801

Phone: (808) 548-8383
Fax: (808) 548-8380

November 1, 1999

Mr. Gary Gill
Subject: Comments on the Draft Environmental Assessment, Pumps and Controls for Puhu Well Nos. 5A and 5B and Modification to Puhu Well No. 1

Page 2

Mr. Gary Gill

DOW Response to Comment #4

It is understood that the Puhu Water System is under the jurisdiction of the Department of Water and that the review and approval of the plans for the subject project is the responsibility of the County of Kauai, Department of Water.

Once again, we appreciate your comments on this project. Should you have any questions, please do not hesitate to contact the Project Engineer, William Eddy, at (808) 245-5412.

Sincerely,

Emmett W. Lau
Manager and Chief Engineer

Attachment

Sano & Associates, Inc.
Mr. Ernest Y.W. Lau  
Page 2  
May 10, 1999

Dear Mr. Lau:

Draft Environmental Assessment  
Pumps and Control for Puhi Wells Nos. 5A & 5B and  
Modification to Puhi Well No. 1, Puhi, Kauai, Hawaii

Thank you for the opportunity to review the subject document. Our comments related to water resources are marked below.

In general, the CWEM strongly promotes the efficient use of our water resources through conservation measures and use of alternative non-potable water resources whenever available, feasible, and there are no harmful effects to the ecosystem. Also, the CWEM encourages the protection of water recharge areas which are important for the maintenance of streams and the replenishment of aquifers.

1. We recommend coordination with the county government to incorporate this project into the county's 20-year Water Use and Development Plan, which is subject to regular updates.

2. We recommend coordination with the Land Division of the State Department of Land and Natural Resources to incorporate this project into the 20-year State Water Projects Plan, which is subject to regular updates.

3. We are concerned about the potential for ground or surface water degradation/deterioration and recommend that approval for this project be conditioned upon a review by the State Department of Health and the development's assistance in any resulting requirements related to water quality.

4. A Well Construction Permit would be required before the well(s) is constructed and/or a Pump Installation Permit would be required before ground water is pumped from the wells(s) for this project.

5. The proposed water supply source for the project is located in a designated water management area, and a Water Use Permit from the CWEM would be required prior to use of the source.

Sincerely,

[Signature]

EDWIN T. SAKODA  
Acting Deputy Director

LNSS

Mr. Ernest Y.W. Lau

Page 2  
May 10, 1999

1. Groundwater withdrawals from this project may affect streamflow. This may require an instream flow standard amendment.

1. If the proposed project diverts additional water from streams or if new or modified stream diversions are planned, the project may need to obtain a stream diversion works permit and permit to amend the known location of the water source.

1. If the proposed project alters the bed and banks of a stream channel, a stream channel alteration permit may be required.

OHWQ:

A pump installation permit was issued for Puhi Well No. 1 (Well No. 5244-00) on February 2, 1993; this permit will expire on January 30, 2000. An application for a pump installation permit for Puhi Well 5A (Well No. 5245-00) should be made and approved prior to pump installation work. A permit to modify the existing pump permits is not required for the existing Puhi Well No. 1 (Well No. 5244-00), unless the existing pump sump capacity is increased or a larger capacity pump is replaced with a larger capacity pump. A water supply permit is not required because the Hanalei Aquifer System has not been designated a water management area.

If there are any questions, please contact the Commission staff at 587-0216 or toll-free at 274-3141, extension 70218.
DEPARTMENT OF WATER
County of Kauai

November 1, 1999

"Water has no Substitute - Conserve it"

Mr. Edwin T. Sakoda, Acting Deputy Director
Commission on Water Resource Management
P. O. Box 621
Honolulu, HI 96819

Dear Mr. Sakoda:

Subject: Comments on the Draft Environmental Assessment, Pumps and Controls for Pahi
Well Nos. 3A and 3B and Modification to Pahi Well No. 1

I am writing to submit comments on the Draft Environmental Assessment (EA) prepared in
support of the proposed installation of pumps and controls for Pahi Well Nos. 3A and 3B,
and modification to Pahi Well No. 1. The Pump Installation Permits are listed in Section III,
"Permits and Approvals Required."

I appreciate the opportunity to review this EA and provide comments. Below are my
comments:

1. Pump Installation Permits will be obtained from your office prior to pumping any groundwater
from the well. The Pump Installation Permits is listed in Section III, "Permits and Approvals
Required."

2. The following discussion on the impact of the proposed project on nearby streams has been
added to Section VI, Pahii:

The impact of the Pahi Well 3A and 3B on streamflow in the area has been analyzed by both
the United States Geological Survey (USGS) and the project's hydrologists consulting
firm, Water Resources Associates. The USGS estimates that pumping of Pahi Well 3A and 3B
may reduce the streamflow in Hanalei, Hanamalu, and Kawainui Streams by as much as
20%. The USGS estimates are based on a comparison of the measured average stream
basinflow and the well pumping rates. A copy of the USGS findings are contained in the
USGS letter dated June 24, 1999, which may be found in the section of this EA regarding
responses to the Draft EA.

Water Resources Associates, however, assert that Well 3A and 3B will have no
measurable short- or long-term effect on Hanalei, Hanamalu, and Kawainui Streams.
The analysis by Water Resources Associates is based on the premise that Pahi Well 3A and 3B
will pump water from a basal aquifer with a head of approximately 64 ft. msl which is
hypothetically cannot contribute to streamflow above an elevation of 64 ft. msl. A copy
of the Water Resources Associates findings are contained in a letter report dated October
4, 1999, which may also be found in the section of this EA regarding responses to the
Draft EA.

The Hanalei and Hanamalu Streams are gauged by USGS in an ongoing program. It
may be possible to evaluate in the future whether any long-term effects on streams in the
area have been observed. However, a 20% change in streamflow rate may not be
observable with current monitoring techniques. Because of the existing USGS
monitoring program and the relatively small potential impact on streamflow, the
Department of Water does not propose to include any new stream monitoring program

Based upon the above analysis, we do not anticipate that the proposed project will alter the
bed or banks of any stream, and therefore, we do not propose to apply for a stream channel
alteration permit at this time.

3. Pahi Well No. 3A. We will be submitting a Pump Installation Permit for Well 3A prior
to the installation of the pump in this well.

Pahi Well No. 3B. It will be necessary to apply for a time extension of the existing Pump
Installation Permit for Well 3B.

Pahi Well No. 1. The flow rate of 200 gpm will not be changed by the proposed project and
therefore we will not be submitting for a Well Modification Permit.

