DRAFT
ENVIRONMENTAL ASSESSMENT

DHHL Wailua Well No. 1 Project Kuhio Highway
Wailua, Kaua‘i, Hawai‘i
TMK No. (4) 3-9-02, portion of Parcel 12

DEPARTMENT OF HAWAIIAN HOME LANDS

May 2017

This Document is prepared pursuant to Chapter 343, Hawai‘i Revised Statutes

The Applicant:

The State of Hawai‘i Department of Hawaiian Home Lands

Accepting Authority:

The State of Hawai‘i Department of Hawaiian Home Lands

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Summary

This Environmental Assessment (EA) is prepared pursuant to Chapter 343, Hawai'i Revised Statutes (HRS) and associated Title 11, Chapter 200, Hawai'i Administrative Rules (HAR). The intent of the document is to ensure that systematic consideration is given to the environmental consequences of the proposed action. This assessment is triggered by the use of State of Hawai'i funds and State of Hawai'i lands. A Finding of No Significant Impact (FONSI) is anticipated for this project.

1.1 Project Information

Project Name:	State of Hawai'i Department of Hawaiian Home Lands (DHHL) Wailua Well No. 1 Wailua, Kaua'i, Hawai'i
Applicant:	Department of Hawaiian Home Lands 91-542 Kapolei Parkway Kapolei, HI 96707 (808) 587-6449
Agent:	Akinaka & Associates 1100 Alakea Street, Suite 1800 Honolulu, HI 96813 (808) 836-1900 x684
Approving Agency:	Department of Hawaiian Home Lands 91-542 Kapolei Parkway Kapolei, HI 96707 (808) 587-6449
Project Location:	Island of Kaua'i, Puna District
Tax Map Key Nos.:	4th Division, Zone 3, Section 9, Plat 002: Portion of Parcel 012
Total Affected Area:	Approximately 4,000 square feet (Well No. 1 site); Approximately 50,000 square feet (existing access road) Total: 54,000 sf (1.24 acres)
Existing Land Use:	Currently vacant, undeveloped land. Some areas were formerly used for agriculture.
State Land Use District:	Agricultural, Conservation
DHHL Designation:	Residential, Special District, Community Use, Subsistence Agriculture
County Zoning Designation:	Agriculture

Acronyms and Abbreviations

BMPs	best management practices
CCD	Census County Division
CDP	Census Demographic Profile
CFR	Code of Federal Regulations
CIA	Cultural Impact Assessment
County-DWM	County of Kaua‘i Department of Public Works Division of Wastewater Management
CZM	Coastal Zone Management
dB	decibel
DHHL	State of Hawai‘i Department of Hawaiian Home Lands
DLNR	State of Hawai‘i Department of Land and Natural Resources
DLNR-CWRM	State of Hawai‘i Department of Land and Natural Resources – Commission on Water Resource Management
DLNR-ED	State of Hawai‘i Department of Land and Natural Resources – Engineering Division
DLNR-SHPD	State of Hawai‘i Department of Land and Natural Resources – State Historic Preservation Division
DOH	State of Hawai‘i Department of Health
DOT	State of Hawai‘i Department of Transportation
DOW	County of Kaua‘i, Department of Water
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	United States Environmental Protection Agency
ESA	Environmental Site Assessment
FEMA	Federal Emergency Management Agency
FONSI	Finding of No Significant Impact
HEPA	Hawai‘i Environmental Policy Act
HAR	Hawai‘i Administrative Rules
HRS	Hawai‘i Revised Statutes
KI	Kimura International
KIUC	Kaua‘i Island Utility Cooperative
LhB	Lihue silty clay, 0 to 8 percent slopes
LhC	Lihue silty clay, 8 to 15 percent slopes
LhD	Lihue silty clay, 15 to 25 percent slopes
mgd	million gallons per day
mg/L CL^-	milligrams per liter of Chloride
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resource Conservation Service
OEQC	Office of Environmental Quality Control
OHA	Office of Hawaiian Affairs
QA/QC	quality assurance/quality control
SCS	Scientific Consultant Services, Inc.
SHPO	State Historic Preservation Officer
SMA	Special Management Area
STP	sewage treatment plant
TMK	Tax Map Key
UBC	Uniform Building Code
U.S.	United States
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service V/C volume to capacity
WWTP	wastewater treatment plant
°F	degrees Fahrenheit

