



Water has no substitute.....Conserve it

June 20, 2012

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OFFICE OF ENVIRONMENTAL
QUALITY CONTROL

Mr. Gary Hooser, Director
Office of Environmental Quality Control
Department of Health
State of Hawaii
235 South Beretania Street Suite 702
Honolulu HI 96813

JUL 23 2012

FILE COPY

Dear Mr. Hooser:

Subject: DRAFT Environmental Assessment for County of Kauai,
Department of Water, Water Plan 2020 Project WKK-15 - Construct
Kilauea 466' Tank, 1.0 MG and Water Plan 2020 Project WKK-02
Drill & Develop Kilauea Well No. 3; TMK: (4) 5-1-05:131; Lot 33

The County of Kauai, Department of Water has reviewed the *DRAFT Environmental Assessment* for the project described above and anticipates a *Finding of No Significant Impact*. Please publish notice in the next available *OEQC Environmental Notice*.

We have enclosed a completed OEQC Publication Form and one (1) copy of the document in pdf format on a CD and one (1) hard copy of the *DRAFT EA*.

Should you have any questions, please contact Mr. Galen Nakamura on Kauai by phone at (808) 632-2267 or by email at galen.nakamura@hawaiiantel.net.

Sincerely,

A handwritten signature in black ink, appearing to read "DRC", is written over a white background.

David R. Craddick PE
Manager and Chief Engineer

DRC/WE/GN:bdm
Shoyu/Admin/Bill/Job No. WKK-15-WKK-02/SOH-OEQC

Enclosures

**Agency Action EA
Chapter 343, HRS
Publication Form**

Project

Name: County of Kaua'i, Department of Water, Water Plan 2020 Projects: WKK-15 Construct Kilauea 466' Tank, 1.0 MG; and WKK-02 Drill & Develop Kilauea Well No. 3

Island: Kaua'i

District: Halele'a District, Kilauea area.

TMK: (4) 5-1-05:131, Lot 33

Permits: County of Kaua'i: Use Permit, Class IV Zoning Permit, and building, grading, plumbing and electrical permits; State Department of Health: NPDES, Community Noise Permit; and State Commission on Water Resource Management, Well Construction/Pump Installation Permit.

Proposing/Determination: Anticipated Determination is a Finding of No Significant Impact (FONSI)

Agency: County of Kaua'i
Department of Water (DOW)
4398 Pua Loke Street
Līhu'e, HI 96766
Contact: Mr. Aaron Zambo
(808) 245-5449

Consultant: Kodani & Associates Engineers, LLC
3126 Akahi Street
Līhu'e, HI 96766
Mr. Jim Turturici
(808) 245-9591

Status: 30-day comment period

Summary: The project proposes to replace the existing 100,000 gallon Pu'u Pane Tank with a new 1.0 million gallon (MG) tank. The new tank will be constructed on the site of the existing tank. The existing tank will be demolished, and six portable small-capacity temporary tanks will be housed within the project's fenced area to provide continued storage capacity for water during construction of the new 1.0 MG tank. In addition to the tank upsizing, the project proposes to drill an exploratory well on the same site to explore the feasibility of co-locating a production well on this tank site. If the DOW determines the well to have sufficient production capacity, then the DOW will consider converting the exploratory well into a permanent production water source ("Pu'u Pane Well") to serve the Kilauea area.

**County of Kaua'i, Department of Water
Water Plan 2020 Projects
WKK-15 Construct Kilauea 466' Tank, 1.0 MG
and
WKK-02 Drill & Develop Kilauea Well No. 3**

TMK (4) 5-1-05:131, Lot 33
Kilauea, Kaua'i, HI 96754

Draft Environmental Assessment

July 1, 2012

Prepared for:
County of Kaua'i
Department of Water
4398 Pua Loke Street
Līhu'e, HI 96766

Prepared by:
Kodani & Associates Engineers, LLC
3126 Akahi Street
Līhu'e, HI 96766

Project:	County of Kaua'i, Department of Water Water Plan 2020 Projects (the "project"): <ul style="list-style-type: none"> • WKK-15 Construct Kilauea 466' Tank, 1.0 MG • WKK-02 Drill & Develop Kilauea Well No. 3
Applicant:	Department of Water ("DOW") County of Kaua'i 4398 Pua Loke Street Lihue, HI 96766 Attn: Mr. Aaron Zambo (808) 245-5449
Owner:	County of Kaua'i Department of Water 4398 Pua Loke Street Lihue, HI 96766
Accepting Agency:	County of Kaua'i Department of Water 4398 Pua Loke Street Lihue, HI 96766
Agent:	Kodani & Associates Engineers, LLC Civil Engineering and Surveying 3126 Akahi Street Lihu'e, HI 96766 (808) 245-9591
Location:	Halele'a District, Island of Kaua'i, Hawai'i
Tax Map Key:	(4) 5-1-05:131, Lot 33
Proposed Action:	<ul style="list-style-type: none"> • Replace existing 100,000 gallon water storage tank with a 1 million gallon storage tank, including connecting pipeline and related appurtenances. • Drilling of an exploratory well and possible construction of a permanent production well and related structures and appurtenances on property.
Land Area:	.525 acres
Present Use:	Existing fenced area contains a DOW 100,000 gallon potable water storage tank.
State Land Use District:	Agricultural
Kaua'i General Plan:	Agriculture
Zoning:	Agriculture
Permits Required:	County of Kaua'i <ul style="list-style-type: none"> • Use Permit • Class IV Zoning Permit • Building, grading, plumbing, electrical State Department of Health <ul style="list-style-type: none"> • NPDES • Community Noise Permit State Commission on Water Resource Management <ul style="list-style-type: none"> • Well Construction/Pump Installation Permit
Anticipated Determination:	Finding of No Significant Impact (FONSI)

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SECTION 1.0 INTRODUCTION

1.1 Project Overview

The County of Kaua‘i (“County”) is a political subdivision of the State of Hawaii. It’s Department of Water (“DOW”) is responsible for the management, control and operation of the County’s water system. Service is provided to residential, commercial, industrial and institutional users via 9 separate, unconnected water systems located on Kaua‘i from Kekaha to Hā‘ena. Currently, the DOW pumps water from 53 underground wells, 66 storage tanks, two tunnels, through 400 miles of pipeline serving about 20,000 customers. This includes service to the 2010 resident population of 67,091 and an approximate annual visitor count of about 964,000.¹ In addition to its own sources, the DOW also purchases water from private sources. Many of the DOW water systems date back to the plantation era, with some pipelines being 80-100 years old.

The Kilauea-Waipake-Kalihiwai service area includes Kilauea Town and a number of non-contiguous agricultural subdivisions that extend toward the mountains or the coast on either side of Kūhiō Highway. While Kilauea Town is a compact area of urban-density residential use and neighborhood businesses, the largest part of the service area consists primarily of low-density residential use, mixed with small farms. The DOW’s Kilauea-Waipake-Kalihiwai service area includes the highest percentage of agricultural users on the island. Approximately 33% of water sales qualify for the DOW agricultural rates.

The distribution system includes 12-inch pipes that connect DOW’s supply source(s) to Kilauea Town and the surrounding agricultural/open districts. An 8-inch main stretches east along Kūhiō Highway to the Waipake subdivision.

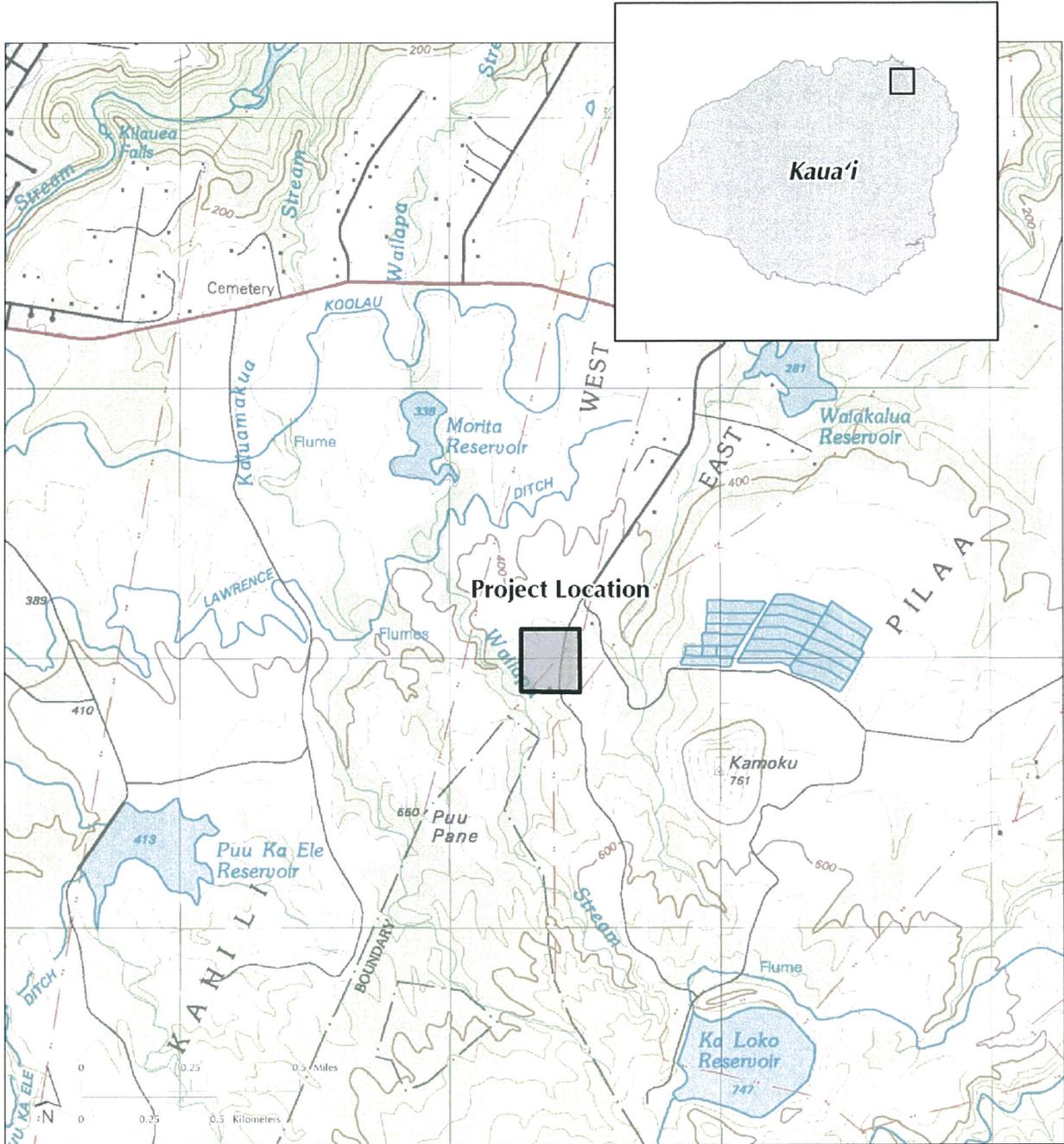
Since the early 1970s rapid development of the areas surrounding Kilauea Town has resulted in additional water system improvements and expansion of DOW’s system into the eastern Kilauea area.

According to the County of Kaua‘i’s Water Plan 2020² (“Plan”), between 2000 and 2020 nearly 40 percent growth in water use was expected in the Kilauea-Waipake-Kalihiwai service. A significant portion of this growth is attributed to agricultural use.

As shown in **Exhibit A**, DOW’s existing Pu‘u Pane 0.1 MG Tank located within the West Waiakalua Subdivision became operational in 2002 in fulfillment of a condition imposed on the developer of the subdivision to provide a water storage tank for the general area. Connected to Pumps No. 1 and No. 2 in the Kalihiwai Ridge

¹ Hawai‘i Tourism Authority, Annual Visitor Research Report.

² Department of Water, County of Kaua‘i, Water Plan 2020, March 2001.



County of Kaua'i
 Department of Water
 Pu'u Pane Water Tank, Kilauea
Environmental Assessment

**Exhibit A
 Location Map**

Prepared by:
 Kodani & Associates Engineers, LLC

area, the 100,000 gallon tank provides water for both potable and agricultural uses.

1.2 Purpose and Need

The Plan projects future water demands from all areas to grow at 20% between 2000 and 2020, with the exception of the Kilauea-Waipake-Kalihiwai area, which is projected to grow 43% between 2000 and 2020. Based on Plan data, the capital improvement program then proposed a new 650,000-gallon tank. The Plan forecast water use in 2010 in the Kilauea-Waipake-Kalihiwai water system to be about 842,000 gallons per day. The actual 2010 use was approximately 714,700 gallons per day. The current 2012 water use is about 871,300 gallons per day. Based on analysis of future water storage needs, the project's proposed tank size was increased to 1.0 MG. In addition, this project proposes to drill an exploratory well to evaluate the feasibility of constructing a new Kilauea production well on the same site.³

The Level of Service (LOS)⁴ to the area was evaluated with the County Fire Department. The evaluation noted that particularly in agriculture zoned areas, the DOW's water systems were not sized to accommodate fire flows. Continued development has attracted other uses and additional densities, creating the need for these systems to provide some level of fire protection.⁵

Providing source and storage facilities in east Kilauea will strengthen the Kilauea water system. It will provide a more reliable system where source and storage can be provided from both ends of the Kaua'i water system, and it will provide a more cost efficient system by locating facilities closer to demand areas.

As identified in the Water Plan 2020, this project proposes to replace the existing 100,000 gallon Pu'u Pane Tank with a new 1.0 million gallon (MG) tank. The new tank will be constructed on the site of the existing tank. The existing tank will be demolished, and six portable small-capacity temporary tanks will be housed within the fenced area to provide continued storage capacity for water during construction of the new 1.0 MG tank. The final engineering design of the new tank is currently underway. The new tank will be approximately 22 feet high with a 97 foot outside diameter.

The bottom of the new 1.0 mg tank will be constructed about one and one-half (1 ½) feet below ground level on a 12 – 18 inch thick concrete pad. The tank's concrete pad bottom is at approximately 448 feet above mean sea level (MSL), and the tank's overflow pipe will be installed at 466 MSL. This is consistent with

³ Currently there are two production wells in Kilauea; if the exploratory well has sufficient production capability, this would be the third Kilauea well.

⁴ "Level of Service" standards are the collection of water system standards and planning criteria that guide DOW's development of new facilities and improvements to existing facilities.

⁵ Water Plan 2020, page 5-2.

the overflow height and “466 pressure zone” of DOW’s existing facilities within the Kilauea-Waipake-Kalihiwai Water Systems.

In addition to the tank upsizing, the project proposes to drill an exploratory well on the same site to explore whether such a well would be capable of supporting the production of 500 gallons per minute (“GPM”). If the DOW determines the well to have sufficient production capability, then the DOW will consider converting this exploratory well into a permanent production water source (“Pu’u Pane Well”) to serve the Kilauea area. A preliminary overview of the project includes:

- Phase I:
 - Drill exploratory well
 - Determine production capacity
- Phase II:
 - Install six portable small capacity, temporary water tanks
 - Demolish existing 100,000 gallon tank
 - Construct new 1 million gallon tank
- Phase III:
 - Construct new production well
 - Construct control building to house equipment

1.4 Environmental Review Trigger

The DOW proposes to replace an existing water storage tank, drill an exploratory well, and possibly construct a new production well on the project site. Use of State or County lands or funds triggers the environmental review process as defined by Chapter 343, Hawai‘i Revised Statutes (“HRS”). Therefore, an environmental assessment is required.

This project may also potentially be funded with Federal funds through the State of Hawai‘i’s Drinking Water State Revolving Fund (DWSRF) program, which requires that this EA include all pertinent the environmental information to comply with the DWSRF program.

1.5 Proposing and Accepting Agency/Applicant

Both the applicant and the accepting agency are the County of Kaua‘i, Department of Water, whose address is 4398 Pua Loke Street, Līhue, HI 96766.

1.6 Anticipated Determination

The anticipated determination of this project is a Finding of No Significant Impact (FONSI), in accordance with HRS chapter 343.

SECTION 2.0 PROJECT DESCRIPTION

2.1 TMK and Owners

The tax map key number for the subject parcel is (4) 5-1-05:131, (also described as Lot 33); fee title to this parcel is vested in the County of Kaua‘i, Department of Water. See **Exhibit B**.

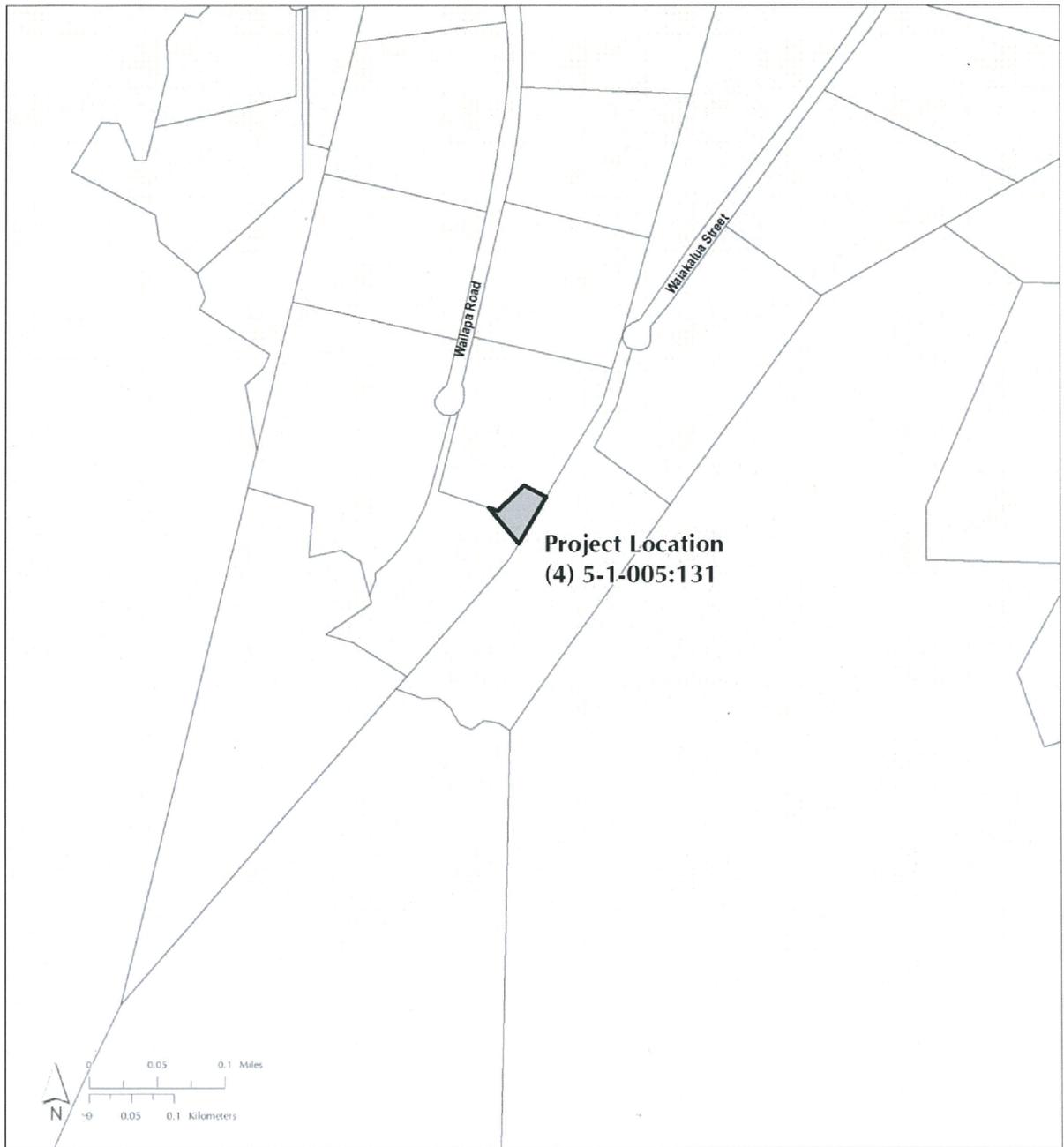
2.2 Existing Land Use

The water supply for the Kilauea Water System, which includes the existing Pu'u Pane Tank, comes from DOW's Kilauea Well Nos. 1 and No. 2. All of the water is then chlorinated and pumped into DOW's distribution system or stored in DOW's following tanks:

- Kilauea- two tanks at 250,000 gallons each
- Kalihiwai- one 100,000 gallon tank
- Waipake- one 100,000 gallon tank
- Namahana Farms- one 100,000 gallon tank
- Pu'u Pane- one 100,000 gallon tank

The existing Pu'u Pane 100,000 gallon water storage tank is located on Lot 33 within the West Waiakalua agricultural subdivision. Located on the *mauka* side of Kūhiō Highway, between Kilauea Town and the Moloa‘a area, access to the tank is provided by the County's Wailapa Road to the end of a cul-de-sac, then by an asphalted easement to Lot 33.