Once again, we appreciate your comments on this project. Should you have any questions,
please do not hesitate to contact the Project Engineer, William Eddy, at 808-243-5412.

Sincerely,

[Signature]

[Name]
Manager and Chief Engineer

[Company]

November 1, 1999
April 22, 1999

Mr. Ernest Lau, Manager and Chief Engineer
Department of Water, County of Kauai
P.O. Box 1706
Lihue, Kauai, Hawaii 96766

Dear Mr. Lau:

SUBJECT: Chapter 6E-42, Historic Preservation Review - DEA for Pumps and Control for Pupu Wells No. 5A & SB and modification to Pupu Well No. 1 (Department of Water, County of Kauai)

TMRC: 4-3-04-05: 10, 14 and 3-4-07: 3, 6
Pupu, Lihue, Kauai

A review of our records indicates the absence of historic sites on this property. The wells have already been built and this DEA is for improvements to the already existing infrastructure. Most of the area has been under sugarcane cultivation. Today no historic sites exist in the area. Thus, we believe that your project will have "no effect" on significant historic sites.

If you have any questions, please call Nancy McMahon at 742-7033.

Aloha,

ERNEST HIBBARD, Administrator
State Historic Preservation Division
Hawai'i State Historic Preservation Division

November 1, 1999

Mr. Don Hibbard, Administrator
State of Hawai'i
Department of Land and Natural Resources
Historic Preservation Division
Kukuiolono Building, Room 224
601 Kamokila Boulevard
Kapolei, Hawai'i 96707

Dear Mr. Hibbard:

SUBJECT: Comments on the Draft Environmental Assessment, Pumps and Controls for Pupu Well No. 5A and SB and Modification to Pupu Well No. 1

TMRC: 4-3-05: 10, 14, 3-4-07: 3, 6

Thank you for your review and response of no comment to the subject Draft Environmental Assessment (EA). Should you have any questions in the future regarding this project, please do not hesitate to contact the Project Engineer, William Eddy, at (808) 245-5412.

Sincerely,

/Ernest Y.W. Lau
Manager and Chief Engineer

WE: c. Sun & Associates
November 1, 1999

Mr. Dean Y. Uchida, Administrator
State of Hawaii
Department of Land and Natural Resources
Land Division
P.O. Box 621
Honolulu, HI 96809

Dear Mr. Uchida:

Subject: Comment on the Draft Environmental Assessment, Pumps and Controls for Puhui Well Nos. SA & SB and Modifications to Puhui Well No. 1 Puhui, Kauai, Hawaii

We have reviewed the subject D EA document and have no comments to offer regarding the proposed project.

Thank you for the opportunity to review the D EA document.

Should you have any questions or require further assistance, please contact staff planner Ed Henry at (808) 587-0380.

Sincerely,

Edward Fedor
Manager and Chief Engineer

cc: Sato & Associates, Inc.
November 5, 1999

Mr. Kazu Hayashida
State of Hawaii
Department of Transportation
2046 South King Street
Honolulu, HI 96826

Dear Mr. Hayashida:

Subject: Comments on the Draft Environmental Assessment, Pumps and Controls for Pali Well Nos. 5A and 5B and Modification to Pali Well No. 1

Thank you for your review and response of no comment to the subject Draft Environmental Assessment (EA). Should you have any questions in the future regarding this project, please do not hesitate to contact the Project Engineer, William Eddy, at (808) 245-5412.

Sincerely,

Ernest Y.W. Lau
Manager and Chief Engineer

cc: Sato & Associates

KAZU HAYASHIDA
Director of Transportation
Mr. Lau

Draft Environmental Assessment for Pumps and Controls for Puhw Well Nos. 5A & 2B and Modification to Puhw Well Nc. 1, Kauai

May 11, 1999

Mr. Ernest Lau
Department of Water
County of Kauai
Live Pua Lake Street
Lihue, Hawaii 96766

Dear Mr. Lau:

Subject: Draft Environmental Assessment for Pumps and Controls for Puhw Well Nos. 5A & 2B and Modification to Puhw Well No. 1, Kauai

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

1. Hydrologic Impact Analysis

Please describe the potential effects the well development may have on Hanamaulu, Pua Lake and Kuleia Stream. If potential impacts exist, a monitoring program for the stream should be included.

2. Financial and Institutional Arrangements

In some instances, a well is developed by private financing, the transfer of public lands to government or private developers, or in return for a water allocation credit to supply an urban development. The EA should include a full discussion of any institutional, financial or land use arrangements or commitments related to developing the well and delivering water to end users. These arrangements may include the formation of public utility companies and subsequent rate-setting, the establishment of county water commitments, the co-funding of state or county water system development, an executive order or other set-asides of state lands, and purchase of land or easements by public entities.

Any or all of these arrangements and all permits or governmental approvals required to fulfill these commitments should be listed.

3. Watershed and Land Use Analysis

Please include a discussion of how waters from the well will be used, and an analysis of how the proposed well development may affect land and water uses on the island and in the region. The analysis should include a discussion of the following (published materials may be referenced):

- Hawaii State Water Plan and its component parts
- County General, Development, and/or Community Plans
- Plans for future water development within the aquifer
- Historical water supply and demand figures for the region
- Any secondary or cumulative impacts caused by promoting land uses that alter the hydrology of the source and/or end-use area
- An assessment of the well's impact on the landowners, water users including farmers and Kauai residents in the region and a declaration if ceded lands are involved.

Should you have any questions, please call Jayan Thirugnanan at 866-4184.

Sincerely,

[Signature]

[Name]
Director

C: Nato and Associates, Inc.
October 29, 1999

Ms. Genevieve Salmanson
State of Hawaii
Office of Environmental Quality Control
235 South Beretania Street, Suite 702
Honolulu, HI 96813

Dear Ms. Salmanson:

Subject: Comments on the Draft Environmental Assessment, Pumps and Controls for Pali Well Nos. 3A and 3B and Modification to Pali Well No. 1

Thank you for the review and comments of the subject Draft Environmental Assessment (EA) prepared by your staff. We have made some modifications in the text of the EA to clarify the issues raised in your response letter. The following specific responses indicate how your comments have been incorporated into the EA.

DEPARTMENT OF WATER
County of Kauai

"Water has no substitute – Conserve it!"

Ms. Genevieve Salmanson
Page 2
October 29, 1999

DOW Response to Comment #2: Financial and Institutional Arrangements

The following section has been added to the EA:

Section V, Part E, "Financial and Institutional Arrangements"

The well development project is funded jointly by the State of Hawaii and the County of Kauai, Department of Water. The limits of the project are entirely within property owned by the either the State of Hawaii or the County of Kauai. Department of Water with the exception of the new power transmission line that will be the property of Kauai Electric Co. and will cross private property. The project does not involve any institutional, financial or land use arrangements in commercial with other public or private entities, with the exception of the power provided by Kauai Electric Co.