1.0 PROJECT LOCATION, DESCRIPTION, AND ALTERNATIVES

1.1 Project Location And Description

The State of Hawai‘i Department of Hawaiian Home Lands (DHHL) is proposing to drill, pump test, and encase Well No. 1 on its property in Wailua, on the Island of Kaua‘i.

The property is located in the Wailua ahupua‘a in the Puna District on the east side of the Island of Kaua‘i, approximately 6 miles north of Līhu‘e (see Figure 1). The project site is situated on a broad coastal plain at the base of the Kalepa Forest Reserve, directly south of the Wailua River. The project site is in the *mauka* portion of DHHL's property on Kūhiō Highway. The project site is situated in Tax Map Key (TMK) number: (4) 3-9-02: 012 (portion) (Figure 2).

The project site consists of vacant, undeveloped land owned by DHHL surrounded by sparse cover of native and non-native vegetation. During the past 100 years, the majority of the project site was used for sugarcane cultivation. The project parcel is bordered by Kalepa Ridge to the west, Wailua River channels to the north, the Kaua‘i Community Correctional facility, Wailua Golf Course and undeveloped lands to the south, and Kuhio Highway and DHHL's *makai* parcel to the east. The surrounding area is sparsely populated and characterized by small resort complexes, public recreational parks and facilities, and lands utilized for grazing.

The purpose of the project is to develop a potable water well to help DHHL provide potable water to its lands in Wailua for homesteading and other related uses. Initial exploratoty Well No. 1 drilling was conducted June 22, 2009 to July 2, 2009 at the 84.69 foot elevation near Kalepa Ridge. The drilled well measures 9 to 10 inches in diameter and is about 138 feet in depth.

The need for an HRS Chapter 343 EA is triggered because of the use of State lands and funds.

1.2 Alternatives Considered

<u>No Action</u>

In this scenario the project site would be left vacant and undeveloped. Environmental conditions would remain unchanged and environmental impacts on the physical environment would not result. Development of a potable water system that would facilitate DHHL's plans for its proposed development would be forestalled. The No-Action scenario would not enable DHHL to achieve its goals and objectives for providing residential opportunities in the Wailua community for its beneficiaries.

The No Action alternative, therefore, is considered less favorable than the proposed action.

<u>Alternative Sites for a Well</u>

Waimea Water Services, Inc. hydrogeologists and Akinaka and Associates project engineers, preliminarily evaluated potential first bore hole site locations in the northern sector of the parcel