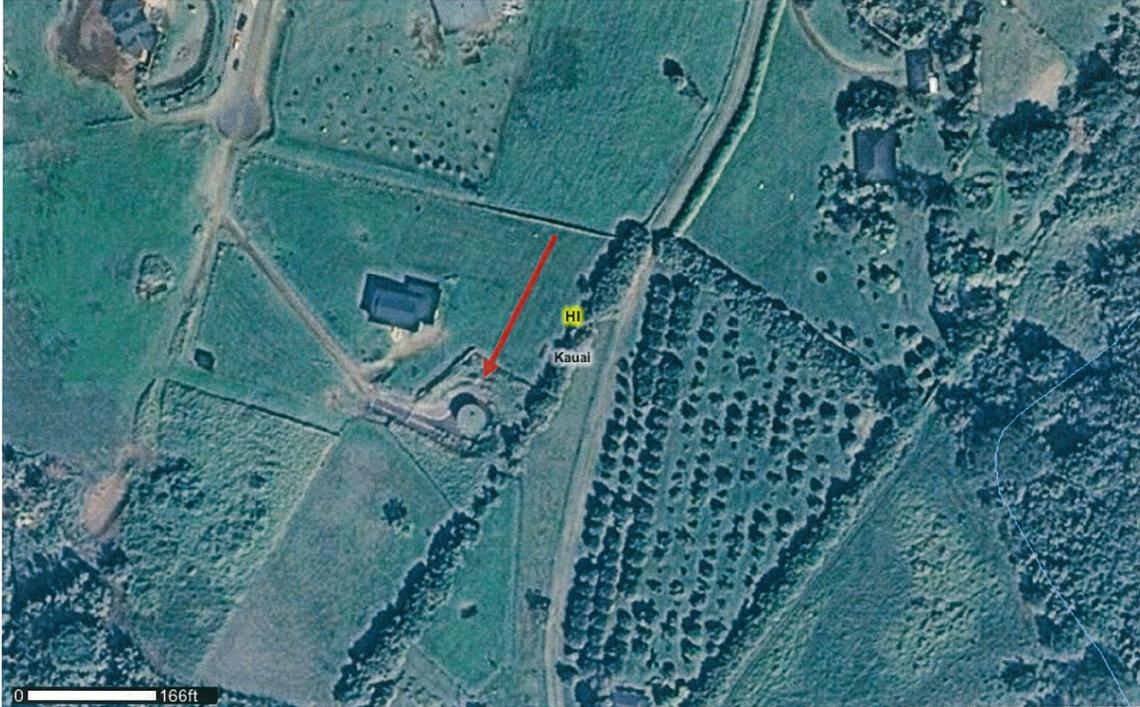
The Pu'u Pane concrete tank area is currently surrounded by a chain link fence with a locked double gate. The existing concrete tank, is approximately 22 feet high, with an inside diameter (diameter of inside wall to inside wall) of 36 feet. Photos of the existing tank are shown in **Exhibit C** and a site plan for the new tank and well are illustrated in **Exhibit D**.



County of Kauai
Department of Water
Pu'u Pane Water Tank, Kilauea
Environmental Assessment

**Exhibit B
Parcel Map**

Prepared by:
Kodani & Associates Engineers, LLC



Parcel and existing Pu'u Pane Tank (Source: Google Earth 7-3-11)



Existing Pu'u Pane Tank, taken from inside locked gate. (Photo: 5-25-11)

County of Kauai
Department of Water
Pu'u Pane Water Tank, Kilauea
Environmental Assessment

Exhibit C
Photos of Existing Tank

Prepared by: Kodani & Associates Engineers, LLC

2.3 Land Use Classification and Zoning

The State Land Use District is *Agricultural*. The County of Kaua‘i General Plan land use designation is *Agriculture*. State Land Use and General Plan and Zoning maps are found in **Exhibits E, F and G** respectively.

The County of Kaua‘i’s zoning on the subject parcel is *Agriculture*. According to the County’s Comprehensive Zoning Ordinance, in the Agriculture District, the purpose of the uses is:

- (a) *To protect the agriculture potential of lands within the County of Kaua‘i to insure a resource base adequate to meet the needs and activities of the present and future.*
- (b) *To assure a reasonable relationship between the availability of agricultural lands for various agriculture uses and the feasibility of those uses.*
- (c) *To limit and control the dispersal of residential and urban use within agriculture lands.*

The location of the parcel is also within the North Shore Development Plan, Special Planning Area. The project site is not situated within the Special Management Area and is not within the Shoreline Setback Area.

As shown on **Exhibit H**, the Agricultural Lands of Importance to the State of Hawai‘i (ALISH) defines the parcel as “Prime” lands. Overall productivity agricultural lands rated by the Land Study Bureau (LSA) range from “A” (very good) to “E” (not suitable). **Exhibit I** shows the productivity rating for the parcel is both “C” and “D.”

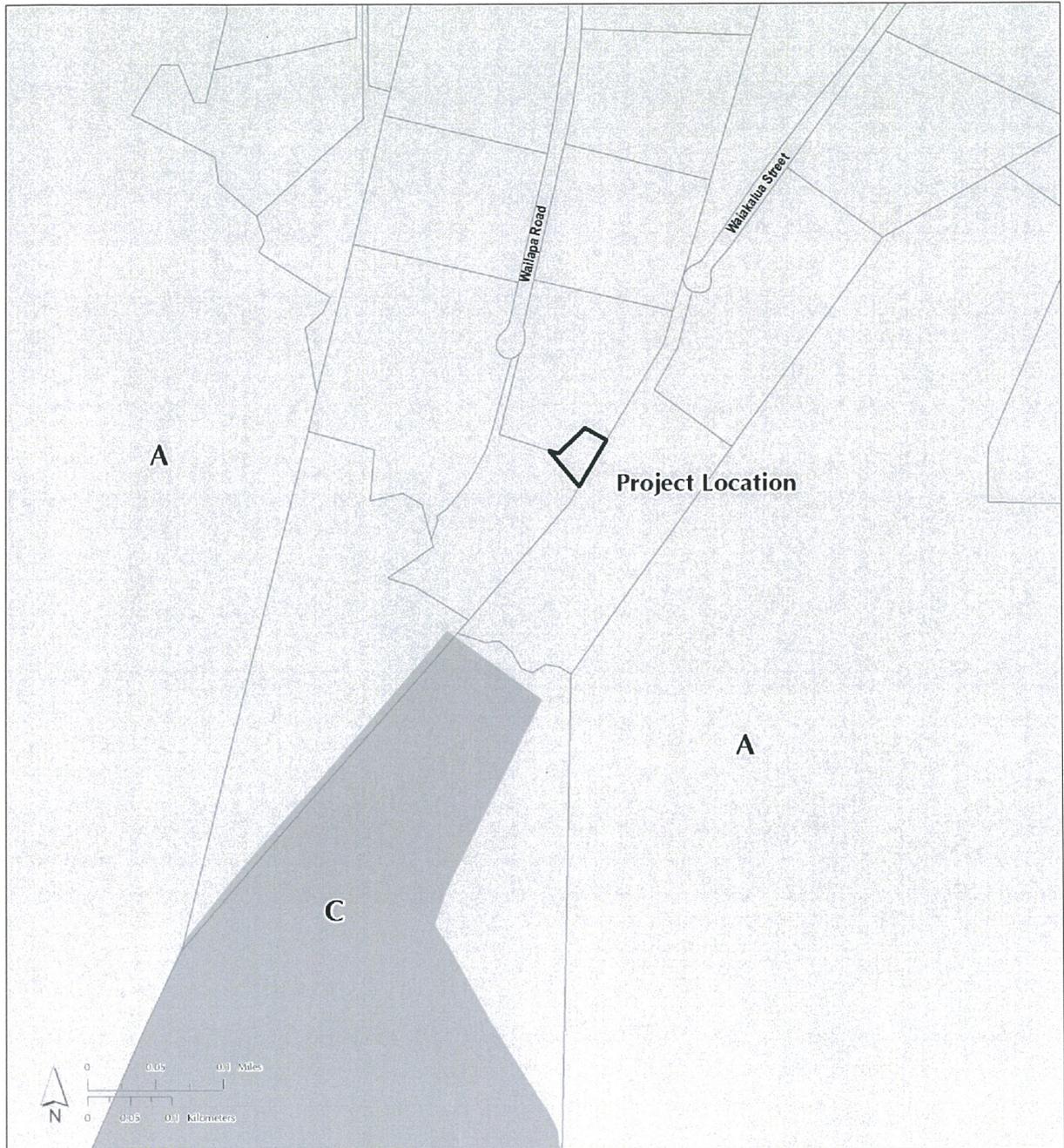
2.4 Permits Required and Approvals

In accordance with Chapter 205-4.5(7), HRS, permissible uses within the agricultural district include:

- (7) *Public, private, and quasi-public utility lines and roadways, transformer stations, communications equipment building, solid waste transfer stations, major water storage tanks, and appurtenant small buildings such as booster pumping stations, but not including offices or yards for equipment, material, vehicle storage, repair or maintenance, or treatment plants, or corporation yards, or other like structures.*

The proposed project is a permissible use within the State *Agricultural District*.

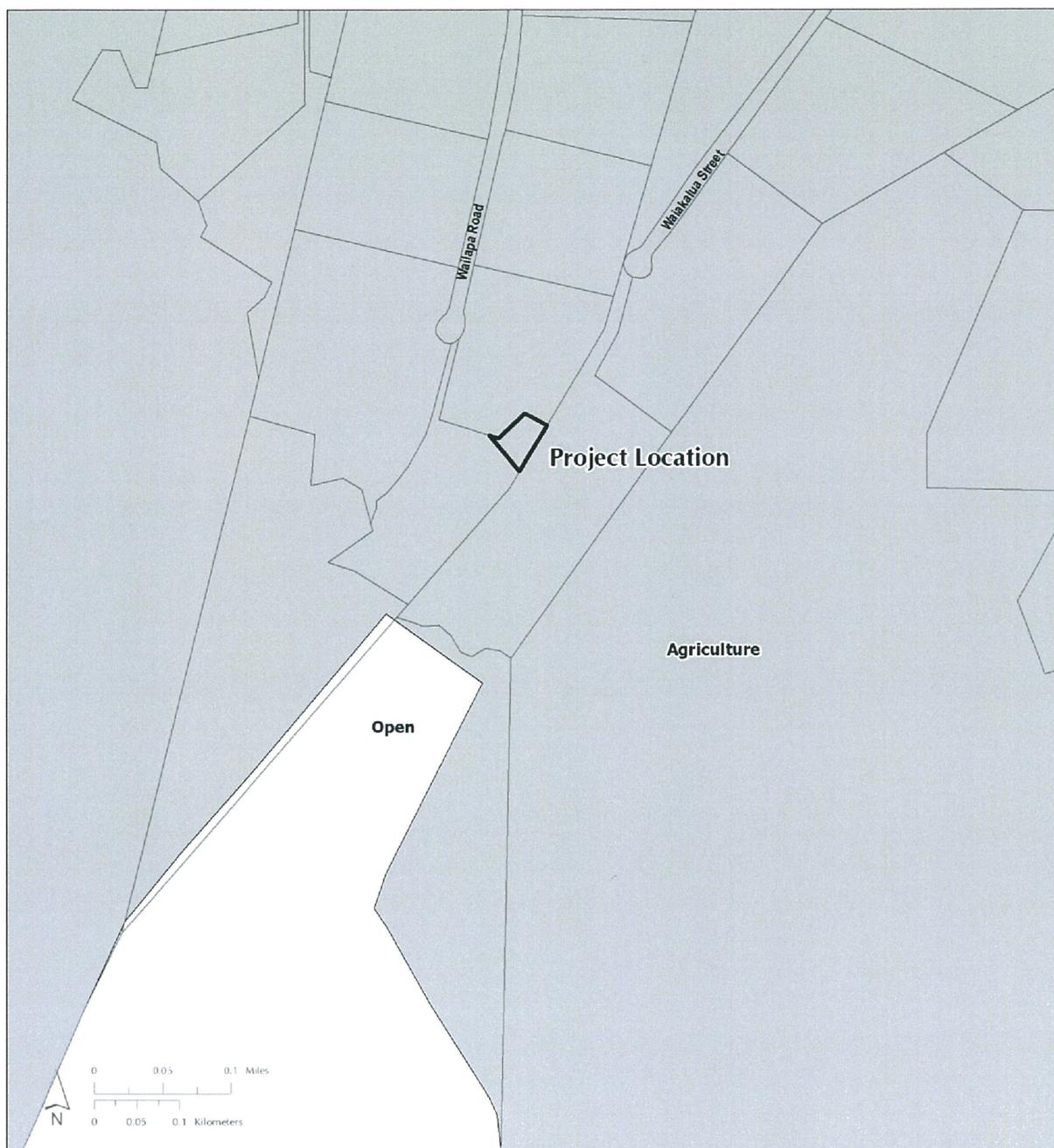
A County of Kaua‘i Use Permit is required in order to comply with the Comprehensive Zoning Ordinance (“CZO”), Article 7, *Agriculture Districts*, Section 8-7.3, *Uses and Structures That Require a Use Permit*: (11) Private and



County of Kauai
Department of Water
Pu'u Pane Water Tank, Kilauea
Environmental Assessment

Exhibit E
State Land Use Map

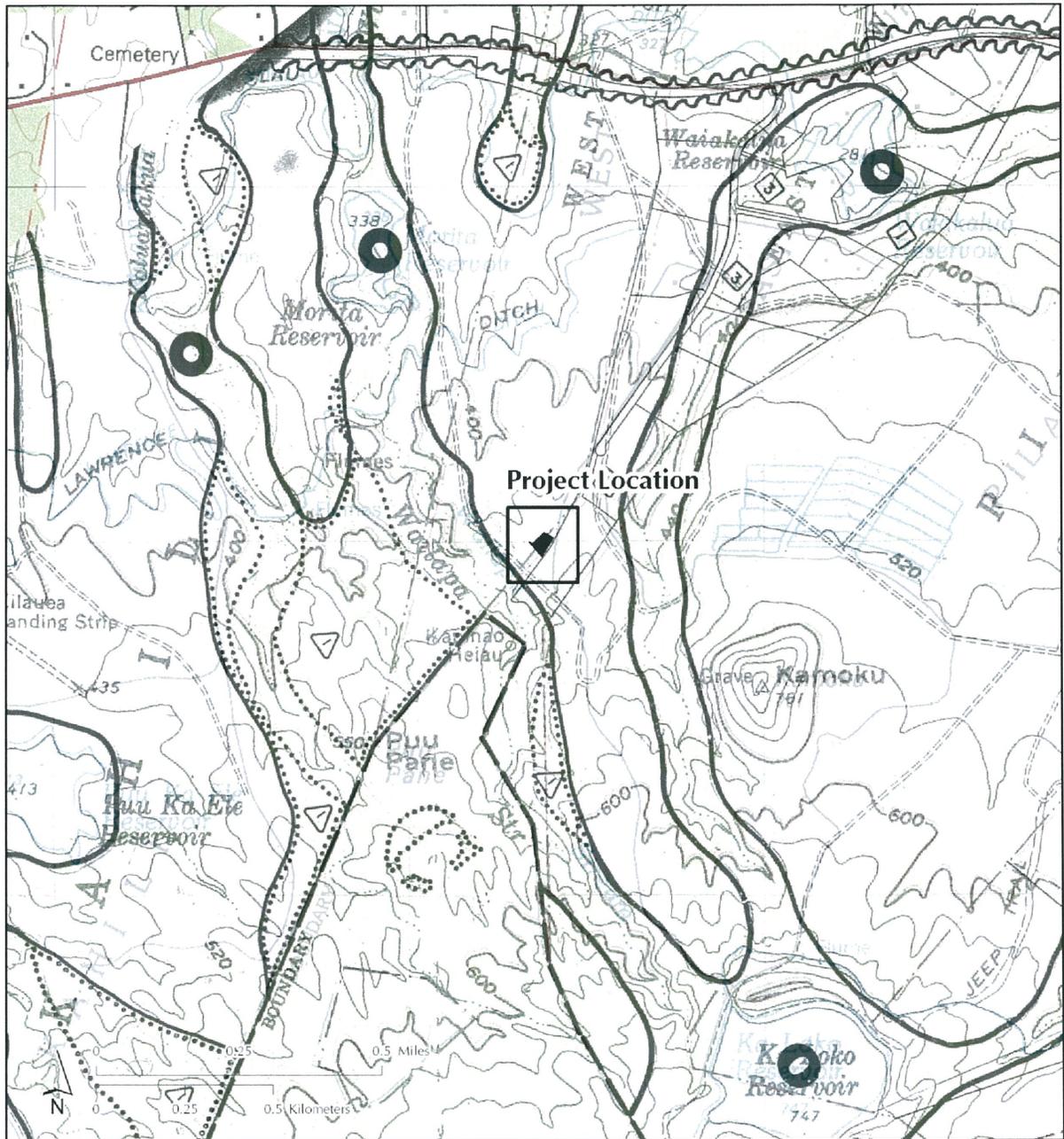
Prepared by:
Kodani & Associates Engineers, LLC



County of Kauai
Department of Water
Pu'u Pane Water Tank, Kilauea
Environmental Assessment