DOW Response to Comment #3: Watered and Land Use Analysis

The following section has been added to the EA:

Section V, Part F, "Watered and Land Use Analysis"

The State of Hawaii Constitution mandates that "the State has an obligation to provide, control, and regulate the use of Hawaii’s water resources for the benefit of its people." The State Water Code at the enforcement level of the state constitution and the Hawaii Water Plan is one of the primary policies of the State Water Code. The Hawaii Water Plan is intended to fulfill comprehensive planning requirements through four component parts: a water resource protection plan, a water use and development plans for each County, a water project plan, and a water quality plan. The proposed project is fully consistent with the Hawaii State Water Plan and is four component parts:

The County of Kauai General Plan as updated in 1981 lists its goals as follows:

- To maintain the concept of Kauai as "The Garden Isle": thus, maintaining any growth be in conformance with the unique landscape and environmental character of the island
- To ensure that all physical growth is consistent with the overall ecology of the island
- To manage growth according to established population growth targets.
- To create opportunities for a great fulfillment of life through the development of a broad spectrum of educational and cultural pursuits.
- To promote and protect the health, safety, and welfare of all residents and visitors.
- To provide opportunities for suitable living quarters for all residents at all income levels.
- To provide for a maximum variety of outdoor recreational activities.
- To recognize these aspects of the island and its people which are historically, and culturally significant, and to maintain and enhance such aspects as a continuing expression of the island’s physical and social structure.
- To promote the improvement and expansion of the island’s economy, by recognizing and carefully utilizing land and water resources.
- To guide and control development to take full advantage of the island’s form, history, and climate and preserve the opportunity for an improved quality of life.
- To guide physical growth on this island and visitor communities will develop in social and economic concert with each other.

— USGS GA USA, 1992

The following text has been added to Section VI, Part D, "Groundwater Hydrology."

The impact of the Wells 3A and 3B on streamflow in the area has been analyzed by both the United States Geological Survey (USGS) and the project’s hydrologist consulting firm, Water Resource Associates. The USGS estimates that pumping of Wells 3A and 3B may reduce the streamflow in Hula, Hoomaluhia, and Kawailoa Streams by as much as 3%. The USGS estimate is based on a comparison of the measured average stream baseline and the well pumping rates. A copy of the USGS findings are contained in the USGS letter dated June 24, 1999, which may also be found in the section of this EA regarding responses to the Draft EA.

The USGS findings are significant because they indicate the potential for significant reductions in streamflow. The reduction in streamflow could have significant impacts on the water supply for the area.

The Hula and Hoomaluhia Streams are gaged by USGS as an ongoing program. It may be possible to evaluate in the future whether any long-term effects on streams in the area have been observed, however a 3% change in streamflow rate may not be discernible with current monitoring techniques. Because of the existing USGS monitoring program and the relatively small potential impact on streamflow, the Department of Water does not propose to include any new streamflow monitoring program.
Mr. Greeneve Salmonson
Page 2
October 29, 1999

- To manage implementation through development of social and physical infrastructure based on
growth targets, priorities and efficient utilization of facilities and services.
- To provide workable planning tools to meet the changing needs of the community.
- To create, develop and sustain an economy and a population composition that will encourage
the youth of Kauai to live in the County and contribute to society.
- To encourage and support efforts to approach self-sufficiency in food production and energy.

The proposed project is fully consistent with the goals of the County of Kauai General Plan as
updated in 1981.

As indicated in Section VI, Part D, the project involves further development of the Hanamalu
Aquifer, which has an estimated sustainable yield of 40 million gallons per day (mgd). Current
pumpage, based on data from the State of Hawaii Commission on Water Resource Management, is
estimated at a maximum of approximately 10.8 mgd, or approximately 27% of the sustainable yield
of the aquifer. The additional ground water production from the proposed project will not be
significant relative to the aquifer sustainable yield.

The DOI is planning to develop additional wells in the Hanamalu area that will also produce from
the same aquifer, at a considerable distance from the Pili area. The combined pumping from all
known current or proposed wells is expected to remain considerably below the sustainable yield of

The proposed project does not promote land uses that will significantly alter the hydrology of the
source or end-use area. The project will provide additional water supplies and address current
stress water deficiencies within the existing water system. The project does not involve any land
use arrangements or commitments with other public or private entities.

It is anticipated that the project will have no impact on nearby landowners or water users, including
farmers or kahuna residents. The majority of the developed property in the vicinity of the project is
agricultural land that uses surface water from the irrigation ditch system for irrigation purposes.
The project does not involve ceded lands.

Once again, we appreciate your comments on this project. Should you have any questions, please do not
hesitate to contact the Project Engineer, William Eddy, at (808) 245-5412.

Sincerely,

[Signature]

Ernest Y.W. Lau
Manager and Chief Engineer

October 29, 1999

Mr. Cesar C. Portugal
County of Kauai
Department of Public Works
4444 Rice Street
Mo‘ili‘ili Building, Suite 275
Lihue, HI 96766

Dear Mr. Portugal:

Subject: Comments on the Draft Environmental Assessment, Pumps and Controls for Puhinui Well Nos. SA and SB and Modification to Puhinui Well No. 1

Thank you for your review and response to the subject Draft Environmental Assessment (EA). Should you have any questions in the future regarding this project, please do not hesitate to contact the Project Engineer, William Eddy, at (808) 245-5412.

Sincerely,

[Signature]

[Title]
Manager and Chief Engineer
c: Sato & Associates, Inc.

cc: Sato & Associates, Inc.
April 16, 1999

Mr. Ernest Y.W. Lau
Manager and Chief Engineer
Department of Water
County of Kauai
P.O. Box 7165
Lihue, Hawaii 96766

Dear Ernest:

RES: Fire Department Comments
Drift Environmental Assessment
Pumps and Control for Pahk Wells #A & #B
and Modifications to Pahk Well #1
Pahk, Kauai, Hawaii

The following comments are rendered after review of the submitted documents. The Fire Department is pleased that these additional resources are being developed to increase the pumping and storage capabilities of the Pahk and Lihue Water Systems. We are simply an end-user of this development during emergency situations. The additional capability enhances our ability to handle incidents in light of the increase of development in the Lihue to Pahk Division.

However, we are concerned of the decision to install a typical compressed gas chlorination system. The proposed timetable for the construction of this Project appears to occur during the period when the new fire code (1997 UFC) will be implemented in the County. The code addresses "new installations" and follow current nationally-recognized practices for the installation of chlorination systems.

To simplify matters, a single 1500 pound chlorine cylinder in use or storage does not exceed the hazardous materials exempt quantity and would therefore not require any additional equipment. On the other hand, if two or more 1500 cylinders were kept at the single site either in use or in storage, any additional cylinder(s) beyond the single cylinder would be required to be enclosed in an approved gas room, exhausted enclosure, or gas cabinet; and/or would be further required to provide additional fire protection, i.e., fire sprinkler systems, etc.

The international fire service community is greatly concerned about issues involving hazardous materials because of its great potential for disaster. This affects not only the value of property, but places extreme risk and danger to occupants, surrounding neighbors, and emergency responders.

We recommend that you consider alternate (safer) technologies to provide the chlorination need or install equipment as suggested above to increase exempt amounts kept on-site.

Please call for further inquiry.

Sincerely,

Mike Kane, Captain
Fire Prevention Bureau
TEL: (808) 245-6511

David K. Sprout
Fire Chief
November 1, 1999

Mr. David K. Sproat, Fire Chief
County of Kauai
Fire Department
4444 Rice Street
Moloaa Building, Suite 295
Lihue, HI 96766

Dear Mr. Sproat:

Subject: Comments on the Draft Environmental Assessment, Pumps and Controls for Public Well Nos. 5A and 5B and Modification to Public Well No. 1

Thank you for your review of the subject Draft Environmental Assessment (EA) and your letter of support for the project. We acknowledge your safety concern regarding the use of a compressed gas chlorination system. Safety is also the utmost concern for the Department of Water including the safety of our employees and the safety of all Kauai residents.

The use of compressed chlorine gas for potable water disinfection has been our standard for several decades and we have an excellent safety record in the use and handling of the disinfectant. Our personnel that maintain the chlorination system are well trained in the handling and installation of the chlorine cylinders. We feel that the system is safe and effective.

We intend to fully comply with the new fire code (1997) and will install not more than a single 150 lb. chlorine cylinder at the proposed well site. Also included at the well site will be chlorine gas detector units to alert persons of danger should there be a gas leak. A set of the construction plans containing the chlorine gas safety equipment will be sent to your office during the building permit review process.

Once again, we appreciate your comments on this project. Should you have any questions in the future regarding this project, please do not hesitate to contact the Project Engineer, William Eddy, at (808) 243-5412.

Sincerely,

[Signature]

Y.W. Lau
Manager and Chief Engineer

WE
Sato & Associates, Inc.
DEPARTMENT OF WATER
County of Kauai

"Water has no substitute - conserve it"

May 3, 1999

Mr. Ernest Y.W. Lau
County of Kauai Department of Water
P.O. Box 1706
Lihue, Kauai, HI 96766

SUBJECT: Draft Environmental Assessment
Pumps and Controls for Puhinawa Kaeo, SA & SB and
Modification to Puhinawa Kaeo No. 1 at Puhinawa, Kauai, Hawaii

The Puhinawa District currently does not have enough potable water to
meet existing and projected demands which has limited growth in
this area. Being Kauai's principal town, it is important that
Lihue develop to provide the island with needed goods and services
for both present and future needs. These proposed facilities will
help Lihue develop.

Please note that construction of the well facilities within the
Agriculture and Open zones will require Use Permits which require
Public Hearings and Planning Commission approval. Our office
should be contacted for more information on permitting requirements
well before commencing the project.

We have no additional comments to offer and should you have any
questions, please feel free to contact Keith Niitsa of my staff at
241-6477.

Sincerely,

[Signature]
DERM. CROWELL
Planning Director

Kapaa Building • 4444 Rice Street, Suite 473 • Lihue, Kauai, Hawaii 96766
AN EQUAL OPPORTUNITY EMPLOYER

October 29, 1999

Mr. Der M. Crowell, Planning Director
County of Kauai
Planning Department
4444 Rice Street
Kapaa Building, Suite 473
Lihue, HI 96766

Dear Mr. Crowell:

Subject: Comments on the Draft Environmental Assessment, Pumps and Controls
for Puhinawa Kaeo, SA and SB and Modification to Puhinawa Kaeo No. 1
TMRC: (808) 245-1084; (808) 245-8734

Thank you for your review of the subject Draft Environmental Assessment (EA) and your
letter of support for the project. In conformance with your comments regarding
construction of the well facilities within Open and Agricultural Zones, we obtained
approval of a Use Permit from the Planning Commission at its regular meeting on
September 23, 1999.

Should you have any questions in the future regarding this project, please do not hesitate to
contact the Project Engineer, William Eddy, at (808) 245-5412.

Sincerely,

[Signature]

Ernest Y.W. Lau
Manager and Chief Engineer
c: Sano & Associates, Inc.
October 29, 1999

Mr. Michael H. Furukawa
Vice President and Project Manager
Grove Farm Company, Inc.
P.O. Box 2069, Pahoa Rural Branch
Pahoa, HI 96778-7069

Dear Mr. Furukawa:

Subject: Comments on the Draft Environmental Assessment, Pumps and Controls for Pahoa Well Nos. 5A and SB and Modification to Pahoa Well No. 1

Thank you for your review and response to the subject Draft Environmental Assessment (DEA). We have made the following modifications in the text of the EA to clarify the items pointed out in your response letter:

1. The first paragraph of Section VI, Part B, “Topography and Climatic,” has been revised to clarify that none of the lands in the vicinity of the project are actively under agricultural cultivation.

2. The second paragraph, first sentence, of Section VI, Part C, “Geology and Soils,” has been revised to clarify that it is the Department of Agriculture, not the Department of Soil Conservation.

Once again, we appreciate your comments on this project. Should you have any questions in the future regarding this project, please do not hesitate to contact the Project Engineer, William Eddy, at (808) 245-5412.

Sincerely,

[Signature]

GROVE FARM COMPANY, INCORPORATED

Michael H. Furukawa
Vice President and Project Manager
X. REFERENCES


"Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii," United States Dept of Agriculture, Soil Conservation Service in cooperation with the University of Hawaii, Agricultural Experiment Station, August 1972.