Exhibit F
General Plan Map

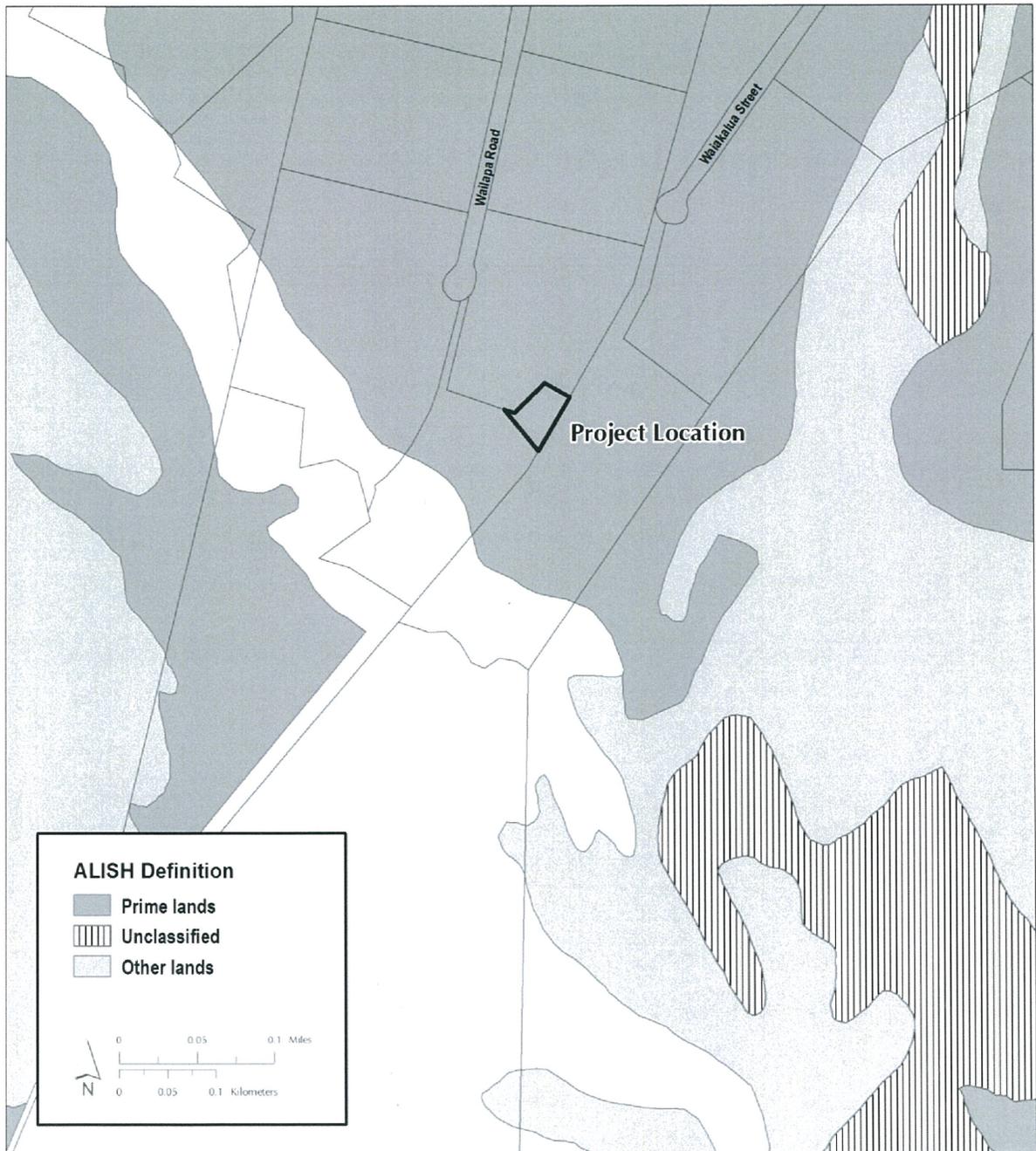
Prepared by:
Kodani & Associates Engineers, LLC



County of Kauai
 Department of Water
 Pu'u Pane Water Tank, Kilauea
Environmental Assessment

Exhibit G
Zoning Map

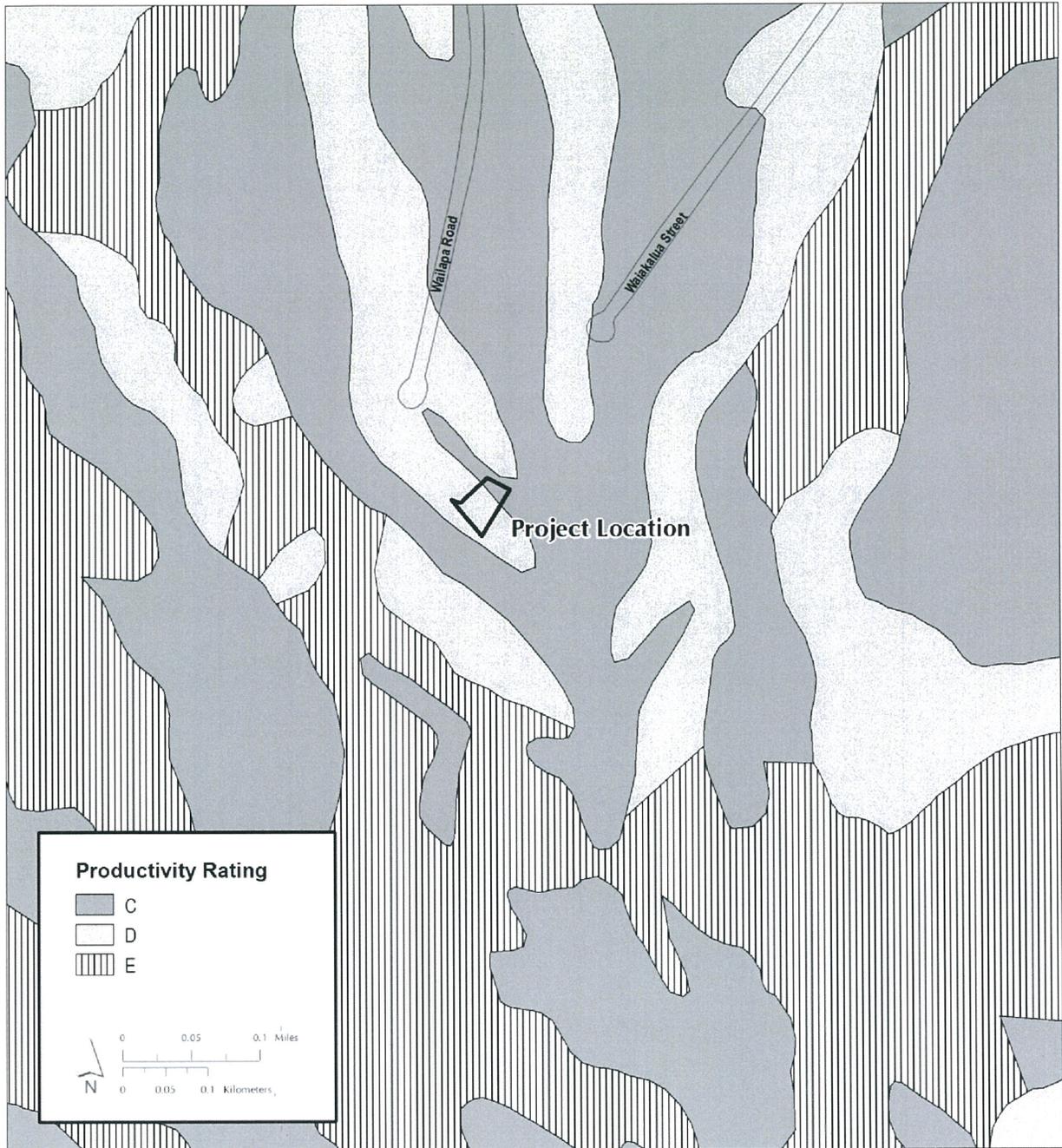
Prepared by:
 Kodani & Associates Engineers, LLC



County of Kauai
 Department of Water
 Pu'u Pane Water Tank, Kilauea
Environmental Assessment

Exhibit H
Agricultural Lands of Importance Map

Prepared by:
 Kodani & Associates Engineers, LLC



County of Kauai
 Department of Water
 Pu'u Pane Water Tank, Kilauea
Environmental Assessment

Exhibit I
Land Study Bureau Map

Prepared by:
 Kodani & Associates Engineers, LLC

public utility facilities. A procedural Class IV zoning permit is also required.⁶ Building, grading, electrical and plumbing permits are also required.

The proposed project also requires permits from the State of Hawai‘i:

- A National Pollution Discharge Elimination System (NPDES) general permit coverage authorizing discharge of stormwater associated with construction activities will be required from the State Department of Health.
- Hawai‘i Administrative Rules (“HAR”) under Title 11, Chapter 20, require that all new sources of potable water serving a public water system be approved by the Director of Health, contingent upon a satisfactory report that addresses HAR Section 11-20-29 requirements.
- A Well Construction/Pump Installation Permit is required from the State Commission on Water Resources Management.
- A Community Noise Permit may be required from the Hawai‘i Department of Health for operating drilling equipment.

Upon acceptance of this Environmental Assessment, drilling of the exploratory well and test pumping, and replacement of the existing tank with the larger tank, the DOW will document pumping results from its exploratory water well. If warranted, DOW will then proceed with Phase III of the project to develop a permanent production well and construction of the well pad and control building.

2.5 Project Schedule & Approximate Cost⁷

The project is planned to commence in the fall of 2012. The estimated construction costs for the project are detailed below. Funding for the project will be provided by the DOW, although the project may potentially be funded with Federal funds through the State of Hawai‘i’s Drinking Water State Revolving Fund (DWSRF) program.

Project WKK-15: Construct 1.0 MG Pu‘u Pane Tank

Temporary water storage tanks	\$20,000
Demolition of existing tank	\$180,000
Construction of new 1.0 MG tank	\$4,800,000
Total Estimated Construction Costs	\$5,000,000

Project WKK-02: Exploratory & Production Well

Construction of exploratory well	\$650,000
Construction of production well	\$2,300,000

⁶ See Kaua‘i County Code (“K.C.C.”), Comprehensive Zoning Ordinance, Section 8-7.7 (4).

⁷ Department of Health, DWSRF Priority List of Projects for SFY 2011.

SECTION 3.0 TECHNICAL CHARACTERISTICS AND PUBLIC SERVICES

3.1 Fire and Police

A Kaua'i Police Department (KPD) substation and a Kaua'i Fire Department station are located in Princeville, approximately eight miles away from the project site. KPD's main headquarters is located in Lihu'e about 23 miles from the project site.

3.2 Medical Services

Emergency medical services are provided through the County's 911 communications center. Ambulance service is provided by American Medical Response. The closest emergency medical services are available at Mahelona Medical Center in Kapa'a. Regional medical services are available at Wilcox Memorial Hospital in Lihu'e, about 23 miles and 45-50 minutes away by automobile.

3.3 Public Facilities

There are no County park or recreation facilities in the vicinity of the project. The closest park and recreation facilities are located in Kilauea Town. The U.S. Fish and Wildlife's Kilauea Refuge and Lighthouse are also near the coastline in Kilauea.

Library and school facilities servicing the area include:

- Princeville Public Library
- Kilauea Elementary School
- Kapa'a Middle School
- Kapa'a High School

3.4 Roads, Traffic and Circulation

The project is situated at the far end of Wailapa Road⁸ and reachable by turning mauka off Kūhiō Highway onto this road. The existing tank and proposed project area are at the end of a cul-de-sac, then accessed by a paved easement to the left of the cul-de-sac.

⁸ Identified as Wailapa Road by the County of Kaua'i, Real Property Division although also identified as Pu'u Pane Road on other maps.

3.5 Sewage Treatment and Disposal, and Solid Waste and Wastewater

The water storage tank facility does not produce any sewage, solid waste, or wastewater. Sewage treatment and disposal in adjacent agricultural lands is handled in a cesspool or septic system, as there is no sewage treatment facility, either public or private, serving the area.

Solid waste for the area is handled by the County of Kaua‘i’s Department of Public Works, Solid Waste Division which schedules weekly pickup for the community and transports the waste to the Hanalei Refuse Transfer Station located in Princeville.

3.6 Utilities and Communications

Utilities available in the vicinity include electrical service by Kaua‘i Island Utility Cooperative and telephone service by Hawaiian Telcom. Broadband Internet and television service to the area is provided by Oceanic Time-Warner Cable. Several cell phone carriers on Kaua‘i provide service to the Kilauea and surrounding areas.

SECTION 4.0 SOCIO-ECONOMIC CHARACTERISTICS

4.1 Demographic Data

The Water Plan listed the 2000 population for the Kilauea-Kalihiwai area as 3066 persons, and forecast the 2020 population to be 4541 persons.

The 2010 population for the County of Kaua‘i was 67,091. According to the 2010 data for the Kilauea and Kalihiwai Census Designated Place’s (CDP), the 2010 population total for this area is 3231.

CDP	Population	Median Income ⁹
Kilauea	2803	\$69,688
Kalihiwai	428	\$55,469

In Census Tract 401.3, which includes Princeville, Kilauea and Kalihiwai, the total 2010 population was 6484, with White (4366 persons), Asian (854 persons), Native Hawaiian and Pacific Islander (285) and other (879).

⁹ U.S. Census, American Fact Finder, the estimated median income is for the 2006-2010 period.

4.2 Economic Data

According to the County of Kaua‘i, Office of Economic Development, Kaua‘i Quarterly Economic Outlook the average daily visitor counts were approximately 21,000 per day. Using this figure of 21,000 and the 2010 Kaua‘i population of 67,000, the *de facto* water users per day would be about 88,000 people.

In 2009, the University of Hawai‘i, Economic Research Organization, prepared a report titled “Kaua‘i Economic Outlook Summary” for the County of Kaua‘i. Related to the economy, the study’s key findings were:

- Construction cycle began to turn down hard and was expected to decline for several years, bottoming out in 2011-12.
- Inflation-adjusted personal income would decline marginally and begin recovery in 2011.

Potential Impacts and Mitigation Measures

The proposed project may have positive long-term economic impacts in that additional storage capacity for this area may help facilitate DOW’s ability to satisfy current and future domestic, agricultural, commercial, industrial, recreational and other water needs in the Kilauea area. There will also be positive short term economic impacts as jobs will be created during the construction phase of the project.

4.3 Historic, Archaeological, Cultural Resources and Practices

As described above, this proposed project will take place on a previously developed parcel where DOW’s existing Pu‘u Pane Tank is located.

The parcel is situated in the West Waiakalua ahupua‘a. According to Wendell Bennett there are both house sites (Site 131) and taro terraces (Site 130) within the West Waiakalua valleys. In addition, the Kapinao heiau (Site 129) is located in Waiakalua Valley. The heiau is located makai and to the west of the existing Pu‘u Pane Tank, and outside the subdivision boundaries.

On May 1, 2012, the Department of Water made a presentation to the Kilauea Neighborhood Association members. No one present had any questions or comments related to historic or archaeological sites, or to cultural resources or practices. See **Appendix A** for the meeting notes.

For a review of compliance with Environmental Justice (Executive Order 12898), see Section 6.7.5.

Potential Impacts and Mitigation Measures

The Department of Land and Natural Resources, State Historic Preservation Division maintains the Hawai'i Register of Historic Places and records of any historic, archaeological or cultural resources throughout the state. As no historic, archaeological or cultural resources have been identified on the property, no negative impacts are anticipated. If any archaeological or cultural resources are discovered during the construction activities, all work will immediately cease and the State Historic Preservation Division will be notified to assess the significance of the find and recommend mitigation measures, if necessary.

SECTION 5.0 ENVIRONMENTAL CHARACTERISTICS

5.1 Climate

The climate of an area is a composite or frequency distribution of various kinds of weather. The outstanding features of Kaua'i's climate includes mild temperatures throughout the year, moderate humidity, persistence of northeasterly trade winds, significant differences in rainfall within short distances, and infrequent severe storms.

According to the National Weather Service, for most of Hawai'i, there are only two seasons: "summer," between May and October, and "winter," between October and April.

The average monthly temperature in the vicinity of the project site ranges from approximately 68°F to 79°F. The average annual rainfall in the area is about 68 inches.

5.2 Soils, Geology, Topography

Kaua'i's origins are volcanic, and at approximately six million years old is the oldest of Hawaii's main islands. Mount Waialeale is one of the wettest spots on earth, with an annual average rainfall of about 460 inches. The high annual rainfall has eroded deep valleys in the central mountains, carving out canyons with many rivers and waterfalls.

According to the U.S. Department Agriculture (USDA), Natural Resources Conservation Service soil map shown in **Figure 1** below, the soil on the project site is Puhi silty clay loam (PnB). PnB soils are described as:

Slope:	3 to 8 percent
Elevation:	170 to 500 feet
Mean annual precipitation:	60 to 80 inches

Mean annual temperature:	72 to 73 degrees F
Drainage class:	Well drained
Depth of water table:	More than 80 inches

The PnB soil description also relates to the geology and topography of the project area in that the parent material is basic igneous rock, the slope, as mentioned above is between 3 to 8 percent, which accurately describes the current site.

Figure 1



Source: U.S. Department of Agriculture, Natural Resources Conservation Service

In March 2012, a *Foundation Investigation 1.0 MG Water Tank* study was performed to provide geotechnical recommendations for the design of foundations, including seismic considerations, resistance to lateral pressures, retaining wall, slabs-on-grade, flexible pavement, and site grading. The study can be found in **Appendix B**.

The proposed project is not located at a shoreline, beach, dune, estuary, or wetland area.

5.3 Flora and Fauna

A botanical survey has not been conducted on the property as the parcel was previously graded and leveled as part of the agricultural subdivision. The area is mostly flat, with a slightly sloped area with patches of vegetation.

In addition, there have been no known occurrences of any rare, threatened or endangered bird or bat species within the project area. The endangered Hawaiian Petrel and Newell's Shearwater, however, may pass by/over the project site when flying in the vicinity of project site.

Potential Impacts and Mitigation Measures

The proposed project area will be graded during the construction phase, and then re-grassed on the sloped areas. Any lights installed within the project will be used for evening maintenance emergency purposes only. The building design will direct the lighting downwards so as not to interfere with the potential flight patterns of any Hawaiian Petrels or Newell's Shearwaters. In addition, the construction documents will incorporate design specifications to assist in decreasing the risk of any seabird attraction, including the use of colored lighting and non-reflective paint for the building tank and potential well structure.

No impacts to any rare, threatened or endangered plant or animal species or their habitats are anticipated, and therefore no mitigation measures are proposed.

5.4 Air Quality and Noise

The area surrounding the existing tank is a low-density agricultural community. The current impacts are primarily from vehicles, some farm equipment, and the occasional fly-over by helicopters and airplanes.

Potential Impacts and Mitigation Measures

Air quality will be somewhat affected during the construction phase of the project. These impacts will be mitigated by compliance with County and State rules and regulations.

Construction Phase: Construction and vehicle noise will be short-term and limited to daytime hours throughout the construction period. Once construction is completed, these noise impacts will cease. Construction activities such as demolition and drilling will create noise.

The equipment used for these activities typically includes pick-up trucks, excavators, backhoes, concrete delivery trucks, forklifts and a drilling rig. Two types of drills are available for drilling the well hole – a cable tool drill and a rotary drill. A cable tool drill involves attaching a drill bit (typically weighing about seven to eight tons and measuring about 20 feet long) to a 20-ft-long cable, which is then picked up and dropped, chipping assay at the subsurface. A bailer is used to haul “cuttings” from the well hole. No electrical or gas power is required and the operation is relatively quiet. A typical rotary drill will require an on-site compressor for its operation. The contractor will determine the appropriate drilling method to be used.

Once the drilling method is determined, the contractor will consult with the Hawai'i Department of Health ("DOH") to determine whether construction noise is expected to exceed the "maximum permissible" property-line noise levels. If so, the contractor will be required to obtain a permit prior to construction. DOH will review the proposed activity, location, equipment, project purpose and timetable in order to decide upon conditions and mitigation measures, such as restriction of equipment type, maintenance requirements, restricted hours, and portable noise barriers.

Other vehicle and construction noise will be short-term and limited to daylight hours through the period of construction. Once construction is completed, these noise impacts will cease.

Any dust created by the construction phase will be managed by the contractor and meet the DOH requirements.

Operational Phase: Following the construction phase of the project, noise will be generated by DOW personnel vehicles and others visiting the project site. Visits will involve inspecting the facility and performing maintenance service approximately three times per week. This level of activity will be similar to the current noise levels when DOW personnel visit the site for maintenance work.

If a new, permanent Pu'u Pane Well is constructed, there may be an increase in on-site noise from the subject parcel, generated by the new well pump. Until the well's yield is determined, the size and type of pump to be possibly installed cannot, at present, be determined. The type of pump used may vary depending on the well's production yield. By way of example, if the well's yield is low, a small, submersible pump may be installed. However, if the well's yield is sufficient, a pump with a surface-mounted motor may be installed. An enclosure may be constructed over the pump equipment, if necessary, to reduce pump noise levels to comply with Title 11, Hawai'i Administrative Rules, Department of Health, Chapter 46, *Community Noise Control*.

5.5 Hazards: Flood, Earthquake, or Hurricane

The project is located in Zone X, which is outside the flood and tsunami zone according to the Federal Emergency Management Agency, National Flood Insurance Program maps. Zone X is an area determined to be outside of the 0.2% annual chance floodplain. Therefore no flood impacts should be anticipated. Earthquake risk on Kaua'i is classified as a Seismic Zone 1 (area of least risk), per the 1997 Uniform Building Code (UBC).

Kaua'i is in the Central Pacific Hurricane area. Two hurricanes occurred on Kaua'i in the past 30 years: Hurricane 'Iwa in 1982, and Hurricane Iniki in 1992. There is a strong possibility for future hurricanes to pass by or touch Kaua'i and

all new structures will be constructed in compliance with current codes and/or regulations.

Potential Impacts and Mitigation Measures

As with all structures on Kaua'i, the tank and well could potentially be impacted by strong hurricane winds and debris. In order to avoid damage to the structures, the above ground components of the project will be designed for a *minimum* wind load of 125 miles per hour (mph). The *Foundation Investigation* study recommends the seismic design be based on the 2003 International Building code, Site Class D.

Pu'u Pane well site is located in Zone X on the Federal Emergency Management Flood Insurance Rate Map (FIRM). Zone X is defined as an "area determined to be outside of the 0.2% annual chance floodplain" and not located within the flood hazard area of a 500-year flood plain. The project site is not subject to flooding and is consistent with applicable regulations and guidance relating to floodplain management.

5.6 Drainage and Surface Water

As described above in the soils and topography section of this document, the project area is relatively flat, and rainwater flows into a nearby subdivision drainage swale. No surface water from streams or irrigation ditches impact the site.

5.7 Water Quality

According to the DOW's Annual Kilauea Water Quality Report which covers the period of January 1, 2010 to December 31, 2010, the DOW regularly conducts microbiological analysis of its water and has contracted for extensive chemical testing of the same in order to comply with the Environmental Protection Agency (EPA) and the Hawai'i State standards. These standards are very strict in order to ensure safe drinking water. All of the water is chlorinated and pumped into the distribution system or stored in the five tanks in the Kilauea System. Details of the test results are found in the Report.

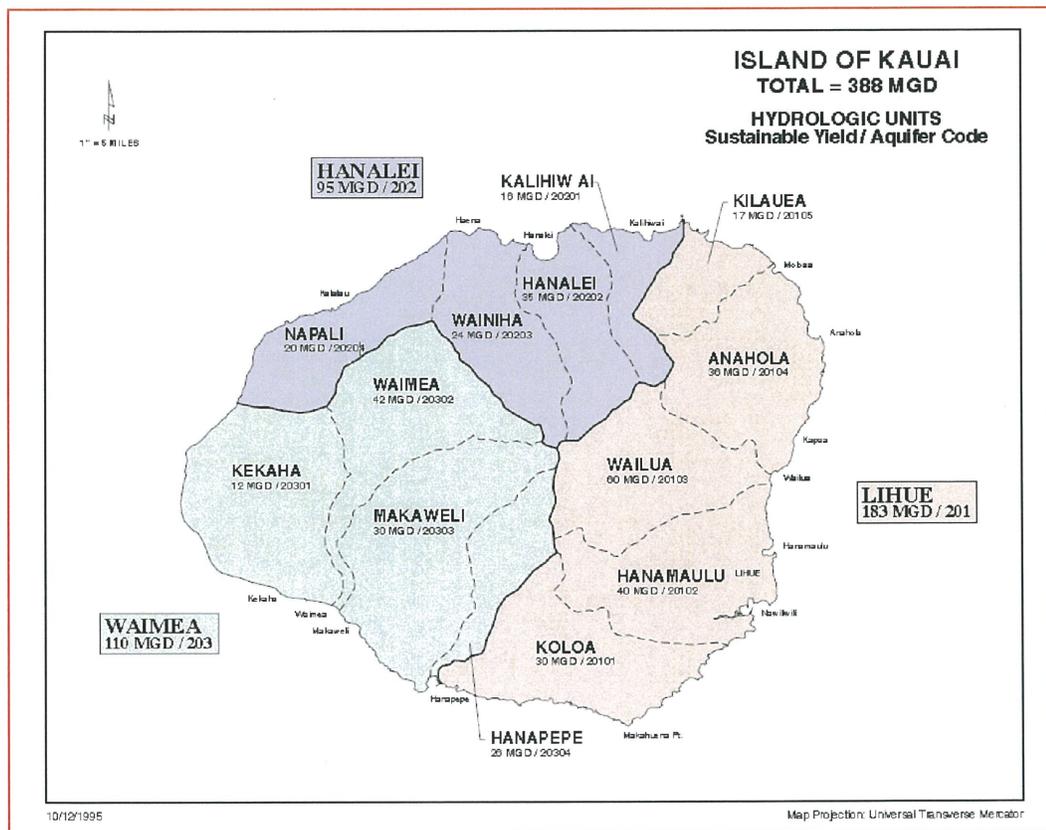
5.8 Groundwater Hydrology

The Hawai'i Commission on Water Resource Management ("CWRM") established ground water hydrologic units to provide a consistent basis for managing the State's ground water resources. In general, each island is divided into regions that reflect broad hydrogeological similarities while maintaining, where possible, hydrographic, topographic and historical boundaries. Smaller sub-regions are then delineated based on hydraulic continuity and related

characteristics. CWRM uses an aquifer coding system to reference and describe the ground water hydrologic units.

There are three Hydrologic Units on Kaua‘i: Līhu‘e, Hanalei and Waimea, as shown in **Figure 2** below. The project site is located within the Kilauea Aquifer (Aquifer Code 20105) of the Līhu‘e Hydrologic Unit. The Kilauea Aquifer has a sustainable yield of 17 MGD according to the Hawai‘i Water Resource Protection Plan. The DOW has two wells within the Kilauea Aquifer. In addition to the two DOW wells, according to the CWRM July 2010 Water Well Index Summary, there are 42 private wells within the Aquifer.

Figure 2



Source: Hawai‘i Commission on Water Resource Management, 2008.

Potential Impacts and Mitigation Measures

No groundwater study was conducted for this proposed project. The *Foundation Investigation* study, found in Appendix B, provides detailed information related to site conditions. The study includes soil conditions, and recommendations for foundations, seismic design, lateral design, retaining walls, foundation settlement, slabs-on-grade, pavement design, and site grading. The borings in the study didn’t go deep enough to address the potential availability of water for the well.

5.9 New 1 Million Gallon Tank, Exploratory Well, and Possible Production Well

See section 1.3 *Proposed Action* of this document for a description of the DOW's existing and planned new tank and other improvements for this project site.

Potential Impacts and Mitigation Measures

The exploratory well is being proposed at this site in order to test the availability of groundwater at this site. Should the exploratory well produce a satisfactory sustainable yield from the aquifer, then the construction of a permanent production well and pump control building on the site will be considered.

Should a permanent production well be constructed, according to the Hawaii Department of Health, the following impacts are anticipated as of the date of this Environmental Assessment:

- Except for existing individual wastewater systems ("IWS") within 1,000 ft. of the production well as of the date the well becomes operational, no IWS shall be located within 1,000 ft. of the well.
- If any modifications to a building (for example, an existing home) located within 1,000 ft. of the well are made, the IWS serving that building must be upgraded to a wastewater system consisting of a minimum of an aerobic unit, chlorinator and horizontal soil absorption system.
- Properties located within the foregoing 1,000 ft. radius (i.e., 1,000 ft. of the production well) may not be subdivided.
- If there are one or more existing wastewater systems within 1,000 ft. of the production well, no further IWS may be located on the subdivided lot of record on which such systems are located. The Department of Health does not consider a unit within a condominium property regime ("CPR") to be a lot of record. For example, if an IWS should be located within 1,000 ft. of the production well, on a CPR unit, and that CPR unit is part of a lot of record that has been submitted to a four unit CPR, three of which are vacant (i.e., have no homes on them), no additional IWS may be located on any of the three vacant CPR units.

A control building of approximately 20 by 40 feet in size would also be constructed to house the equipment necessary to operate the well and overall DOW facility.

Concrete masonry unit retaining walls will be constructed in some areas of the parcel boundaries. The top of the retaining walls will be at ground level, and the overall height of the wall of approximately ten feet.

Best Management Practices will be followed as during the construction phases of the project there will be a temporary increase in construction equipment activity, noise and dust.

5.10 Scenic and Visual Resources

The subject parcel has not been identified as a scenic resource in the county or state plans or studies. The larger tank and potential well will increase the footprint of structures on the lot. The production well structure, if constructed, would be about four feet tall. The control building will be approximately 12 feet tall.

The nearby Kūhiō Highway was identified in the Kaua‘i General Plan as a Scenic Roadway Corridor and is not affected by this project because of its distance from the project.

Potential Impacts and Mitigation Measures

No significant adverse impacts on scenic and visual resources are anticipated by this project.

The larger tank and potential production well will increase the size and lot-coverage of the structures on the site; however the project will not result in any significant changes to the scenic and visual environment as the Pu'u Pane water storage tank currently exists on the property. Like the existing tank, the new tank and potential permanent well and control building structures will be painted an earth-tone color with non-reflective roofs to blend in with the surrounding landscape. See **Exhibit C** for photos of the existing Pu'u Pane Tank.

SECTION 6.0 RELATIONSHIP TO STATE, COUNTY AND FEDERAL LAND USE PLANS, POLICIES AND CONTROLS

6.1 Hawai‘i State Plan

The Hawai‘i State Plan, adopted in 1978 and revised in 1988, now set forth as Chapter 226, HRS, Hawai‘i State Planning Act, states, among a number of purposes, that the plan shall serve as a guide for the future long-range development of the State; shall identify the goals, objectives, policies and priorities for the State; and shall provide a basis for determining priorities and allocating limited resources. The proposed Pu'u Pane Tank replacement and exploratory well drilling project supports and is consistent with the following State Plan objectives and policies:

Section 226-16 Objectives and policies for facility systems - water

(b) To achieve the facility systems water objective, it shall be the policy of the State to:

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

Replacement of the Pu'u Pane water storage tank, drilling of a new exploratory well, and possible development of a permanent production well on the project site will meet the projected demands of the service area. The proposed project will be consistent with the object of providing water to adequately accommodate current and future domestic, agricultural, commercial, industrial, recreational and other water needs of the Kilauea area.

6.2 Hawai'i Land Use Law

The Hawai'i State Land Use Law, Chapter 205, HRS, classifies all land in the State into four land use districts – Urban, Agricultural, Rural and Conservation. The Conservation District has five subzones: Protective, Limited, Resource, General and Special. With the exception of the Special subzone, the four subzones are arranged in a hierarchy of environmental sensitivity (Protective) to the least sensitive (General). These subzones define a set of identified land uses which may be allowed by a discretionary permit.

As described in Section 2.4 above and in accordance with Chapter 205-4.5(7), HRS, permissible uses within the agricultural district include:

(7) Public, private, and quasi-public utility lines and roadways, transformer stations, communications equipment building, solid waste transfer stations, major water storage tanks, and appurtenant small buildings such as booster pumping stations, but not including offices or yards for equipment, material, vehicle storage, repair or maintenance, or treatment plants, or corporation yards, or other like structures.

6.3 Kaua'i General Plan

The purpose of the *Kaua'i General Plan* is to provide guidance for land use regulations, the location and character of new development and facilities, and planning for county and State facilities and services. The *Plan* states the county's 20 year vision for Kaua'i and sets policies for achieving that vision.

Section 7 of the *Plan* sets forth the policies for the island's water systems.

Section 7: Building Public Facilities and Services

This chapter addresses the basic services needed to support projected economic and population growth on Kaua'i.

7.4.4 Policy

a) Develop a long-range plan to guide expansion, improvement, and rehabilitation of County water systems.

- b) *Coordinate planning of future water system development and rate structures with General Plan policies and guidelines.*
- c) *Support compact development by giving priority to water supply improvements for existing and planned Urban Center, Residential Community, and Resort areas, while also supporting development in already-established Agricultural Communities.*

The *Kaua‘i General Plan* indicates the Kilauea, East Water System storage is “at capacity” and the water source is “near capacity.” Therefore, inasmuch as the proposed project will substantially increase storage capacity in the area and possibly increase water source capacity as well, the proposed project is consistent with the water supply policies of the *Kaua‘i General Plan*.

6.4 Kaua‘i Water Plan 2020

The purpose of the *Kaua‘i Water Plan 2020* is to 1) develop a long-range plan to guide the DOW’s future operations, and 2) identify the improvements and facilities required to continue to provide safe, affordable and reliable water service to the community in a sustainable and financially secure manner. A goal of the *Water Plan 2020* is to ensure a reliable future water supply.

Water Plan 2020 recommends adding a new 650,000-gallon tank in the area. Based on the increased water use between 2000 and 2010, the DOW is now recommending that the existing 100,000 storage tank be replaced with a 1.0 MG tank, and that drilling an exploratory well, and possible development of a production well, occur to plan for and meet the future needs of the Kilauea area.

6.5 North Shore Development Plan

The existing water storage tank is located within the North Shore Special Planning Area. The *North Shore Development Plan Update* (“NSDPU”) is a statement of policy that reflects the community’s desires, intentions, and aspirations. The development plan encompasses the watershed area between Moloa‘a Stream and the Na Pali Coast.

The *North Shore Development Plan* acknowledges the limitations on the municipal systems serving the communities. The NSDPU states that expansion of Kauai’s municipal water systems requires major improvements to its water sources, storage facilities, and transmission lines. This proposed project is consistent with those recommendations.

6.6 Kaua‘i County Code, Comprehensive Zoning Ordinance

The purpose of the Comprehensive Zoning Ordinance (“CZO”) is to provide regulations and standards for land development and the construction of buildings and other structures in the County of Kaua‘i. The regulations and standards prescribed in the CZO are intended to regulate development to ensure its compatibility with the overall character of the island.

The proposed project is within the County’s Agriculture District, and will satisfy the necessary requirements of Section 8-7.4 of the CZO.

6.7 Compliance with State of Hawai‘i’s Drinking Water State Revolving Fund (“DWSRF”) Program Requirements

This project may be funded by federal funds through the Hawai‘i’s Drinking Water State Revolving Fund program. The 1996 amendments to the U.S. Safe Drinking Water Act (Public Law 104-182) established the Drinking Water State Revolving fund Loan Program to offer below-market interest rate loans to public water systems to finance the cost of constructing or improving their drinking water infrastructure projects to achieve or maintain compliance with the Safe Drinking Water Act. The DWSRF gave special consideration to the needs of small water systems, such as the DOW’s Kilauea Water System. The proposed project is consistent with the program’s emphasis on improving small water systems. This document includes all of the environmental information required for compliance with the DWSRF program.

This project is listed as a priority project with the State of Hawai‘i’s, Department of Health, Safe Drinking Water Branch’s DWSRF. The project number is DW407-0001, Public Water System #407 DOW Kilauea.

Cross-Cutting Federal Authorities

The following sub-sections address the proposed project’s relationship to other federal “cross-cutting” authorities.

1. Archaeological and Historic Preservation Act of 1974 (16 USC §461 a-1)

Under 16 USC §461 a-1, Declaration of National Policy, “It is declared that it is a national policy to preserve for public use historic sites, buildings, and objects of national significance for the inspiration and benefits of the people of the United States.”

As discussed in Section 4.3 of this document, this site currently houses an existing water storage tank included on one of the parcels in the West Waikalua agricultural subdivision. No archaeological or historic sites were noted at the time of the development of the existing tank. Copies of this Draft Environmental Assessment will be provided to the State of Hawai‘i, Department of Land and

Natural Resources, State Historic Preservation Division, and the Office of Hawaiian Affairs. Comments will be solicited from the those State agencies.

2. Clean Air Act (42 USC § 7401

During the later 1940s, serious smog incidents in Los Angeles and Donora, Pennsylvania raised public awareness and concern about the issue of clean air. In 1955, the federal government decided that this problem needed to be addressed on a national level. The U.S. Air Pollution Control Act of 1955 (the “Clean Air Act”) was the first in a series of clean air and air quality control acts which are still in effect and continue to be revised and amended.

Among the purposes of the Clean Air Act was to: (1) protect and enhance the quality of the Nation’s air resources so as to promote the public health and welfare and the productive capacity of its population; (2) initiate and accelerate a national research and development program to achieve the prevention and control of air pollution; (3) provide technical and financial assistance to state and local governments in connection with the development and execution of their air pollution prevention and control programs; and (4) encourage and assist the development and operation of regional air pollution prevention and control programs.

As discussed in Section 5.4 of this document, air quality in the North Shore Planning area and vicinity of the project is good. There are no stationary sources of air pollutants and vehicle traffic is light in the vicinity of the project site.

Grading and excavation are required for the project. Construction activities will comply with the State Department of Health Air Pollution Control rules with respect to fugitive dust during construction, although emissions from construction vehicles will slightly degrade air quality for the short period of time they are in operation. All applicable emission and ambient air quality standards will continue to be met. Consequently, no adverse health effects from this source are anticipated.

Once construction has been completed, operation of the project site will involve visits approximately three times a week by Department of Water personnel, who will perform periodic maintenance and testing of equipment and systems. This level of activity will not generate sufficient traffic to adversely affect air quality in the area.

The electrical power consumed in the operation of the storage tank and potential well will be relatively small, adding minimal load to the existing electrical systems on Kaua‘i. As such, additional fuel consumption and emissions from power generation to support this project should not significantly increase and will represent only a small portion of the total power usage on Kaua‘i.

3. Coastal Barrier Resources Act, 16 USC 1451)

In 1982, the U.S. Congress passed the U.S. Coastal Barrier Resources Act (CBRA) (16 USC 3501), which established the John H. Chaffee Coastal Barrier Resources System (CBRS), and was comprised of undeveloped coastal barriers along the Atlantic, Gulf, and Great Lakes coasts. The law encourages the conservation of hurricane prone, biologically rich coastal barriers by restricting federal expenditures that encourage development, such as federal flood insurance through the National Flood Insurance Program.

The U.S. Coastal Barrier Resources Reauthorization Act of 2000 reauthorized the U.S. Coastal Barrier Resources Act (CBRA) and directed the U.S. Fish & Wildlife Service to complete a Digital Mapping Pilot Project that includes digitally produced draft maps for up to 75 CBRS areas and a report to Congress that describes the feasibility and costs for completing digital maps for all GBRS areas.

The purpose of the CBRA is to minimize the loss of human life, wasteful expenditure of federal revenues, and the damage to fish, wildlife, and other natural resources associated with the coastal barriers along the Atlantic and Gulf coasts and along the Atlantic and Gulf coasts and along the Great Lakes, by restricting future federal expenditures and financial assistance which have the effect of encouraging development of coastal barriers.

The project site is located over a mile inland from the shoreline along the coast. The project will not involve construction of facilities along coastal barriers.