APPENDIX A

PUHI WELL 5A
WELL COMPLETION REPORT
AND
REPORT OF PUMP TESTS
**WELL COMPLETION REPORT**

State of Hawaii  
COMMISSION ON WATER RESOURCE MANAGEMENT  
Department of Land and Natural Resources  

(Well Name: PUHI WELL NO 5A)  
Island: KAUA'I  

<table>
<thead>
<tr>
<th>Part I: WELL CONSTRUCTION REPORT</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. Drilling Company: ROSECORE MOSS HAWAII, INC.</td>
</tr>
<tr>
<td>4. Name of driller who performed work: JOHN CARROLL &amp; JERRY BOURNE</td>
</tr>
<tr>
<td>5. Type of rig/construction: AIR ROTARY &amp; CABLE TOOL</td>
</tr>
<tr>
<td>6. Date(s) Well Construction and pump tests (if any) completed: 3/12/97 WELL 4/28/97 PUMP</td>
</tr>
<tr>
<td>7. GROUND ELEVATION (referenced to mean sea level, msl): 482.3 ft.</td>
</tr>
<tr>
<td>Well Bench Mark (description/location): MARK ON CONCRETE HEADWALL ELEVATION (msl): 488.93 ft.</td>
</tr>
<tr>
<td>8. DRILLER'S LOG: Please attach geologic log (if available or if required by permit)</td>
</tr>
<tr>
<td>Depths (ft.)</td>
</tr>
<tr>
<td>9. Total depth of well below ground: 125 ft.</td>
</tr>
<tr>
<td>10. Hole size: 20 inch dia. from 0 ft. to 900 ft. below ground</td>
</tr>
<tr>
<td>11. Casing installed: 12 in. I.D. x .375 in. wall solid section to 565 ft. below ground</td>
</tr>
<tr>
<td>Casing Material/Slot Size:</td>
</tr>
<tr>
<td>12. Annulus: Grouted from 0 ft. below ground to 100 ft. below ground</td>
</tr>
<tr>
<td>Cemented from 200 ft. below ground to 215.45 ft. below ground</td>
</tr>
<tr>
<td>13. Initial water level: 417.48 ft. below ground</td>
</tr>
<tr>
<td>14. Initial chloride: 74 ppm</td>
</tr>
<tr>
<td>15. Initial temperature: 23.4°C</td>
</tr>
<tr>
<td>16. PUMPING TESTS: Reference Point (R.P.) used: PUMP BASE</td>
</tr>
<tr>
<td>(1) Step-Drawdown Test Date: 4/14/97</td>
</tr>
<tr>
<td>Start water level: 417.48 ft. below R.P.</td>
</tr>
<tr>
<td>End water level: 448.59 ft. below R.P.</td>
</tr>
<tr>
<td>(2) Long-term Aquifer Test Date: 4/21/97</td>
</tr>
<tr>
<td>Start water level: 416.81 ft. below R.P.</td>
</tr>
<tr>
<td>End water level: 448.59 ft. below R.P.</td>
</tr>
<tr>
<td>17. Aquifer Pump Test Procedures data &amp; graphs (1/92 LTAT Form) attached? Yes No</td>
</tr>
<tr>
<td>18. As-built drawings attached? Yes No</td>
</tr>
<tr>
<td>19. Other remarks/comments:</td>
</tr>
</tbody>
</table>

Well Drilling Contractor (print): ROSECORE MOSS HAWAII, INC.  
C-57 Lic. No. C-16437  
Date: 7/1/97  

Surveyor (print):  
Lic. No.  
Date:  

Applicant (print): Ernest Y. W. Lau, Manager & Chief Eng.  
Date: 7/21/97
PART II.

(PERMANENT) PUMP INSTALLATION REPORT

20. Pump Installation Company:_________________________________________________________

21. Name of person performing work:_________________________________________________

22. Date Pump Installation Completed:________________________________________________

23. PUMP INSTALLATION:
   Pump Type, Make, Serial No.:_______________________________________________________
   Capacity: __________ ppm
   Motor type, H.P., Voltage, rpm:_____________________________________________________
   Depth of Pump Intake Setting __________ ft. below __________ ft. which elevation is __________ ft.
   Depth to bottom of airline __________ ft. below __________ ft. which elevation is __________ ft.
   Pumping Head is __________ ft. Type of flow meter:____________________________________
   which measures in _________________________________________________________________

24. As-built drawings attached attached? __ Yes __ No

25. Other remarks/comments: (See below)

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<th>C-57 Lic. No.</th>
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8.(cont'd) DRILLER'S LOG (cont'd):

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<th>Depth (ft.)</th>
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19 & 25. Remarks:

WELL 5A WAS DRILLED TO A DEPTH OF 105' AND BACKFILLED TO 970' DUE TO POOR GEOLOGY.
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P U H I  W E L L  5 A
A S  B U I LT  W E L L  S E C T I O N

Elevation at top of casing

Ground Elevation 482.27 ft. msl

Current Grout 200 ft.

Rock Packing 15.75 ft

Hole Diameter: 20° TO 90°
11 1/2" TO 1058

Total Depth 970 ft. AFTER BACKFILLING

Steel A-53 Grade B
Material
Length 56.5 ft.
Diameter 11 1/2" W.D.
Wall Thickness 0.125

Casing: □ Perforated □ Screen
Material □ N/A
Length
Diameter
Wall Thickness
Openings

Open Hole: AFTER BACKFILL BEFORE B
Length 617.25/705.25
Diameter 11 1/2/11 1/2

*Approximate elevation at time of filing application. Ground elevation above mean sea level (msl) by a surveyor licensed by the State must be submitted at completion. Final elevation of well components shall be submitted in the well completion/well abandonment report.
Report of Pump Tests

Puhi Well No. 5A,
State Well No. 5824-08

County of Kauai, Department of Water

June 1997
Test Pump Setting - Puhi Well No. 5A

pump base

elev. 483.73'

USGS sounder (4/16/67)

DTW = 417.88'

SWL elev. 65.85'

11-5/8" diameter bowls

elev. -28.27'

elev. -16.27'

elev. 21
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APPENDIX B

PUHI WELL 5B
WELL COMPLETION REPORT
AND
REPORT OF PUMP TESTS
# WELL CONSTRUCTION REPORT

### PART I.

3. **Drilling Company:** ROSCOE MOSS HAWAII, INC.