4. Coastal Zone Management Act (16 USC 1456(C)(1))

In 1972, the U.S. Congress enacted the federal Coastal Zone Management Act to ensure that each federal agency undertaking an activity within or outside the coastal zone that affects any land or water use or natural resource of the coastal zone shall be carried out in a manner which is consistent to the maximum extent practicable with the enforceable policies of approved state management programs. Each federal agency carrying out an activity subject to the Act shall provide a consistency determination to the relevant state agency designated under section 1455(d)(6) of this title at the earliest practicable time.

In 1977, Hawai'i enacted Chapter 205A, HRS, the Hawai'i Coastal Zone (CZM) Program. The CZM area encompasses the entire State, including all marine waters seaward to the extent of the State's police power and management authority, including the 12-mile U.S. territorial sea and all archipelagic waters.

The Hawai'i Coastal Zone Management Program focus on ten policy objectives:

- **Recreational Resources.** To provide coastal recreational opportunities accessible to the public and protect coastal resources uniquely suited for recreational activities that cannot be provided elsewhere.
- **Historic Resources.** To protect, preserve, and where desirable, restore those natural and manmade historic and prehistoric resources in the coastal zone management area that are significant in Hawaiian and American history and culture.
- **Scenic and Open Space Resources.** To protect, preserve, and where desirable, restore or improve the quality of coastal scenic and open space resources.
- **Coastal Ecosystems.** To protect valuable coastal ecosystems, including reefs, from disruption and to minimize adverse impacts on all coastal ecosystems.
- **Economic Uses.** To provide public or private facilities and improvements important to the State's economy in suitable locations; and ensure that coastal dependent development such as harbors and ports, energy facilities, and visitor facilities, are located, designed, and constructed to minimize adverse impacts in the coastal zone area.
- **Coastal Hazards.** To reduce hazard to life and property from tsunamis, storm waves, stream flooding, erosion, subsidence, and pollution.
- **Managing Development.** To improve the development review process, communication, and public participation in the management of coastal resources and hazards.
- **Public Participation.** To stimulate public awareness, education and participation in coastal management; and maintain a public advisory body to identify coastal management problems and provide policy advice and assistance to the CZM program.
- **Beach Protection.** To protect beaches for public use and recreation; locate new structures inland from the shoreline setback to conserve open space and to minimize loss of improvements due to erosion.
- **Marine Resources.** To implement the State's ocean resources management Plan.

Other key areas of the CZM program include: a permit system to control development within a Special Management Area (SMA) managed by each County and the State Office of Planning; a Shoreline Setback Area which serves as a buffer against coastal hazards and erosion, and which protects view-planes; and management of marine and coastal resources. Finally, a Federal Consistency provision requires that federal activities, permits, and financial assistance be consistent with the Hawai'i CZM program.

This project is not located within the county of Kaua‘i’s Special Management Area. The project does not involve the placement, erection or removal of materials near the coastline. Activities at the project site do not have the potential to significantly affect coastal resources. Finally, the proposed project is consistent with the CZM objectives that are relevant to this type of activity. A copy of this Draft EA will be sent to the Hawai‘i Department of Business, Economic Development and Tourism, Office of Planning for review and comment.

5. Endangered Species Act (16 USC § 1531)

The U.S. Endangered Species Act (16 USC § 1531-1544, as amended) provides broad protection for species of fish, wildlife and plants that are listed as threatened or endangered in the U.S. or elsewhere. The Act mandates that federal agencies seek to conserve endangered and threatened species and use their authorities in furtherance of the Act’s purposes. Provisions are made for listing species, as well as for recovery plans and the designation of critical habitat for listed species.

Under 16 USC § 1536, *Interagency Cooperation*, each federal agency shall, in consultation with and with the assistance of the Secretary of the Interior, ensure that any action authorized, funded or carried out by a governmental agency (an “agency action”) is not likely to jeopardize the continued existence of any endangered species or threatened species, or result in the destruction or adverse modification of habitat of such species, which is determined by the Secretary, after consultation as appropriate with affected States, to be critical, unless such agency has been granted an exemption for such action.

As discussed in section 5.3 of this document, the site is currently in use and vegetation was highly disturbed when previously graded. No plants or animals considered to be rare, threatened or endangered by either the U.S. Fish & Wildlife Service or the State of Hawai‘i’s Department of Land and Natural Resources, Division of Forestry & Wildlife are known to exist within the project site.

Any exterior lights on the structures will only be used for evening maintenance or emergency work. The construction documents will incorporate design specifications to assist in decreasing any risk of seabird attraction, including the use of colored lighting and non-reflective paint for the tank and other structures.

No impacts to any rare, threatened or endangered plant or animal species of their habitats are anticipated. Copies of this Draft EA will be provided to the U.S. Fish & Wildlife Service and to the Hawai‘i Department of Land and Natural Resources for review and comment.

6. Environmental Justice (Executive Order 12898)

Enacted on February 11, 1994, the intent of U.S. Executive Order 12898, Environmental Justice (full title *Federal Actions to Address Environmental Justice to Minority and Low Income Populations*) is to avoid disproportionately high adverse human health or environmental effects of projects on minority and low income populations. Executive Order 12898 also requires that federal agencies ensure that minority and low income communities have adequate access to public information related to health and the environment.

As discussed in Section 4.1 of this document, the CDP Kilauea and Kalihiwai population represent a relatively small proportion of the County's total population of 67,091. In Census Tract 401.3, which includes Princeville, Kilauea and Kalihiwai, the total population is 6,484, with White (4,366 persons), Asian (854 persons), Native Hawaiian and Pacific Islander (285) and other (879). As reflected in the 2010 census data in Section 4.1 of this document, the proposed project will not result in a disproportionately high adverse impact to human health or environmental quality on minority or low income populations.

7. Farmland Protection Policy Act (7 USC § 4201)

Adopted on December 22, 1981, the purpose of the U.S. Farmland Protection Policy Act (FPPA) is to:

- Minimize the extent to which federal programs contribute to the unnecessary and irreversible conversion of farmland to nonagricultural uses.
- Assure that federal programs are administered in a manner that, to the extent practicable, will be compatible with state, unit of local government, and private programs and policies to protect farmland.

Administered by the U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS), "farmland", as used in the FPPA, includes prime farmland, unique farmland and land of statewide or local importance. "Farmland" subject to FPPA requirements does not have to be currently used for cropland.

As discussed in Section 2.3 of this document, the project site is classified as Prime *Agricultural Lands of Importance to the State of Hawai'i* (ALISH) classification, and as shown in **Exhibit H**. The productivity rating according to the State of Hawai'i's Land Study Bureau is "C" and "D" lands as shown in **Exhibit I**. The tank provides water for both residential and agricultural use, and can therefore be considered to have positive impacts in support of farm lands in the area. The project will not necessarily contribute to the unnecessary and irreversible conversion of farmland to nonagricultural uses. A copy of the Draft EA will be provided to NRCS for review and comment.

8. Fish and Wildlife Coordination Act (16 USC § 661)

The U.S. Fish and Wildlife Coordination Act, as amended, authorizes the Secretaries of Agriculture and Commerce to require consultation with the U.S. Fish & Wildlife Service and the fish and wildlife agencies of states where the “waters of any stream or other body of water are proposed or authorized, permitted or licensed to be impounded, diverted...or otherwise controlled or modified” by any agency under a federal permit or license. Consultation is to be undertaken for the purpose of preventing loss of and damage to wildlife resources”.

As discussed in Section 5.6 of this document, the project site does not contain surface water resources. Therefore, there will be no diversions of any water body and the project will not result in impacts on fish or wildlife resources. Copies of the Draft EA will be provided to the U.S. Fish & Wildlife Service, and to the State of Hawai‘i Department of Land and Natural Resources for review and comment.

9. Floodplain Management (Executive Order 11988, as amended by EO 12148)

U.S. Executive Order 11988, Floodplain Management, dated May 24, 1977 requires federal agencies to take action to reduce the risk of flood loss, restore the natural and beneficial values of floodplains, and minimize the impacts of floods on human safety, health, and welfare. This Executive Order was amended by U.S. Executive Order 12148, July 20, 1979. The main feature of the amendment added that agencies with responsibilities for federal real estate properties and facilities shall, at a minimum, require the construction of federal structures and facilities to be in accordance with the criteria in the National Flood Insurance Program (NFIP).

As discussed in Section 5.5 of this document the Pu'u Pane Tank and well site is located in Zone X on the Federal Emergency Management Flood Insurance Rate Map (FIRM). Zone X is defined as an “area determined to be outside of the 0.2% annual chance floodplain” and not located within the flood hazard area of a 500-year flood plain. The project site is not subject to flooding and is consistent with applicable regulations and guidance relating to floodplain management.

10. National Historic Preservation Act (16 USC § 470)

Section 106 of the U.S. National Historic Preservation Act of 1966 requires that federal agencies consider the effects of their projects on historic properties and allow the Advisory Council on Historic Preservation a reasonable opportunity to comment on such projects. The Section 106 review regulations are set forth in Code of Federal Regulations 800. In most cases, the State of Hawai‘i Department of Land and Natural Resources, Historic Preservation Division (SHPD) acts for

the Advisory Council to undertake this review process. The Historic Preservation Division must concur that the proposed project will have “no effect” on historic properties.

As discussed in Section 4.3 of this document, the proposed project site was previously graded, and a water storage tank constructed. No archaeological sites or potential subsurface cultural materials were discovered and no archaeological research is recommended. Copies of this Draft EA will be provided to the SHPD and the Office of Hawaiian Affairs for review and comment.

11. Protection of Wetlands (Executive Order 11990, as amended by EO 12608)

The purpose U.S. Executive Order 11990, dated 1977, is to "minimize the destruction, loss or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands". To meet these objectives, the Order requires federal agencies, in planning their actions, to consider alternatives to wetland sites and limit potential damage if an activity affecting a wetland cannot be avoided. The Order applies to:

- Acquisition, management, and disposition of Federal lands and facilities construction and improvement projects which are undertaken, financed or assisted by federal agencies;
- Federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulation, and licensing activities.

As discussed in Section 5.6 of this document, there are no surface water resources on the project site. Copies of the Draft EA will be provided to the U.S. Fish & Wildlife Service, and to the State of Hawai‘i Department of Land and Natural Resources for review and comment.

12. Safe Drinking Water Act (42 USC § 300f)

The U.S. Safe Drinking Water Act (SDWA) was originally passed by Congress in 1974 to protect public health by regulating the nation’s public drinking water supply. The law was amended in 1986 and 1996 and requires many actions to protect drinking water and its sources – rivers, lakes, reservoirs, springs and groundwater wells. (SDWA does not regulate private wells, which serve fewer than 25 individuals.) SDWA authorizes the United States Environmental Protection Agency (EPA) to set national health-based standards for drinking water to protect against both naturally-occurring and man-made contaminants that may be found in drinking water. EPA, states and water systems then work together to ensure these standards are met.

Originally, SDWA focused primarily on treatment as the means of providing safe drinking water at the tap. The 1996 amendments greatly enhanced the existing law by recognizing source water protection, operator training, funding for water system improvements, and public information as important components of safe drinking water. This approach ensures the quality of drinking water by protecting it from source to tap.

Sole Source Aquifer (SSA) designation is one tool to protect drinking water supplies. The designation protects areas where there are few or no alternative sources to the groundwater resource and where, if contamination occurred, using an alternative source would be extremely expensive. EPA defines a sole source aquifer as an aquifer that supplies at least 50 percent of the drinking water consumed in the area overlying the aquifer. These areas may have no alternative drinking water source(s) that could physically, legally and economically supply all those who depend on the aquifer for drinking water. Under the rules, EPA will review certain proposed projects within SSA-designated areas. Furthermore, all proposed projects receiving federal funds are subject to review to ensure that they do not endanger the water source.

As discussed in Section 5.8 of this document, the Hawai'i Commission on Water Resource Management (CWRM) uses an aquifer coding system to reference and describe the State's ground water hydrologic units. The proposed project site is located within the Kilauea Aquifer (20105) of the Līhu'e Hydrologic Unit, with a sustainable yield of 17 MGD by the aquifer.

According to the *Water Plan 2020* the Kilauea Water System had an historical water use of 0.718 MGD in 1999, and a projected water use of 0.842 MGD in 2010, and 0.969 in 2020. The current 2012 water use of the Kilauea area is approximately 871,300 GPD. The projected increase will not adversely affect the Kilauea Aquifer. The County will conduct water sampling tests as part of its pump testing activities to ensure the quality of withdrawn water meets all applicable state and federal drinking water regulations. The proposed project will comply with all State requirements regulating new sources of drinking water, including submission of a satisfactory engineering report, source water assessment, source water protection plan, and all other requirements set forth under the terms of Hawai'i Administrative Rules Chapter 20, Section 11-20-29.

Once the testing phase on the new exploratory well is completed, the County will monitor the on-going operation of the Kilauea Water System to ensure it continues to meet all applicable state and federal drinking water regulations. The proposed project will not adversely affect the water quality of the water system. No chloride gas will be used and there will be no hazards to nearby residences due to any accidental release of chloride gas. A copy of the Draft EA will be provided to the State Department of Health and to CRWM for review and comment.

13. Wild and Scenic Rivers Act (16 USC § 1271)

First passed in October 1968, the U.S. Wild and Scenic Rivers Act established a National Wild and Scenic Rivers System for the protection of rivers with important scenic, recreational, fish and wildlife, and other values. Rivers are classified as wild, scenic or recreational. The Act also designated specific rivers for inclusion in the System and prescribes the methods and standards by which additional rivers may be added. The Act contains procedures and limitations for control of lands in federally administered components of the System and for disposition of lands and minerals under federal ownership. Hunting and fishing are permitted in components of the system under applicable federal and state laws.

There are no rivers in Hawai‘i designated as wild and scenic as part of the Wild and Scenic Rivers Act. According to the Federal Requirements for DWSRF Loan Applications (August 2008), this Act is not applicable to the State of Hawai‘i at this time.

14. Essential Fish Habitat Consultation Process Under The Magnuson-Stevens Fishery Conservation and Management Act (16 USC § 1801)

The U.S. Fishery Conservation and Management, Magnuson-Stevens Conservation and Management Act is intended to conserve, restore and enhance aquatic systems to provide for increased recreational fishing opportunities nationwide. The Act was first enacted in 1976 and amended in 1996. Most notably, the Magnuson-Stevens Act aided in the development of the domestic fishing industry by phasing out foreign fishing. To manage the fisheries and promote conservation, the Act created eight regional fishery management councils. The 1996 amendments focused rebuilding overfished fisheries, protecting essential fish habitat, and reducing by-catch.

The Act has been amended several times in response to continued overfishing of major stocks. The most recent version, authorized in 2007, includes seven purposes:

1. Acting to conserve fishery resources
2. Supporting enforcement of international fishing agreements
3. Promoting fishing in line with conservation principles
4. Providing for the implementation of fishery management plans (FMPs) which achieve optimal yield
5. Establishing Regional Fishery Management Councils to steward fishery resources through the preparation, monitoring, and revising of plans which
(A) enable stake holders to participate in the administration of fisheries and
(B) consider social and economic needs of states.
6. Developing underutilized fisheries
7. Protecting essential fish habitats

The Pu'u Pane storage tank and potential well do not include any water resources that support fishery resources and will not adversely affect any fishery resources.

SECTION 7.0 ALTERNATIVES TO THE PROPOSED ACTION

Under *Hawai'i Administrative Rules*, Title 11, Chapter 200, Environmental Impact Statement Rules, Section 11-200-10(6), the alternatives to the proposed action considered are limited to those that would allow the objectives of the project to be met, while minimizing potential adverse environmental impacts. The feasible alternatives must also address the project's economic characteristics while responding to the surrounding land uses that will be impacted by the project. In conformance with applicable regulations, the following alternatives, including an alternative site and uses of the property, have been identified and investigated.

7.1 "No-Action" Alternative

Both the *Kaua'i General Plan* and *Kaua'i Water Plan 2020* identify the water system in Kilauea-Kalihiwai area near to or at capacity. As previously discussed, the *Kaua'i Water Plan 2020* recommended a new 650,000 gallon tank be constructed, and the tank's proposed size has now been increased to a 1 million gallons. The no-action alternative would not resolve the projected water demand for the service area and would not meet the goals set forth in both the *Kaua'i General Plan* and *Kaua'i Water Plan 2020*.

7.2 Alternative Locations

- Alternative #1: The Department of Water's desired location for a new water storage tank was on a parcel directly adjacent to the existing Pu'u Pane Tank location. The DOW attempted to negotiate with the adjacent landowners to acquire this land area, but the negotiations were unsuccessful.
- Alternative #2: Based on the unavailability of other alternative sites in the general area, the DOW determined that the current proposal to demolish the existing tank and construct a new tank on the site was both financially and environmentally feasible.

7.3 Preferred Alternative

Alternative #2, above, is the **preferred alternative**.

SECTION 8.0 SIGNIFICANCE DETERMINATION

The impacts of the proposed action have been assessed. The proposed project is not anticipated to cause significant negative impacts to the environment. Therefore, a Finding of No Significant Impact (FONSI) is found. The determination of a FONSI is based on the following:

1. The proposed action does not involve an irrevocable commitment to loss or destruction of any natural or cultural resources;

The Pu'u Pane water tank facility is currently situated on the subject parcel. No rare, threatened, or endangered plants or animal species, or their habitats have been identified within or near the existing site. No adverse impacts on archaeological, historical or cultural resources are anticipated; the proposed project will not result in the loss or destruction of any natural or cultural resources.

2. The proposed action will not curtail the range of beneficial uses of the environment;

The proposed project is consistent with the current use of the project site and compatible with the uses of the surrounding area. Sufficient water will remain within the sustainable yield of the aquifer and promote other beneficial uses of groundwater in the region should the results of the exploratory well lead to the construction of a permanent production well. The project will not curtail future beneficial uses of the environment.

3. The proposed action does not conflict with the State's long-term goals or guidelines as expressed in Chapter 344, HRS, State Environmental Policy;

The purpose of the proposed project is to meet projected water demands, and maintain the public health, safety and welfare of the residents and visitors in the area. The proposed project will not involve actions or activities that would adversely affect the natural resources of the area, and is consistent with the State's long-term environmental goals to conserve natural resources and enhance the quality of life. The proposed project will not conflict with the State's long-term goals or guidelines as outlined in Chapter 344, HRS, State Environmental Policy.

4. The proposed action does not substantially affect the economic or social welfare of the community or state;

Economic impacts on the community and state will not be negatively affected. Some short-term economic benefits will occur during the construction phase of the project. The project is consistent with the *Kaua'i General Plan* and the *Kauai Water Plan 2020* and will benefit the social and economic welfare of Kaua'i by improving the potable and agricultural water supply system in the area.

5. The proposed action does not substantially affect public health;

Public health will not be negatively affected. A purpose of this proposed project is to meet the projected water demand, and maintain the public health and welfare for residents and visitors of this area. The project will include water quality testing to ensure standards are met; the exploratory well will evaluate public health issues. Construction activities will be regulated to minimize any noise and dust concerns, and Best Management Practices will be followed.

6. The proposed action does not involve substantial secondary impacts such as population changes or effects on public facilities;

The project does not involve any substantial secondary impacts such as population changes. There are direct positive impacts on public facilities, inasmuch as the proposed project will significantly increase the size of the existing water storage tank. Positive secondary impacts may occur following the results from the drilling of the exploratory well, as a new permanent production well may be developed.

7. The proposed action does not involve substantial degradation of environmental quality;

The site is presently used for a 100,000 gallon water storage tank. The construction of the new 1 million gallon tank will not involve any substantial degradation of the environmental quality in the area. No rare, threatened, or endangered plant or animal species, or their habitats within the project site will be affected. Implementation of Best Management Practices for all construction will ensure that the proposed project activities will not substantially degrade the site's environmental quality.

8. The proposed action does not cumulatively have a considerable effect on the environment or involve a commitment to larger actions;

Cumulative impacts result when implementation of several projects that individually, have minor impacts, combine to produce more severe impacts or conflicts among mitigation measures. No cumulative impacts as a result of the proposed project are anticipated. While the proposed project is part of the County of Kaua'i, Department of Water's municipal water system, approval of the project does not constitute a commitment for any larger action.

9. The proposed action does not affect a rare, threatened, or endangered species or its habitat;

The site is presently used as a water tank facility. No rare, threatened, or endangered plants or animal species, or their habitats have been identified within or near the project site.

10. The proposed action does not detrimentally affect air or water quality or ambient noise levels;

There will be short-term impacts which will include disruption on the project site, decline in air quality, and an increase in noise levels from construction activities. These impacts will be mitigated by Best Management Practices and regulated by the project plans and specifications. Once construction is completed, no long-term effects on air, water quality or noise levels are anticipated. Ambient noise levels will be consistent with the Title 11 Hawai'i Administrative Rules, Chapter 46, Community Noise Control.

11. The proposed action does not affect an environmentally sensitive area such as a flood plain, tsunami zone, erosion-prone area, geologically hazardous land, estuary or coastal waters;

The proposed project is not adjacent to a shoreline and is outside the 500-year flood hazard and tsunami inundation areas. There are no natural drainageways draining onto the project site and there are no conditions that would classify the area as a wetland. Implementation of Best Management Practices will be employed to properly manage potential stormwater runoff or soil erosion. The proposed project site will not affect an environmentally sensitive area and no damages to the surrounding areas are expected as a result of the project.

12. The proposed action does not substantially affect scenic vistas and view planes identified in county or state plans or studies; and

The subject parcel has not been identified in the *Kaua'i General Plan* as a scenic resource area. The Pu'u Pane Tank cannot be seen from Kūhiō Highway. The tank and possible pump station facilities will be painted with earth-tone colors to blend with their surrounding environment. The structures will also comply with the North Shore Development Plan Ordinance requirements of non-reflective roof colors.

13. The proposed action does not require substantial energy consumption.

The proposed project will require some energy consumption; provided that if a permanent production well is installed, a permanent well may have relatively high energy use.

8.1 Determination

Based on these findings and the assessment of potential impacts for the proposed project, the DOW does not foresee that the project will have any significant adverse impacts on the existing natural, physical, or human environment, and has determined a Finding of No Significant Impact ("FONSI").

SECTION 9.0 CONSULTED PARTIES

A meeting with the Kilauea Neighborhood Association (KNA) was held on May 1, 2012 to discuss the project with members of the community. A summary from this meeting is included in **Appendix A**.

Copies of the Draft Environmental Assessment were sent to KNA as well as to the following agencies, organizations and individuals listed below:

Federal

U.S. Department of the Interior, U.S. Fish and Wildlife Service
U.S. Department of Agriculture, Natural Resources Conservation Service

State of Hawai‘i

Department of Agriculture
Department of Business, Economic Development & Tourism
 Office of Planning
Department of Health
 Environmental Management Division
 Safe Drinking Water Branch
 Office of Environmental Quality Control
Department of Land and Natural Resources
 Commission on Water Resources Management
 State Historic Preservation Division
 Office of Conservation and Coastal Lands
 Engineering Division
 Land Division
 Division of Forestry & Wildlife
Department of Transportation
Office of Hawaiian Affairs
University of Hawai‘i
 Environmental Center
 UH Manoa Water Resource Research Center
Līhu‘e Public Library (Government Documents Center)
Princeville Public Library

County of Kaua‘i

Planning Department
Department of Public Works

Citizens Groups, Individuals

Kilauea Neighborhood Association

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SECTION 11.0 APPENDICES

- A Kilauea Neighborhood Association, May 1, 2012 Meeting Notes
- B *Foundation Investigation 1.0 MG Water Tank*

APPENDIX A

**Meeting Notes:
DOW Pu'u Pane Tank Project Presentation
at Kilauea Neighborhood Association
Kilauea Neighborhood Center
Tuesday, May 1, 2012
7:00 PM**

The Kilauea Neighborhood Association (KNA) held their monthly meeting on May 1, 2012, and the Department of Water (DOW) and project consultants made a brief presentation and then were available to answer questions and address comments. There were approximately 35 KNA members present. Representing the DOW was Aaron Zambo (Project Engineer), the design civil engineering firm Kodani & Associates' Jim Turturici (Civil Engineer), attorney Galen Nakamura (drafting of the Environmental Assessment), and Barbara Robeson (sub-consultant to the EA preparation).

Galen Nakamura provided an overview of the project location, replacement of the existing 100,000 gallon Pu'u Pane Tank with a 1 million gallon tank, drilling of a new exploratory well, and the possible construction of a permanent production well. A tax map and project site map were posted. Aaron Zambo and Jim Turturici answered questions from those present. Aaron introduced the project by providing an overview of the Kilauea Water System: daily use is about 1.2 MGD, Kilauea sources of 1 MGD are currently available, storage is available for .9 MGD, and sometimes low water pressure occurs in the System.

Questions and Answers directly related to proposed project

Q: Why was only one property owner notified?

A: DOW is in the early phase of the project. We wanted to ensure that the nearby property owner was notified about the presentation to the KNA members and community. Also, this meeting represents DOW's efforts to further get the word out to the community regarding this project.

Q: Will more water meters be available following the project?

A: If the well production is successful, DOW will make an announcement whether or not new meters may be available.

Q: Has the test well been dug yet?

A: Not yet.

Q: If the existing water storage tank is demolished, then how will people get water until the new tank is built?

A: Six temporary water storage tanks will be installed during the construction phase of the new tank. The DOW is striving for no disruption in water service.

- Q: What is the current condition of the existing tank? Will the new tank be situated in the same place?
- A: The condition of the existing tank is good. DOW examined 3-4 other potential areas to construct a new tank, but none of those potential sites worked out.
- Q: Is there enough space on the existing site to build the new tank (without demolishing the existing tank)?
- A: No.
- Q: Are the pre-existing lines from this tank to the Kilauea area up to standards? Do they need to be upgraded?
- A: The existing lines are up to standards and do not need to be upgraded. The existing tank now has water levels that go up and down relatively. A new tank would keep water levels more consistently high and water pressure more consistent.
- Q: What is the retaining wall height?
- A: The height will be at about eight feet up from the internal ground level inside the parcel area.
- Q: When are you planning to begin the project?
- A: We have the funds to build, and would like to start as soon as possible. We still have to do the Environmental Assessment, get permits, bid, then begin. Construction would probably be around 3-6 months, with the overall project taking about one year.
- Q: Is this an EIS process?
- A: We are currently working on an Environmental Assessment in compliance with HRS Chapter 343.
- Comment: Fast tracking this project is not a benefit to us. The use of Ag water is a concern.
- Q: How much capacity would be added if a new permanent well is installed?
- A: 300-500 gallons per minute would bring water source up to the current needs, which would also include more storage of water.
- Q: Do you know if well water is available at this site?
- A: A study has been done for the foundation, road and cut slopes, but the borings in the study didn't go deep enough to address the potential availability of water for the well.
- Q: What are the materials?
- A: Pre-stressed concrete, similar to the Kapa'a tank.
- Q: Could the existing 100,000 gallon tank structure be used for the Kilauea Ag Park?
- A: Probably not, because it is made of concrete.

Q: If the existing tank is in good shape, then why can't it be preserved, and you try to build next to it – like condemning the land?

A: We looked at condemning the nearby land, and decided to go with the current plan as there is some urgency in moving ahead with the project. Condemnation would take several years. We thought this current decision was a win-win.

Q: Don't people use water from this tank for both potable and Ag water uses? This abuses good (potable) water being used for Ag purposes.

A: Yes, it's used for both. Potable water coming off this system is used for irrigation purposes. We didn't expect that the water would be used for irrigation. DOW does not have any alternative. We can discuss with Water Resources.

Comment: Kalihiwai Ridge is used for agriculture. No one is hooked up to the Ag water system there because the price of ag water is the same as for potable system. It's not feasible to hook up to the Ag water system. If the cost is not feasible for farmers, then how can we connect to the two systems?

Q: In the future, will some of the main lines be upgraded to larger lines?

A: That is still on the drawing board.

Q: Is there an existing well on the lot?

A: No. Booster pumps across the highway send water to this tank. We are proposing to drill an exploratory well on this Pu'u Pane Tank site to supplement the tank.

Q: How do you know if a new well up there will produce water for the tank?

A: At this time we do not know. That is the reason for drilling the exploratory well.

Q: If the new well doesn't produce water, will you still do the tank?

A: Nine out of ten test wells are successful, so we're looking at other sources too.

Q: If you build the new tank and the well doesn't work, will other wells supply this new tank?

A: Yes, they will keep it filled.

Q: Number of wells in Kilauea now?

A: 4-5 wells in the Kilauea system.

Questions and Answers not related to proposed project

Q: Will the EA discuss the wells for the Kilauea Ag Park?

A: This project is not related to the Ag Park.

Q: How does this fit in the progress of the Kaua'i Park Water Plan?

A: This addressed by another division of DOW.

Comment: We request that DOW come tell us about the entire system – we want to know about the big picture.

Comment: The County needs to reactivate the ditch water/surface water availability. There is the potential for both. DOW should consider this.

Response: DOW does not operate any Ag water systems.

Comment: It's not legal for farmers to use drinking water for crops. There is a huge need for non-drinking water and the water budget is out of whack because drinking water is being used for Ag purposes.

Prepared by
B. Robeson for Kodani & Associates Engineers, LLC

APPENDIX B

(attached)

**FOUNDATION INVESTIGATION
1.0 MG WATER TANK
KILAUEA, KAUAI, HAWAII
TMK: 5-1-005: 131**

for

KODANI & ASSOCIATES, INC.

**HIRATA & ASSOCIATES, INC.
W.O. 12-5271
March 19, 2012**



Hirata & Associates

Geotechnical
Engineering

Hirata & Associates, Inc.

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March 19, 2012

W.O. 12-5271

Mr. Clyde Kodani
Kodani & Associates, Inc.
3126 Akahi Street
Lihue, Hawaii 96766

Dear Mr. Kodani:

Our report, "Foundation Investigation, 1.0 MG Water Tank, Kilauea, Kauai, Hawaii, TMK: 5-1-005: 131", dated March 19, 2012, our Work Order 12-5271 is enclosed. This investigation was conducted in general conformance with the scope of services presented in our proposal dated April 21, 2010.

Borings B3 and B4, drilled above the slopes surrounding the existing tank, encountered surface soils consisting of reddish brown and brown clayey silt. The clayey silt was in a medium stiff condition, and extended to depths of about 5 and 18 feet. Underlying the pavement section in borings B1 and B2, and the surface clayey silt in borings B3 and B4, was a stratum of completely weathered basalt. The completely weathered basalt was in a firm to medium stiff condition and extended to the maximum depths drilled. Seepage water was encountered in borings B1, B2, and B4 at depths ranging from about 23.8 to 29.8 feet.

Conventional shallow foundations may be used to support the proposed water tank. However, to provide more uniform support for structure, we recommend that all footings and concrete slabs-on-grade be underlain by a minimum 24 inches of imported granular structural fill.

The following is a summary of our geotechnical recommendations. This summary is not intended to be a substitute for our report which includes more detailed explanations of our recommendations, as well as additional requirements.

- Allowable bearing value = 2,000 psf
- Coefficient of friction = 0.4
- Passive earth pressure = 200 pcF

We appreciate this opportunity to be of service. Should you have any questions concerning this report, please feel free to call on us.

Very truly yours,

HIRATA & ASSOCIATES, INC.

Paul S. Morimoto

President

PSM:SJ

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Unified Soil Classification System Plate A3.2

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APPENDIX B

Description of Laboratory Testing Plates B1.1 and B1.2

Consolidation Test Reports Plates B2.1 through B2.3

Direct Shear Test Reports Plates B3.1 through B3.4

Modified Proctor Test Report Plate B4.1

CBR Test Report Plate B5.1

FOUNDATION INVESTIGATION**1.0 MG WATER TANK****KILAUEA, KAUAI, HAWAII****TMK: 5-1-005: 131****INTRODUCTION**

This report presents the results of our foundation investigation performed for the proposed 1.0 MG Water Tank in Kilauea, Kauai, Hawaii. Our scope of services for this study included the following:

- A visual reconnaissance of the site to observe existing conditions which may affect the project. The general location of the project site is shown on the enclosed Location Map, Plate A2.1.
- A review of available in-house soils information pertinent to the site and the proposed project.
- Drilling and sampling four exploratory borings to depths ranging from about 25.5 to 44.5 feet. A description of our field investigation is summarized on Plates A1.1 and A1.2. The approximate exploratory boring locations are shown on the enclosed Boring Location Plan, Plate A2.2, and the soils encountered in the borings are described on the Boring Logs, Plates A4.1 through A4.6.
- Laboratory testing of selected soil samples. Testing procedures are presented in the Description of Laboratory Testing, Plates B1.1 and B1.2. Test results are presented in the Description of Laboratory Testing, and on the Boring Logs (Plates A4.1 through A4.6), Consolidation Test reports (Plates B2.1 through B2.3), Direct Shear Test reports (Plates B3.1 through B3.4), Modified Proctor Test report (Plate B4.1), and CBR Test report (Plate B5.1).
- Engineering analyses of the field and laboratory data.
- Preparation of this report presenting geotechnical recommendations for the design of foundations, including seismic considerations, resistance to lateral pressures, retaining wall, slabs-on-grade, flexible pavement, and site grading.

PROJECT CONSIDERATIONS

Information regarding the proposed project was provided by personnel from your office and KAI Hawaii, Inc., Structural Engineers.

The proposed project will consist of demolishing the existing 100,000 gallon water tank and constructing a new 1.0 million gallon (MG) water storage tank. The new concrete tank will have a diameter of about 95 feet.

Based on the existing topography and the proposed finish floor elevation of +447, grading will primarily consist of excavation, with maximum cut depths of about 10 feet. Preliminary plans show an approximate 1.5H:1V cut slope gradient. Retaining walls are planned along the northwest, northeast and southeast of the property line to accommodate grade changes.

The project will also include an AC paved perimeter road, extending around the new tank. We expect that the perimeter road will be about 10 to 12 feet wide.

SITE CONDITIONS

The project site is located on the south side of Kuhio Highway, southeast of its intersection with Puu Pane Road in Kilauea, Kauai. The central portion of the parcel is occupied by the existing water tank and service road. The remainder of the site is covered by low to moderate vegetation. Vacant land borders the site on the north and west.

Slopes ranging from about 4 to 10 feet in height surround the tank. The slopes are moderately to heavily overgrown, and the topographic survey indicates an approximate 2H:1V gradient. A 6-foot high chain-link fence extends around the existing tank site.

SOIL CONDITIONS

Borings B1 and B2 were drilled through the existing AC pavement which consisted of about 2 to 2.5 inches of asphaltic concrete over about 7 to 8 inches of base material. Borings B3 and B4, drilled from elevations about 10 and 5 feet higher than the existing service road, encountered reddish brown and brown clayey silt in a medium stiff condition.

Underlying the pavement section in borings B1 and B2, and the surface clayey silt in borings B3 and B4 at depths of about 5 and 18 feet, respectively, was a stratum of completely weathered basalt. Completely weathered basalt, also known as saprolite, is rock which has completely decomposed to soil, but with its structure preserved. The weathered basalt was in a firm to medium stiff condition, and extended to the maximum depths drilled. Laboratory testing on the completely weathered basalt indicated a low expansion potential.

Seepage water was encountered in borings B1, B2, and B4 at depths ranging from about 23.8 to 29.8 feet. Neither groundwater nor seepage water was encountered in boring B3.

CONCLUSIONS AND RECOMMENDATIONS

Based on the proposed finish floor elevation and the existing topography of the site, grading within the proposed tank footprint will consist primarily of excavation. In the northern portion of the tank footprint, cut depths will range from about 1 to 7 feet, while in the southern portion, cut depths will extend to depths of about 3 to 10 feet.

Conventional shallow foundations may be used to support the proposed 1.0 MG water tank. However, due to the firm to medium stiff condition of the completely weathered basalt and to provide more uniform support, we recommend that all footings and concrete slabs-on-grade be underlain by a minimum 24 inches of imported granular structural fill.

Foundations

Conventional shallow foundations, such as spread footings or thickened slab foundations, founded on a minimum 24 inches of imported granular structural fill may be used to support the proposed water tank. The granular structural fill should also extend laterally, a minimum 12 inches beyond the edge of footings. Imported granular structural fill should conform to and be placed in accordance with recommendations presented in the *Site Grading* section of this report.

Foundations may be designed for an allowable bearing value of 2,000 pounds per square foot. The recommended allowable bearing value is for the total of dead and frequently applied live loads, and may be increased by one-third for short duration loading which includes the effect of wind and seismic forces.

Foundations should be a minimum 16 inches in width, and embedded at least 18 inches below finish adjacent grade. The bottom of all footing excavations should be cleaned of loose or deleterious material prior to placement of reinforcing steel and concrete.

Footings located on, or near the top of slopes should be embedded such that a minimum horizontal distance of 5 feet is maintained between the bottom edge of footing and slope face.

Seismic Design

Based on the borings drilled as part of this study and our knowledge of deep soil conditions in the area, the subsurface soils can be characterized as a stiff soil profile. Therefore, based on the 2003 International Building Code, Site Class D is recommended for this site.

Lateral Design

Resistance to lateral loading may be provided by friction acting at the base of foundations, and by passive earth pressure acting on the buried portions of foundations.

A coefficient of friction of 0.4 may be used with the dead load forces. Passive earth pressure may be computed as an equivalent fluid having a density of 200 pounds per cubic foot with a maximum earth pressure of 2,000 pounds per square foot. Unless covered by pavement or concrete slabs, the upper 12 inches of soil should not be considered in computing lateral resistance.

Retaining Walls

Retaining wall foundations may be designed using recommendations presented in the *Foundations*, *Seismic Design*, and *Lateral Design* sections of this report.

For active earth pressure considerations, equivalent fluid pressures of 40 and 50 pounds per cubic foot may be used for level and sloping backfill conditions, respectively. An equivalent fluid pressure of 55 pounds per cubic foot may be used for restrained conditions.

Both the onsite soils and imported structural fill may be used for backfill behind new retaining walls. Backfill should be compacted in lifts to between 90 and 95 percent compaction as determined by ASTM D 1557. Overcompaction of the backfill material should be avoided.

To prevent buildup of hydrostatic pressures, retaining walls should be well-drained. The standard of practice consists of placing a minimum 12-inch thick layer of free-draining gravel at the back of the wall. The gravel should extend from the base of the wall, around subdrains or weepholes, and up to within 12 inches of finish grade.

Alternatively, prefabricated drainage geocomposites, such as Miradrain or J-drain, may be used in lieu of the free-draining gravel. As with the free-draining gravel, the drainage geocomposites should be placed at the back of the wall, be connected with the weepholes and/or subdrains (in accordance with manufacturers specifications), and extend to within 12 inches of finish grade. For freestanding walls, the drainage system should be covered by at least 12 inches of low permeability soil, such as the onsite clayey silt. If the backfill is covered by interior or exterior concrete slabs, the gravel fill should extend to the bottom of slab cushion elevation.