4. **Name of driller who performed work:** JOHN CARROLL

5. **Type of rig/construction:** AIR ROTARY

6. **Date(s) Well Construction and pump tests (if any) completed:** CONSTRUCTION IS NOT COMPLETE

7. **GROUND ELEVATION** (reference to mean sea level, msl): **482.63 ft.**

   - **Well Bench Mark (description/location):** MARK ON CONCRETE HEADWALL, Elevation (msl): **480.93 ft.**

8. **DRILLER'S LOG:** Please attach geologic log (if available or if required by permit)

   - **Decks (ft.):**
     - **Rock Description, Water Level, Dates, etc.:**
     - **Depth (ft.):**
     - **Rock Description, Water Level, Dates, etc.:**

   - **ATTACHED**

9. **Total depth of well below ground:** **925 ft.**

10. **Hole size:**
    - **24 inch dia. from 0 ft. to 83 ft. below ground**
    - **20 inch dia. from 83 ft. to 900 ft. below ground**
    - **12 inch dia. from 900 ft. to 925 ft. below ground**

11. **Casing installed:**
    - **14 in. I.D. x 312 in. wall sold section to 500 ft. below ground**
    - **14 in. I.D. x 312 in. wall perforated section to 900 ft. below ground**

   - **Casing Material/Slot Size:** FULL FLOW

12. **Annulus:**
    - **Grouted from N/A ft. below ground to N/A ft. below ground**
    - **Gravel packed from 900 ft. below ground to N/A ft. below ground**

13. **Initial water level:** **414.75 ft. below ground**

14. **Initial chloride:** **160 ppm**

15. **Initial temperature:** **70°F**

16. **PUMPING TESTS:** Reference Point (R.P.) used: **PUMP BASE** which elevation is **483.25 ft.**

   - (1) Step-Drawdown Test Date: **3/3/96**
     - Start water level **419.65 ft. below R.P.**
     - End water level **431.83 ft. below R.P.**

   - (2) Long-term Aquifer Test Date: **3/12/96**
     - Start water level **417.65 ft. below R.P.**
     - End water level **428.16 ft. below R.P.**

17. **Aquifer Pump Test Procedures data & graphs (1/88 LTA Form) attached?** **Yes**

18. **As-built drawings attached?** **Yes**

19. **Other remarks/Comments:** (On back of this form)

---

**Well Drilling Contractor (print):** ROSCOE MOSS HAWAII, INC. C-57 Lic. No. C-16437

**Signature:** [Signature]

**Date:** 7/1/97

**Surveyor (print):**

**Signature:** [Signature]

**Date:**

**Applicant (print):** ERNEST W. LAM, Manager & Chief Eng.

**Signature:** [Signature]

**Date:** 7/21/97
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Report of Pump Tests

Puhi Well No. 5B,
State Well No. 5824-09

County of Kauai, Department of Water

April 1996
Puhí Well No. 5A (Observation Well)
State Well No. 5824-08
Open Hole

elev. = 452' +/-
Kilohana Well "D"

well is not developed
Puhi Well No. 5
Step-Drawdown Test

Test Pump Base

Elev. = 483.35'

SWL
Elev. = 66.20'

SWL Elev. Computed by Airline Method
Bott. of Airline Elev.
+ Airline Submergence
NOTE: Airline not operable because of air leak

WL Elev. Computed by Under Reading

First Pump Base Elev.
Depth to SWL

Length of Discharge Column

Airline Submergence

Bottom of Airline
Elev. = (-) 16.65'

Elev. = (-) 33.69'

II & Test Puhi Well No. 5B
First Pump Setting
**Well 5B**

**STEP DRAWDOWN CURVE**

Puhi Well 5 (redrill) (5824-09), Kauai

Date of Test: March 6, 1996

![Graph showing drawdown over time.](image)

- **Drawdown**

---

*Water Resource Associates*

*39720G1*
Well 5A
STEP DRAWDOWN CURVE
Puhi Monitor Well (5824-08), Kauai
Date of Test: March 6, 1996

Drawdown, in ft.

Time Since Pumping Started, in minutes

Note: 20.6 ft. from 5824-08

Water Resources Associates
DRILL & TEST PUHI WELL NO. 5
PUHI, KAUAʻI, HAWAII

Job No. 93-5

PUMPING TEST NO. 1
LONG TERM TEST - ANNULAR SPACE UNFILLED

March 12 to March 22, 1996

NEW WELL
Well 5B
(5824-09)
March 12, 1996

Puhi Well No. 5 (Well 5B)

Test No. 1 - Long Term Test, Annular Space Unfilled

Test Pump Base Elev. = 483.35'

SWL Elev. Computed by Airline Method

Bottom of Airline Elev. = (-) 16.65'

NOTE: Airline not operable because of an air leak.

Airline Submergence

WL Elev. Computed by Under Reading

Pump Setting
1996
Puhi Well No. 6B
Sustained Rate Test, Q = 700 gpm

Elapsed Time (min.)

Drawdown (ft.)

- pump
○ recovery
DRILL & TEST PUHI WELL NO. 5
PUHI, KAUAI, HAWAII

Job No. 93-5

PUMPING TEST NO. 1
LONG TERM TEST - ANNULAR SPACE UNFILLED

March 12 to March 22, 1996

MONITOR WELL

Well 5A

(5824-08)
DRILL & TEST PUHI WELL NO. 5
PUHI, KAUAI, HAWAII

Job No. 93-5

PUMPING TEST NO. 1
LONG TERM TEST - ANNULAR SPACE UNFILLED

March 12 to March 22, 1996

EXISTING 8- INCH WELL

(KILOHANA WELL "D")
# PUMPING TEST RECORD

**Well Name:** Existing 8" Well (High Level)  
**State Well No.:**  
**Project:** Kilohana Well "D"  
**Island:** Kauai  

**DEPTH (Below Ground Surface):**  
- Solid Casing: 150'  
- Perforated Casing: N/A  
- Total Depth: 250'  
- Depth to Water: 90.5'  

**ELEVATIONS (Mean Sea Level):**  
- Ground Surface: 423.3'  
- Top of Casing: 485.66'  
- Top of Perforated: 486.61'  
- Bot. of Solid Casing: N/A  
- Bot. of Perforated: N/A  
- Bot. of Well: 735.65'  
- Static Water Level: 724.5'  

**TEST PUMP:**  
- Type: N/A  
- Intake Elev: N/A  

**DRAWDOWN MEASUREMENT:**  
- Manometer  
- Pressure Gage  
- Elect. Probe  

**DISCHARGE MEASUREMENT:**  
- Flowmeter  
- Other: N/A

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*Notes:*
- Remarks: N/A  
- Water Source: N/A  
- Location: 756.2 ft from the existing well.  