Foundation Settlement

Maximum column loads of about 88 kips are anticipated. Based on the estimated structural loads, maximum settlements of less than ½ inch were computed for foundations bearing on a minimum 24 inches of compacted granular structural fill. Differential settlement is not expected to exceed 1/4 inch.

Slabs-on-Grade

Due to the firm to medium stiff condition of the completely weathered basalt and to provide more uniform support, we recommend that the tank slab be underlain by a minimum 24 inches of imported granular fill. The upper six inches of the granular

fill should consist of aggregate base course. The remainder of the fill section should consist of granular structural fill. The tank slab should also be protected by a vapor barrier.

Prior to placement of granular structural fill, the subgrade soil should be scarified to a minimum depth of 6 inches, moisture conditioned to about 2 percent above optimum moisture content, and compacted to between 90 and 95 percent compaction as determined by ASTM D 1557. The overlying granular structural fill and aggregate base course should be compacted to a minimum 95 percent compaction as determined by ASTM D 1557.

Pavement Design

Flexible pavement for the perimeter road may be designed based on the following section:

2.0"	Asphaltic Concrete
6.0"	Base Course (minimum CBR = 85)
<u>6.0"</u>	<u>Select Borrow (minimum CBR = 25)</u>
14.0"	Total Thickness

Prior to placement of the select borrow, the exposed subgrade soil should be scarified to a minimum depth of 6 inches, moisture conditioned to about 2 percent above optimum moisture content, and compacted to between 90 and 95 percent compaction as determined by ASTM D 1557. The select borrow and base course should be compacted to a minimum 95 percent compaction as determined by ASTM D 1557.

Site Grading

Site Preparation - The project site should be cleared of all vegetation, AC pavement, concrete footings and slabs, and other deleterious material. In areas requiring fill placement, the exposed subgrade should first be scarified to a minimum depth of 6 inches, moisture conditioned to about 2 percent above optimum moisture content,

and compacted to between 90 and 95 percent compaction as determined by ASTM D 1557.

Structural Excavations - Based on our exploratory borings, we believe that excavations into the surface clayey silt and completely weathered basalt can be accomplished using conventional excavating equipment.

Temporary shallow cuts into the near surface soils should be stable at slope gradients of 1H:1V or flatter. However, it should be the Contractor's responsibility to conform to all OSHA safety standards for excavations.

Onsite Fill Material - The onsite soils will be acceptable for reuse in compacted fills and backfills, except in the imported granular fill section recommended below foundations and slabs-on-grade. All rock fragments larger than 3 inches in maximum dimension should be removed from the onsite soils prior to reuse.

Imported Fill Material - Imported structural fill should be well-graded, non-expansive granular material. Specifications for imported granular structural fill should indicate a maximum particle size of 3 inches, and state that between 8 and 20 percent of soil by weight shall pass the #200 sieve. In addition, the plasticity index (P.I.) of that portion of the soil passing the #40 sieve shall not be greater than 10. Granular structural fill should also have a minimum CBR value of 15 and a CBR expansion value less than 1.0 percent when tested in accordance with ASTM D 1883.

Compaction - The onsite soils should be placed in horizontal lifts restricted to eight inches in loose thickness and compacted to between 90 and 95 percent compaction as determined by ASTM D 1557. Imported granular structural fill, should also be placed in horizontal lifts restricted to eight inches in loose thickness, but compacted to a minimum 95 percent compaction as determined by ASTM D 1557.

Fill placed in areas which slope steeper than 5H:1V should be continually benched as the fill is brought up in lifts.

Slope Gradients - Permanent cut slopes should be stable at gradients of 1.5H:1V or flatter. All slopes should be planted as soon as practical upon completion of grading to reduce the effects of erosion and weathering.

ADDITIONAL SERVICES

We recommend that we perform a general review of the final design plans and specifications. This will allow us to verify that the foundation design and earthwork recommendations have been properly interpreted and implemented in the design plans and construction specifications.

For continuity, we recommend that we be retained during construction to (1) observe footing excavations prior to placement of imported granular fill, reinforcing steel and concrete, (2) review and/or perform laboratory testing on import borrow to determine its acceptability for use in compacted fills, (3) observe structural fill placement and perform compaction testing, and (4) provide geotechnical consultation as required. Our services during construction will allow us to verify that our recommendations are properly interpreted and included in construction, and if necessary, to make modifications to those recommendations, thereby reducing construction delays in the event subsurface conditions differ from those anticipated.

LIMITATIONS

The boring logs indicate the approximate subsurface soil conditions encountered only at those times and locations where our borings were made, and may not represent conditions at other times and locations.

This report was prepared specifically for Kodani & Associates, Inc. and their sub-consultants for design of the proposed 1.0 MG Water Tank in Kilauea, Kauai,

Hirata & Associates, Inc.

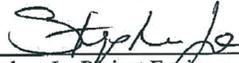
Hawaii. The boring logs, laboratory test results, and recommendations presented in this report are for design purposes only, and are not intended for use in developing cost estimates by the contractor.

During construction, should subsurface conditions differ from those encountered in our borings, we should be advised immediately in order to re-evaluate our recommendations, and to revise or verify them in writing before proceeding with construction.

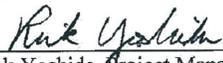
Our recommendations and conclusions are based upon the site materials observed, the preliminary design information made available, the data obtained from our site exploration, our engineering analyses, and our experience and engineering judgement. The conclusions and recommendations in this report are professional opinions which we have strived to develop in a manner consistent with that level of care, skill, and competence ordinarily exercised by members of the profession in good standing, currently practicing under similar conditions in the same locality. We will be responsible for those recommendations and conclusions, but will not be responsible for the interpretation by others of the information developed. No warranty is made regarding the services performed, either express or implied.

Respectfully submitted,

HIRATA & ASSOCIATES, INC.



Stephen Jo, Project Engineer



Rick Yoshida, Project Manager



This work was prepared by
me or under my supervision
Expiration Date of License:
April 30, 2012

APPENDIX A

FIELD INVESTIGATION

DESCRIPTION OF FIELD INVESTIGATION

GENERAL

The site was explored on February 1, 6 and 7, 2012, by performing a visual reconnaissance of the site and drilling four test borings to depths ranging from about 25.5 to 44.5 feet with a Mobile B40-L12 truck-mounted drill rig and a portable Concore drilling equipment.

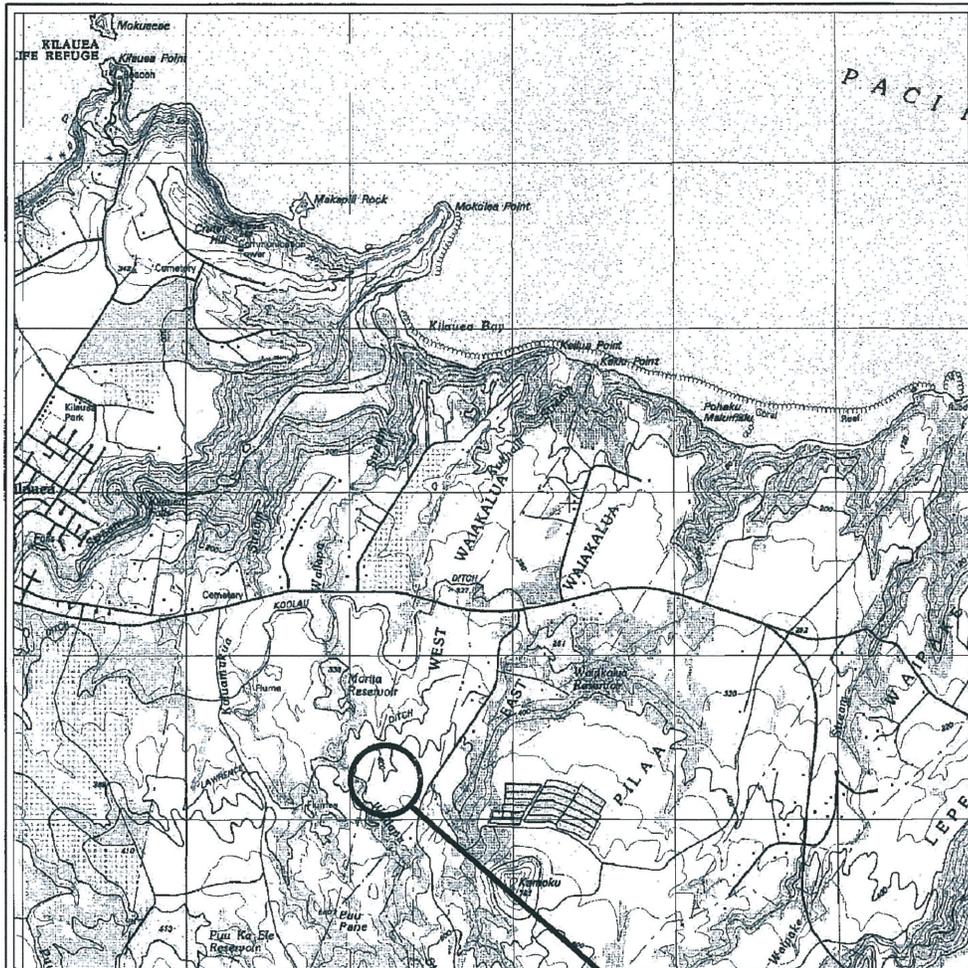
During drilling operations, the soils were continuously logged by our field engineer and classified by visual examination in accordance with the Unified Soil Classification System. The boring logs indicate the depths at which the soils or their characteristics change, although the change could actually be gradual. If the change occurred between sample locations, the depth was interpreted based on field observations. Classifications and sampling intervals are shown on the boring log. A Boring Log Legend is presented on Plate A3.1. The Unified Soil Classification and Rock Weathering Classification Systems are shown on Plates A3.2 and A3.3, respectively. The soils encountered are logged on Plates A4.1 through A4.6.

Borings were located in the field by measuring/taping offsets from existing site features shown on the plans. Surface elevations at boring locations were estimated based on the Site Plan provided by Kodani & Associates, Inc. The accuracy of the boring locations shown on Plate A2.2 and the boring elevations shown on Plates A4.1 through A4.6 are therefore approximate, in accordance with the field methods used.

SOIL SAMPLING

Representative and bulk soil samples were recovered from the borings for selected laboratory testing and analyses. Representative samples were recovered by driving a 3-inch O.D. split tube sampler a total of 18 inches with a 140-pound hammer

dropped from a height of 30 inches. The number of blows required to drive the sampler the final 12 inches are recorded at the appropriate depths on the boring logs, unless noted otherwise. A bulk soil sample was recovered from near boring B2 at a depth of about 2 feet below ground surface.



PROJECT SITE

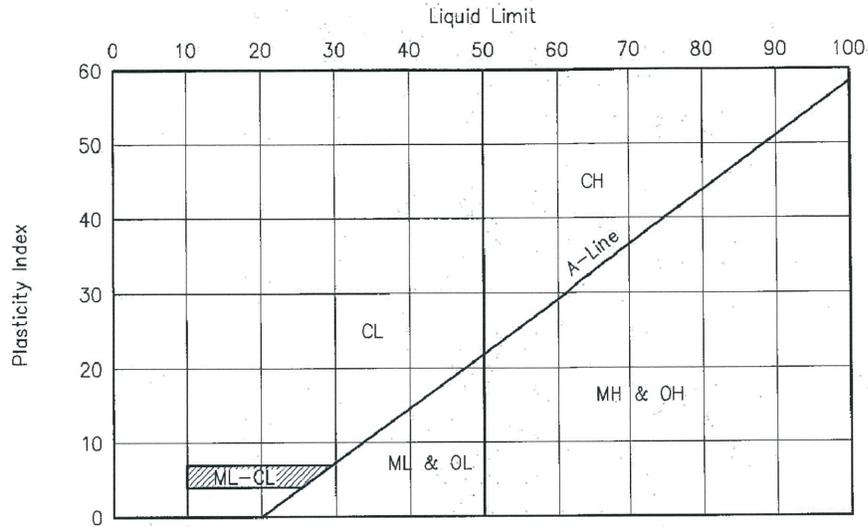


Reference: U.S.G.S. Anahola Quadrangle, Hawaii-Kauai Co.
7.5-Minute Series, Topographic, 1996

W.O. 12-5271	1.0 MG Water Tank - Kilauea, Kauai
Hirata & Associates, Inc.	<p style="text-align: center;">LOCATION MAP</p> <p style="text-align: right;">Plate A2.1</p>

MAJOR DIVISIONS		GROUP SYMBOLS	TYPICAL NAMES
COARSE GRAINED SOILS (More than 50% of the material is LARGER than No. 200 sieve size.)	GRAVELS (More than 50% of coarse fraction is LARGER than the No. 4 sieve size.)	CLEAN GRAVELS (Little or no fines.)	GW Well graded gravels, gravel-sand mixtures, little or no fines.
		GRAVELS WITH FINES (Appreciable amt. of fines.)	GP Poorly graded gravels or gravel-sand mixtures, little or no fines.
			GM Silty gravels, gravel-sand-silt mixtures.
		GC Clayey gravels, gravel-sand-clay mixtures.	
	SANDS (More than 50% of coarse fraction is SMALLER than the No. 4 sieve size.)	CLEAN SANDS (Little or no fines.)	SW Well graded sands, gravelly sands, little or no fines.
		SANDS WITH FINES (Appreciable amt. of fines.)	SP Poorly graded sands or gravelly sands, little or no fines.
			SM Silty sands, sand-silt mixtures.
		SC Clayey sands, sand-clay mixtures.	
FINE GRAINED SOILS (More than 50% of the material is SMALLER than No. 200 sieve size.)	SILTS AND CLAYS (Liquid limit LESS than 50.)	ML Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.	
		CL Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.	
		OL Organic silts and organic silty clays of low plasticity.	
	SILTS AND CLAYS (Liquid limit GREATER than 50.)	MH Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.	
		CH Inorganic clays of high plasticity, fat clays.	
		OH Organic clays of medium to high plasticity, organic silts.	
HIGHLY ORGANIC SOILS		PT Peat and other highly organic soils.	
		FRESH TO MODERATELY WEATHERED BASALT	
		VOLCANIC TUFF / HIGHLY TO COMPLETELY WEATHERED BASALT	
		CORAL	
SAMPLE DEFINITION			
	2" O.D. Standard Split Spoon Sampler		Shelby Tube
	3" O.D. Split Tube Sampler		NX / 4" Coring
			RQD Rock Quality Designation
			Water Level
W.O. 12-5271	1.0 MG Water Tank - Kilauea, Kauai		
Hirata & Associates, Inc.	BORING LOG LEGEND		
	Plate A3.1		

PLASTICITY CHART



GRADATION CHART

COMPONENT DEFINITIONS BY GRADATION	
COMPONENT	SIZE RANGE
Boulders	Above 12 in.
Cobbles	3 in. to 12 in.
Gravel	3 in. to No. 4 (4.76 mm)
Coarse gravel	3 in. to 3/4 in.
Fine gravel	3/4 in. to No. 4 (4.76 mm)
Coarse sand	No. 4 (4.76 mm) to No. 200 (0.074 mm)
Medium sand	No. 4 (4.76 mm) to No. 10 (2.0 mm)
Fine sand	No. 10 (2.0 mm) to No. 40 (0.42 mm)
Silt and clay	No. 40 (0.42 mm) to No. 200 (0.074 mm)

W.O. 12-5271

1.0 MG Water Tank - Kilauea, Kauai

Hirata & Associates, Inc.

UNIFIED SOIL CLASSIFICATION SYSTEM

Plate A3.2

<u>Grade</u>	<u>Symbol</u>	<u>Description</u>
Fresh	F	No visible signs of decomposition or discoloration. Rings under hammer impact.
Slightly Weathered	WS	Slight discoloration inwards from open fractures, otherwise similar to F.
Moderately Weathered	WM	Discoloration throughout. Weaker minerals such as feldspar decomposed. Strength somewhat less than fresh rock but cores cannot be broken by hand or scraped by knife. Texture preserved.
Highly Weathered	WH	Most minerals somewhat decomposed. Specimens can be broken by hand with effort or shaved with knife. Core stones present in rock mass. Texture becoming indistinct but fabric preserved.
Completely Weathered	WC	Minerals decomposed to soil but fabric and structure preserved (Saprolite). Specimens easily crumbled or penetrated.
Residual Soil	RS	Advanced state of decomposition resulting in plastic soils. Rock fabric and structure completely destroyed. Large volume change.

Reference: Soils Mechanics, NAVFAC DM-7.1, Department of the Navy, Naval Facilities Engineering Command, September, 1986.

W.O. 12-5271	1.0 MG Water Tank - Kilauea, Kauai
Hirata & Associates, Inc.	ROCK WEATHERING CLASSIFICATION SYSTEM Plate A3.3

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Geotechnical Engineering

BORING LOG

W.O. 12-5271

BORING NO. B1 DRIVING WT. 140 lb. START DATE 2/1/2012
 SURFACE ELEV. 446±* DROP 30 in. END DATE 2/1/2012

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0						COMPLETELY WEATHERED BASALT (WC) – Reddish brown and brown, moist, firm. Covered by 2 inches of AC over 7 inches of base material.
			10	79	36	
			8	Sample Disturbed	44	
5			5	69	43	
10			12	69	40	Medium stiff from 9 feet.
15			12	70	51	
20			17	64	59	
▽						Seepage water encountered at 23.8 feet on 2/1/2012 at 4:55 p.m.
25			20	61	59	
						End boring at 25.5 feet.
30						* Elevations based on Tophographic Survey Map provided by Kodani & Associates. Plate A4.1

HIRATA & ASSOCIATES, INC.

Geotechnical Engineering

BORING LOG

W.O. 12-5271

BORING NO. B2 DRIVING WT. 140 lb. START DATE 2/1/2012
 SURFACE ELEV. 446± DROP 30 in. END DATE 2/7/2012

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0						COMPLETELY WEATHERED BASALT (WC) - Reddish brown and brown, moist, firm. Covered by 2.5 inches of AC over 8 inches of base material.
			5	63	47	
			6	68	46	
5						
			7	67	52	
10						
			12	64	59	Medium stiff from 13 feet.
15						
			20	71	50	
20						
			24	66	60	
						Seepage water encountered at 25.2 feet on 2/7/2012 at 11:00 a.m.
			14	63	65	
30						

Plate A4.2

HIRATA & ASSOCIATES, INC.

Geotechnical Engineering

BORING LOG

W.O. 12-5271

BORING NO. B2 (continued) DRIVING WT. 140 lb. START DATE 2/1/2012
 SURFACE ELEV. 446± DROP 30 in. END DATE 2/7/2012

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
30			5	55	77	Firm at 33 feet.
35			14	57	74	
40						End boring at 39.5 feet.
45						
50						
55						
60						

Plate A4.3

HIRATA & ASSOCIATES, INC.

Geotechnical Engineering

BORING LOG

W.O. 12-5271

BORING NO. B3 DRIVING WT. 140 lb. START DATE 2/1/2012
 SURFACE ELEV. 456.3± DROP 30 in. END DATE 2/1/2012

DEPTH FOOT	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0						
			18	77	43	Clayey SILT (MH) – Reddish brown, moist, medium stiff. Covered by 3 inches of gravel.
			21	82	43	
5			11	83	40	COMPLETELY WEATHERED BASALT (WC) – Reddish brown and brown, moist, medium stiff.
			16	78	46	
10						
			11	80	41	
15						
			28	84	38	Stiff from 19 feet.
20						
			27	64	59	
25						
			49	68	52	End boring at 30.5 feet.
30						

Plate A4.4

HIRATA & ASSOCIATES, INC.

Geotechnical Engineering

BORING LOG

W.O. 12-5271

BORING NO. B4 DRIVING WT. 140 lb. START DATE 2/06/2012
 SURFACE ELEV. 450± DROP 30 in. END DATE 2/06/2012

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0						Clayey SILT (MH) - Brown, moist, medium stiff.
5		□	32	Sample Disturbed	34	Stiff at 4 feet.
10		□	12	68	59	Slightly wet at 8 feet.
20		□	27	75	44	COMPLETELY WEATHERED BASALT (WC) - Reddish and brown, moist, medium stiff.
25		□	13	65	60	Slightly wet from 23 feet.
30		□	20	68	59	Seepage water encountered at 29.8 feet on 2/06/2012 at 8:45 a.m.

Plate A4.5

HIRATA & ASSOCIATES, INC.

Geotechnical Engineering

BORING LOG

W.O. 12-5271

BORING NO. B4 (continued) DRIVING WT. 140 lb. START DATE 2/06/2012
 SURFACE ELEV. 250± DROP 30 in. END DATE 2/06/2012

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
30						
			5	60	72	Firm from 33 feet.
35						
			7	60	71	
40						
			7	54	70	
45						End boring at 44.5 feet.
50						
55						
60						

Plate A4.6

APPENDIX B

LABORATORY TESTING

DESCRIPTION OF LABORATORY TESTING

CLASSIFICATION

Field classification was verified in the laboratory in accordance with the Unified Soil Classification System. Laboratory classification was determined by visual examination. The final classifications are shown at the appropriate locations on the Boring Logs, Plates A4.1 through A4.6.

MOISTURE-DENSITY

Representative samples were tested for field moisture content and dry unit weight. The dry unit weight was determined in pounds per cubic foot while the moisture content was determined as a percentage of dry weight. Samples were obtained using a 3-inch O.D. split tube sampler. Test results are shown at the appropriate depths on the Boring Logs, Plates A4.1 through A4.6.

CONSOLIDATION

Selected representative samples were tested for their consolidation characteristics. Test samples were 2.42 inches in diameter and 1 inch high. Porous stones were placed in contact with the top and bottom of test samples to permit addition and release of pore fluid. Loads were then applied in several increments in a geometric progression, and the resulting deformations recorded at selected time intervals. Test results are plotted on the Consolidation Test Reports, Plates B2.1 through B2.3.

SHEAR TESTS

Shear tests were performed in the Direct Shear Machine which is of the strain control type. Each sample was sheared under varying confining loads in order to determine the Coulomb shear strength parameters, cohesion and angle of internal friction. Test results are presented on Plates B3.1 through B3.4.

SWELL TESTS

Swell tests were performed on representative soil samples by placing a 90 psf surcharge load on one-inch high specimens. The samples were inundated with water, and total expansion recorded after a period of at least 24 hours. Test results were recorded as a percentage of original height. Test results are summarized in the following table:

Sample	Sample Type	Recorded Expansion	Moisture Content Prior to Test
B1 @ 1'	Representative	0.1%	36%
B2 @ 2'	Representative	0.1%	47%

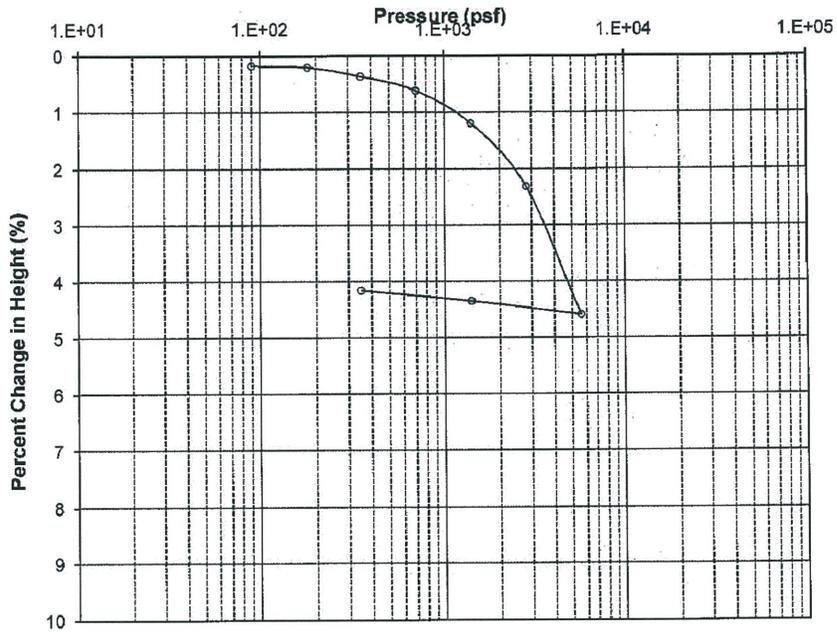
PROCTOR TESTS

A Modified Proctor test was performed in general accordance with ASTM D 1557 on a bulk soil sample obtained from near boring B2 at a depth of about 2 feet below existing grade. The test is used to determine the optimum moisture content at which the soil compacts to 100 percent density. Results are shown on Plate B4.1.

CALIFORNIA BEARING RATIO TEST

A CBR test was performed in general accordance with ASTM D 1883 on a bulk soil sample obtained from near boring B2 at a depth of about 2 feet below existing grade. The test is used to evaluate the relative quality of subgrade soils to be used in the design of flexible pavements. Results are shown on Plate B5.1.

Consolidation Test Results



Sample Description

Boring No.: B1 Depth (ft): 5
Soil Description: Reddish brown clayey silt

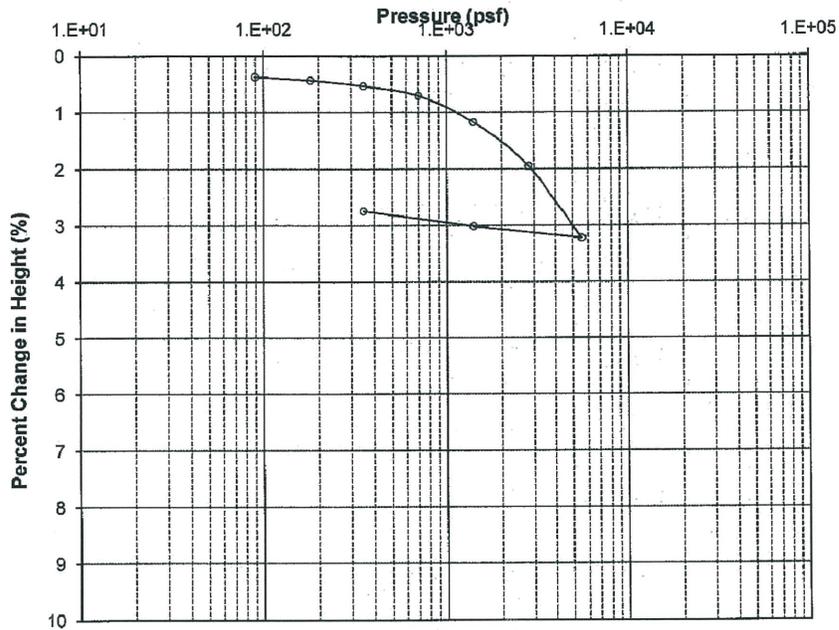
	Moisture Content (%)	Dry Density (pcf)
Initial	43.3	68.6
Final	41.2	71.6

Remark: 2/9/12

W.O. 12-5271	1.0 MG Water Tank - Kilauea, Kauai
Hirata & Associates, Inc.	CONSOLIDATION TEST

Plate B2.1

Consolidation Test Results



Sample Description

Boring No.: B4 Depth (ft): 18
 Soil Description: Reddish brown clayey silt

	Moisture Content (%)	Dry Density (pcf)
Initial	44.4	75.0
Final	44.2	77.1

Remark: 2/10/12

W.O. 12-5271

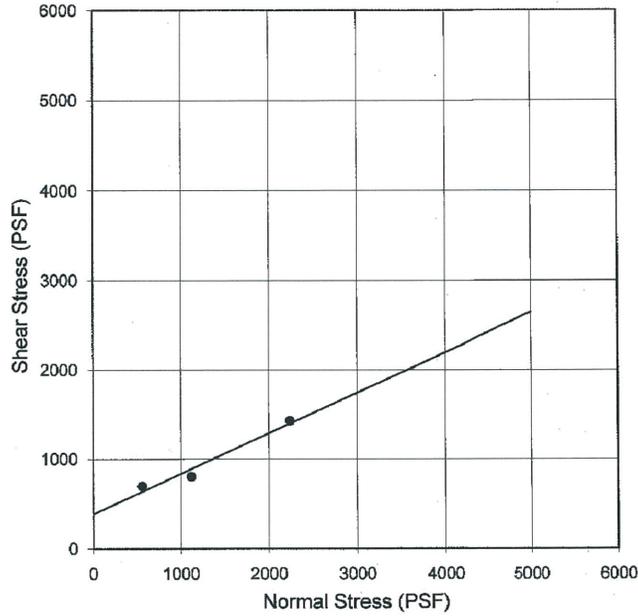
1.0 MG Water Tank - Kilauea, Kauai

Hirata & Associates, Inc.

CONSOLIDATION TEST

Plate B2.3

Direct Shear Test Results



Sample Description

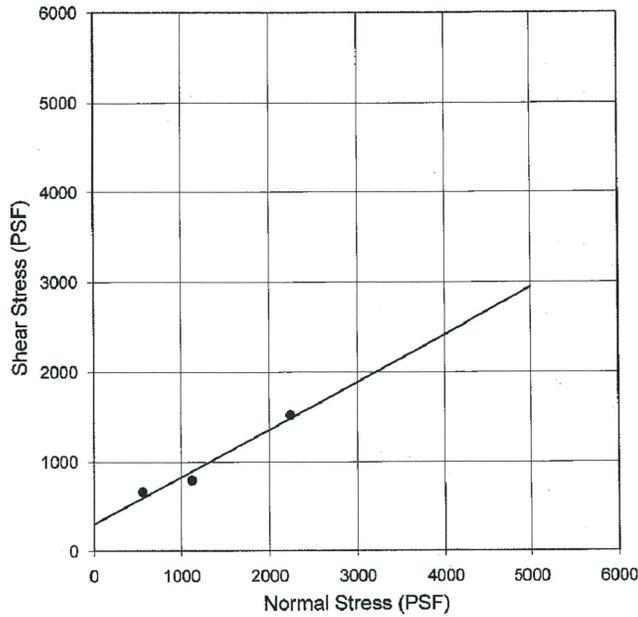
Boring No.: B1 Depth (ft): 5
 Soil Description: Reddish brown clayey silt
 Strength Intercept (C): 385.0 PSF
 Friction Angle (ϕ): 24.4 DEG

Remark: 2/11/2012

W.O. 12-5271	1.0 MG Water Tank - Kilauea, Kauai
Hirata & Associates, Inc.	DIRECT SHEAR TEST

Plate B3.1

Direct Shear Test Results



Sample Description

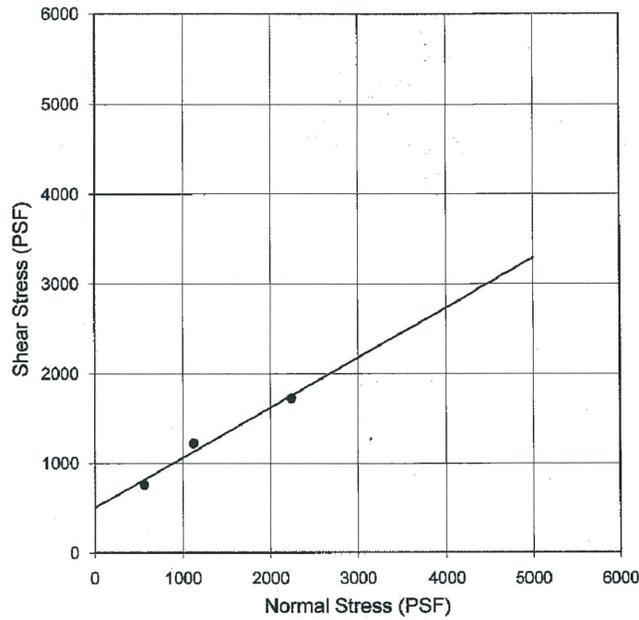
Boring No.: B2 Depth (ft): 4
 Soil Description: Reddish brown clayey silt
 Strength Intercept (C): 305.1 PSF
 Friction Angle (ϕ): 27.8 DEG

Remark: 2/27/2012

W.O. 12-5271	1.0 MG Water Tank - Kilauea, Kauai
Hirata & Associates, Inc.	DIRECT SHEAR TEST

Plate B3.2

Direct Shear Test Results



Sample Description

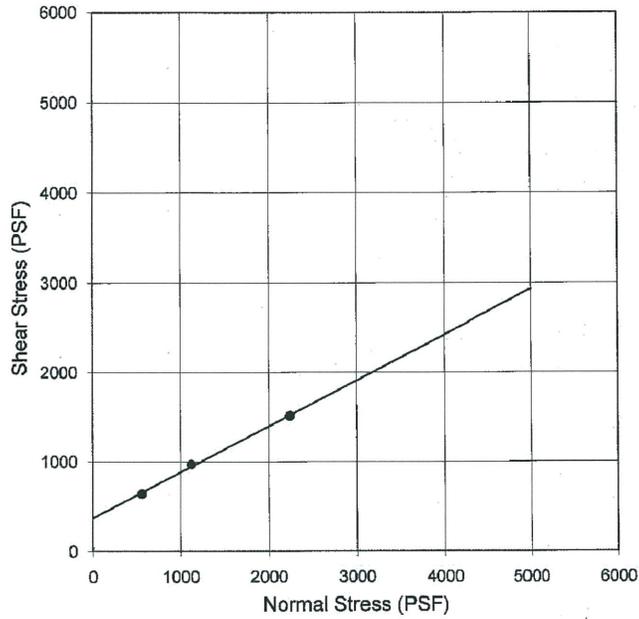
Boring No.: B3 Depth (ft): 14
 Soil Description: Reddish brown clayey silt
 Strength Intercept (C): 506.9 PSF
 Friction Angle (ϕ): 29.1 DEG

Remark: 2/27/2012

W.O. 12-5271	1.0 MG Water Tank - Kilauea, Kauai
Hirata & Associates, Inc.	DIRECT SHEAR TEST

Plate B3.3

Direct Shear Test Results



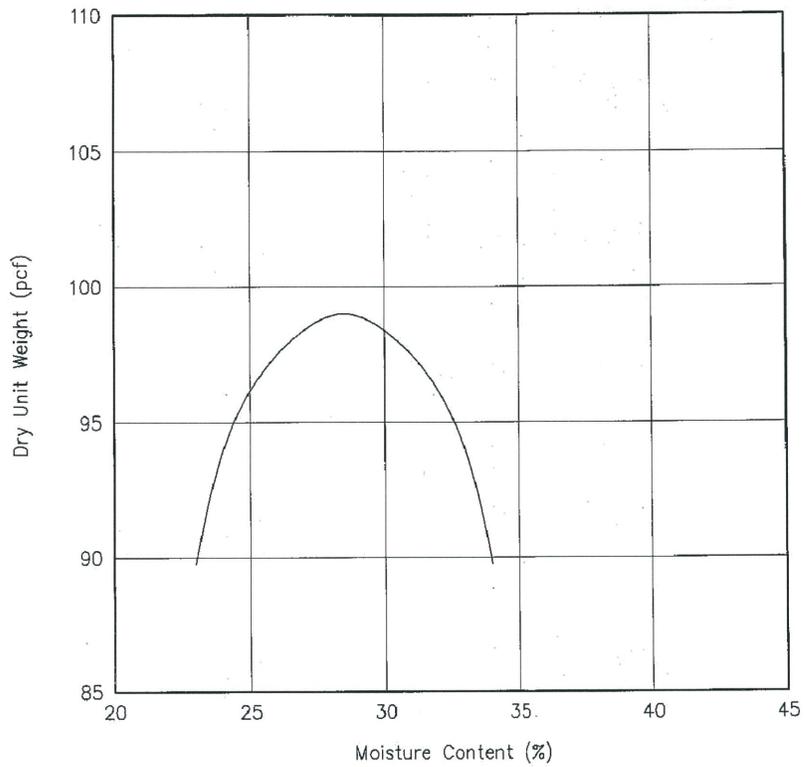
Sample Description

Boring No.: B4 Depth (ft): 4
 Soil Description: Reddish brown clayey silt
 Strength Intercept (C): 373.6 PSF
 Friction Angle (ϕ): 27.1 DEG

Remark: 2/27/2012

W.O. 12-5271	1.0 MG Water Tank - Kilauea, Kauai
Hirata & Associates, Inc.	DIRECT SHEAR TEST

Plate B3.4



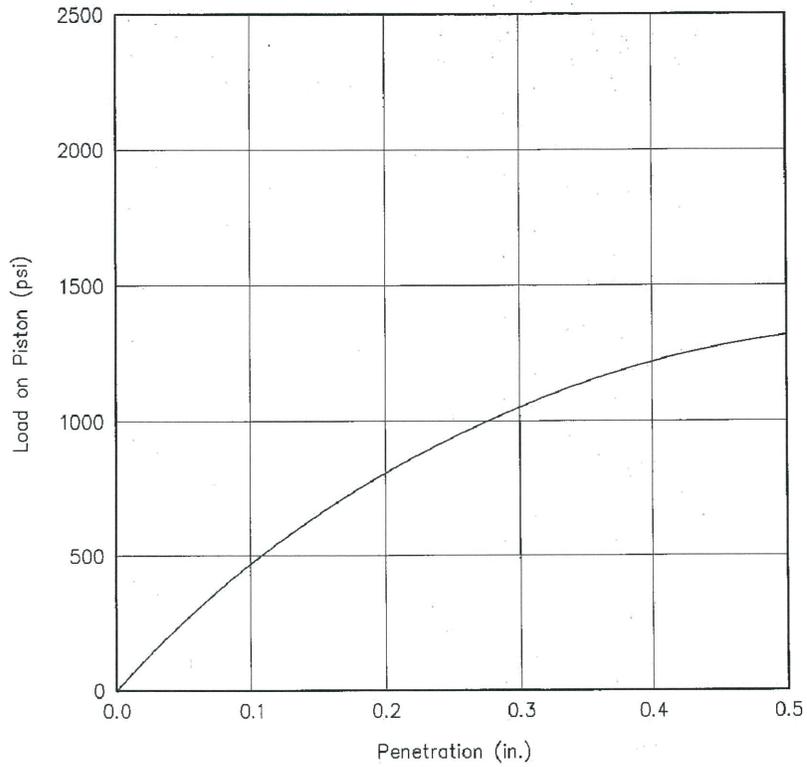
Soil Data

Location: Near boring B2 at 2 feet
 Description: Reddish brown clayey silt

Test Results

Maximum Dry Density: 99 pcf
 Optimum Moisture Content: 28.5%

W.O. 12-5271	1.0 MG Water Tank - Kilauea, Kauai
Hirata & Associates, Inc.	<p style="text-align: center;">MODIFIED PROCTOR CURVE</p> <p style="text-align: right;">Plate B4.1</p>



Soil Data

Location: Near boring B2 at 2 feet
 Description: Reddish brown clayey silt
 Sample Dry Density: 97.5 pcf
 Sample Moisture Content: 31%

Test Results

CBR Value: 46%
 Expansion: 0.2%

W.O. 12-5271

1.0 MG Water Tank - Kilauea, Kauai

Hirata & Associates, Inc.

CBR STRESS PENETRATION CURVE

Plate B5.1