*After Resource Associates  
FamPum2*
## Pumping Test Record (Cont'd)

**Well Name:** Existing 8" Well  
**State Well No.:**  
**Test No.:** 1  
**Kilohana Well D**

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<th>Elapsed Time (min)</th>
<th>Date &amp; Time</th>
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<th>Initial Readings</th>
<th>Observed Drawdown (ft)</th>
<th>Adjusted Drawdown (ft)</th>
<th>Sample No.</th>
<th>Chlorides (ppm)</th>
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Shut down: End of pump test.

---

Iter Resource Associates

wmPum2
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<th>Date</th>
<th>Time</th>
<th>Flow Rate (gpm)</th>
<th>Observed Electrolysates</th>
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<th>Sample Chlorides ppm</th>
<th>Temp</th>
<th>Cond.</th>
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APPENDIX C

WATER RESOURCE ASSOCIATES

REPORT

ON

SUSTAINABLE YIELDS AND DRAWDOWN
August 18, 1997

Mr. Ernest Lau  
Manager & Chief Engineer  
Department of Water  
County of Kauai  
P.O. Box 1706  
Lihue, Kauai 96766-5706

Attention: Mr. Bill Eddy

Dear Mr. Lau:

Puhui Wells 5A and 5B, Kauai

We have reviewed all of the data, including tests, driller’s logs and cuttings for Puhui Wells 5A and 5B. Particular focus was on the 7-day April-May 1997 test for Puhui Well 5A, pumping at 700 gpm, but the 1996 test data for Puhui 5B, pumping at 700 gpm, was also reviewed.

As you know, wells in the Lihue Basin tap a complex suite of geologic formations, exhibited not only by their geologic logs, but also by multiple hydraulic discontinuities observed in the graphical plots of the test data. Because of this complexity, graphical analyses of the time-drawdown curves is the only way that drawdown at various times and pumping rates can be estimated.

Sustainable Yield

Figures 1 and 2 were used to predict drawdowns in Puhui 5A at pumping rates of 700 gpm and 1000 gpm for periods of pumping ranging from 7 days to 700 days. These results are shown in Table 1 below:

<table>
<thead>
<tr>
<th>Days of Continuous Pumping</th>
<th>Drawdown (ft.) @700 gpm</th>
<th>Drawdown (ft.) @1,000 gpm</th>
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<tr>
<td>7</td>
<td>34</td>
<td>61</td>
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<tr>
<td>70</td>
<td>40</td>
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<tr>
<td>7000</td>
<td>52 (+12&quot;)</td>
<td>85 (-21&quot;)</td>
</tr>
</tbody>
</table>

1188 Bishop Street, Suite 602 • Honolulu, Hawaii 96813-3302 • (808) 528-0074 • Fax 528-0808
The above table assumes 24 hrs/day pumping and no additional hydraulic discontinuities being encountered after seven days of pumping. Because the drawdown is asymptotic (values of approximately 52 ft at 700 gpm and 85 ft at 1,000 gpm, after 7,000 days of pumping), the sustainable yield of the well can be estimated from the projected drawdowns. A pump setting designed to accommodate a maximum drawdown of 52 ft would provide a sustainable yield of 700 gpm and a pump setting designed to accommodate a maximum drawdown of 85 ft would provide a sustainable yield of 1,000 gpm.

Puhi Well 5A is cased from ground elevation 482 ft. to a depth of 565 ft. (-83 ft., msl), or 147 ft. below static water level of 64 ft., msl. Open hole (20-inch) extends to a depth of 900 ft. (-418 ft., msl). Therefore, the well can easily accommodate a pump setting which provides for a maximum drawdown of 85 ft. (-23 ft., msl). The above sustainable yield estimate must, on the other hand, be tempered by the fact that well required 7 days to recover approximately 95 percent from 7 days of pumping at 700 gpm. This slow recovery suggests, prima facie, that in addition to water withdrawn from aquifer storage, recharge of approximately 350 gpm occurred during the test.

In summary, the test data indicates that aquifer tapped by Puhi Well 5A can sustain a yield of 1,000 gpm, based upon an asymptotic drawdown that reaches 85 ft. after 7,000 days of continuous pumping (in practical terms: sustainable). We recommend the maximum design capacity for Puhi Well 5A's 12-inch diameter casing, or 700 gpm, with the pump set for a maximum drawdown of 85 ft.

Completion of Puhi Well 5B

Current status of Puhi Well 5b is as follows:

Gr. Elev.: 482 ft.
Head: 64 ft., approx.
Solid Casing: 0-500 ft. (-18 ft., msl)
Perforated Casing with gravel packing: 500-900 ft. (-418 ft., msl).
Open Hole: 900-925 ft. (-443 ft., msl)

Step drawdown tests performed before and after gravel packing indicate specific capacity of the well is now 7 gpm/ft of drawdown, down from 86 gpm/foot of drawdown (see Figure 3).

Puhi Well 5B, as currently constructed, has a recommended pump capacity of 400 gpm, based upon the step drawdown test data. Using data from the 10-day test in
March 12-22, 1996 for Pahi Well 5B pumping at 700 gpm (see Figure 4), estimated drawdown in Well 5B pumping at a rate of 400 gpm, is approximately 50 ft. after 7 days, 55 ft. after 70 days, 60 ft. after 700 days, and 65 ft. after 7,000 days. Therefore, installation of a 400 gpm permanent pump, set to accommodate a maximum drawdown of 65 ft.(-1 ft., msl) in Pahi Well 5B can be considered without further pump testing.

If a constant rate test is desired to verify the above estimated drawdown characteristics of the well, a minimum 3-day constant-rate test would be okay.

As currently constructed, pumping Pahi Well 5B at a rate of 700 gpm should not be considered, since well efficiency is poor, initial drawdown is estimated at approximately 150 ft.(-86 ft., msl), and cascading water in the dewatered perforated zone might occur.

Please call me if you or your staff have any questions.

Sincerely,

DAN LUM
TIME-DRAWDOWN CURVE
Puhi Well No. 5A (Pumping) (5824-08)
Date of Test: April 21-28, 1997

Figure 1
TIME-DRAWDOWN CURVE
Puhi Well 5B (Obs) (5824-09)
Date of Pumping Well 5A: 4/21-28/97

Head: 64 ft, approx.

Well 5A Pumps Rate = 700 gpm
Source of data: Kauai DEP

Time since pumping started, in minutes

Drawdown (ft)

Figure 2

Water Resource Associates
OSTCOCETO
TIME-DRAWDOWN CURVE
Puhi Well 5B (Pumping) (5824-09), Kauai
Date of Test: March 12-22, 1996

Static Water Level = 60.2 ft.

Figure 4
PUHI WELL 5B (5824-09)
Drawdown vs Pumping Rate

Drawdown, in ft.

Pumping Rate, in gpm

- 3/6/96 Test
- 5/3/96 Test

Water Resources Associates

daylight

Figure 3
Mr. Ernest Lau  
Manager & Chief Engineer  
Department of Water  
County of Kauai  
P.O. Box 1706  
Lihue, Kauai 96766-5706  
Attention: Mr. Bill Eddy  

Dear Mr. Lau:

Puhi Wells 5A and 5B, Kauai

This letter supplements our letter of August 18, 1997, regarding Puhi Wells 5A and 5B and presents, at the request of Bill Eddy, our estimate of the drawdowns to be expected in the wells, assuming both wells are pumped simultaneously and continuously (24 hrs/day) for the time periods indicated in Table 1. All other pertinent assumptions and conditions stated in our previous letter, apply.

<table>
<thead>
<tr>
<th>Days of Continuous Pumping</th>
<th>Drawdown (ft.) Well 5A (700 gpm)</th>
<th>Drawdown (ft.) Well 5B (400 gpm)</th>
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<tr>
<td>7</td>
<td>34 + 7 = 41</td>
<td>50 + 13 = 63</td>
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<td>70</td>
<td>40 + 12 = 52</td>
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<td>700</td>
<td>46 + 17 = 63</td>
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<td>52 + 22 = 74</td>
<td>65 + 31 = 96</td>
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The above table assumes that no additional hydraulic discontinuities will be encountered besides those encountered during the constant-rate pumping tests for both wells.
Puhi Well 5A

Puhi Well 5A is cased with solid casing to a depth of 565 ft. (-83 ft., msl), or 147 ft. below the static water level of 64 ft., msl. Therefore, Puhi Well 5A can easily accommodate a pump setting which provides for the estimated maximum drawdown of 74 ft. (-10 ft., msl), for a 700 gpm pump. It would be okay to set the permanent pump a little deeper to accommodate a drawdown of 85 ft., or -23 ft., msl.

Puhi Well 5B

Current status of Puhi Well 5b is as follows:

Gr. Elev.: 482 ft.
Head: 64 ft., approx.
Solid Casing: 0-500 ft. (-18 ft., msl)
Perforated Casing with gravel packing: 500-900 ft. (-418 ft., msl).
Open Hole: 900-925 ft. (-443 ft., msl)

As indicated above, Puhi Well 5B is cased with solid casing to a depth of 500 ft. (-18 ft., msl), or 82 ft. below the static water level of 64 ft. Perforated casing has also been installed, and it extends 400 ft. below the solid casing. Referring to Table 1, Well 5B will drawdown 85 ft., or 3 ft. into the perforated section of the well, after 700 days of pumping; and, consequently, air entrainment in the pumped water may occur. To minimize this occurrence, the top of the bowls of the permanent pump should be set, say, 24 ft. lower than the maximum anticipated drawdown of 96 ft., that is, a rounded 120 ft. below static water level (-56 ft., msl).

Please call me if you or your staff have any questions.

Sincerely,

[Signature]

DAN LUM
APPENDIX D

LABORATORY REPORT

CHEMICAL ANALYSIS
Laboratory Report

for

Rosco Moss Hawaii, Inc.
91-255A Olai Street
Kapolei, HI 96707
Attention: Tracy Runnells
Fax: (808) 682-5865

MONTGOMERY WATSON LABS.
SUBMITTED ON
MAY 28 1997

HGS/HS Hillary Strefer

Report #: 33916
PHASEV
Group Comments

Result for TCDD analysis submitted by Quantexra
Environmental Services.
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525 Semivolatiles by GC/MS

- 05/15/97 | 62406 | (ML/EP/255.2) | 2,4-Dinitrotoluene | ND | ug/l | 0.10 | 1 |
- 05/15/97 | 62406 | (ML/EP/255.2) | Alpha-Chlordane | ND | ug/l | 0.10 | 1 |
- 05/15/97 | 62406 | (ML/EP/255.2) | Acrephphenylenes | ND | ug/l | 0.10 | 1 |
- 05/15/97 | 62406 | (ML/EP/255.2) | Alichlor | ND | ug/l | 0.10 | 1 |
- 05/15/97 | 62406 | (ML/EP/255.2) | Aldrin | ND | ug/l | 0.10 | 1 |
- 05/15/97 | 62406 | (ML/EP/255.2) | Atacesine | ND | ug/l | 0.10 | 1 |
- 05/15/97 | 62406 | (ML/EP/255.2) | Bentazone | ND | ug/l | 0.10 | 1 |
- 05/15/97 | 62406 | (ML/EP/255.2) | Benzo(a)Anthracene | ND | ug/l | 0.10 | 1 |
- 05/15/97 | 62406 | (ML/EP/255.2) | Benzo(a)Pyrene | ND | ug/l | 0.10 | 1 |
- 05/15/97 | 62406 | (ML/EP/255.2) | Benzo(b)Fluoranthene | ND | ug/l | 0.10 | 1 |
- 05/15/97 | 62406 | (ML/EP/255.2) | Benzo(g,h,i)Perylene | ND | ug/l | 0.10 | 1 |
- 05/15/97 | 62406 | (ML/EP/255.2) | Benz[a]Indeno| ND | ug/l | 0.10 | 1 |
- 05/15/97 | 62406 | (ML/EP/255.2) | Benz[a]Pyrene | ND | ug/l | 0.10 | 1 |
- 05/15/97 | 62406 | (ML/EP/255.2) | Butachlor | ND | ug/l | 0.10 | 1 |
- 05/15/97 | 62406 | (ML/EP/255.2) | Caffeine | ND | ug/l | 0.10 | 1 |
- 05/15/97 | 62406 | (ML/EP/255.2) | Chlorpyrifos | ND | ug/l | 0.10 | 1 |
- 05/15/97 | 62406 | (ML/EP/255.2) | Chlorpyrifos | ND | ug/l | 0.10 | 1 |
- 05/15/97 | 62406 | (ML/EP/255.2) | Dibenzo(a,h)Anthracene | ND | ug/l | 0.10 | 1 |
- 05/15/97 | 62406 | (ML/EP/255.2) | Dieldrin | ND | ug/l | 0.10 | 1 |
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<th>Dilution</th>
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**Aldicarbons**

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**Diquat and Paraquat**

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**EDB and DSCP by GC-ECD**

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**Herbicides by 515.1**

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**ICPMS Metals**

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**Nitrate by IC as NO₃ & N**

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**SDWA Pesticides**

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**Volatile Organic Compounds**

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### Rosco Moss Hawaii, Inc. (continued)

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