Figure 1 Location Map

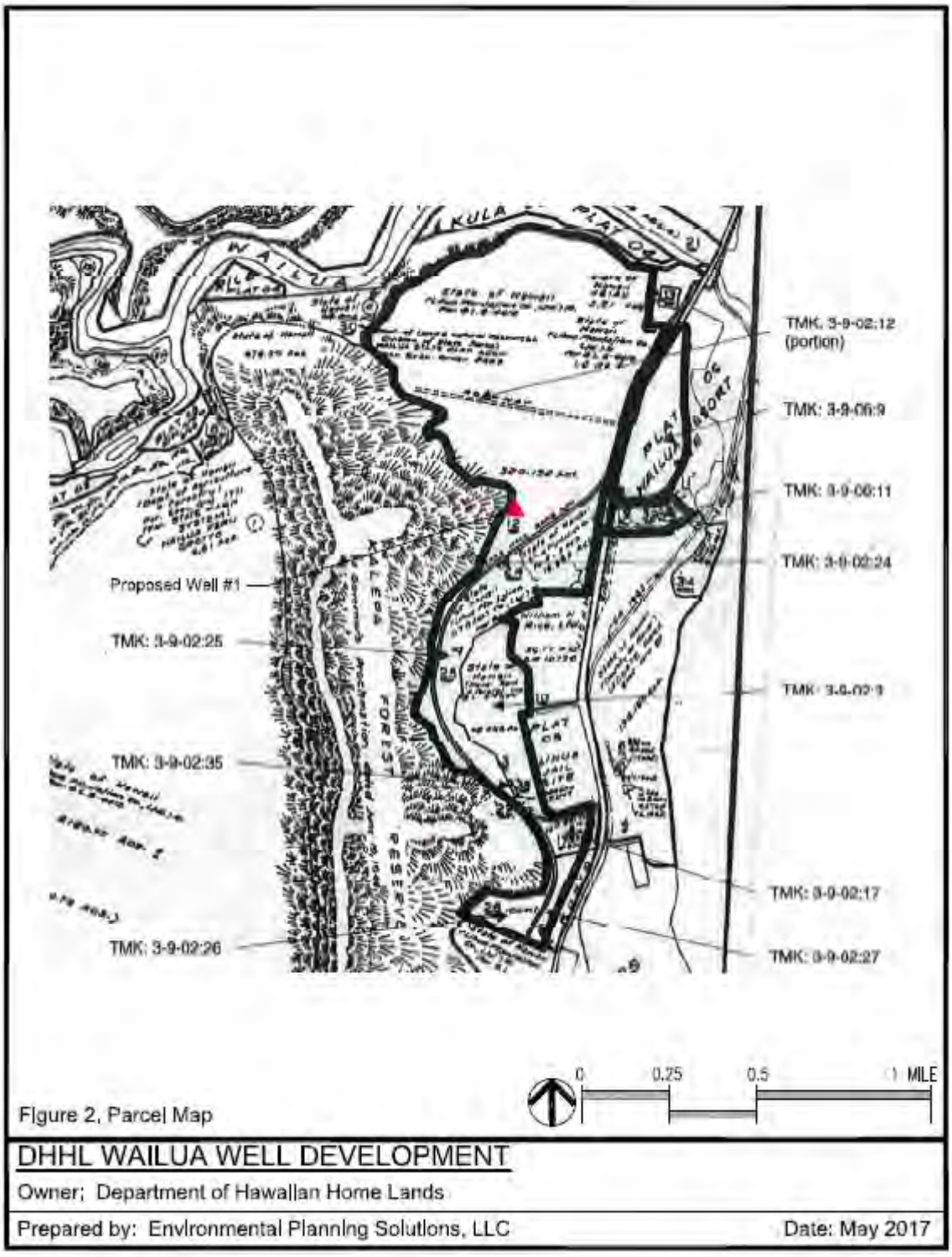
Figure 1. Location Map
Portion of the U.S. Geological Survey (USGS) Honolulu Quad map (1998) showing the location of the project area

DHHL WAILUA WELL DEVELOPMENT

Owner: Department of Hawaiian Home Lands

Prepared by: Environmental Planning Solutions, LLC Date: May 2017

Figure 2 Parcel Map



for testing. Following an on-site visit, the team focused on narrowing the bore hole site selection further south at the base of Kalepa Ridge utilizing the following site screening criteria:

A. Geological Characteristics and Topography:

1) Evidence of porous basalt of the "Waimea Series" soils. The advantage of drilling a well into the basalt of the Waimea Series would be related to the potential gpm that could be produced by the well. The permeability (rate at which water flows through rock) of the Waimea Series is known to be high and therefore expected to provide adequate yield. For example, during the drilling of the original pilot hole, clay was encountered at a depth between 117 ft-125 ft. The original plan was to have the bottom of the well at this depth and the field team attempted a pump test. Due to the low permeability of clay, the targeted gpm was not achieved. It was then decided to drill deeper into a more permeable layer of rock to increase the flow of water into the bore hole.

2) The location of the well higher on the property serves two purposes. First, a well location further away from the coast reduced the chance of "salt water intrusion" which would maintain existing sustainable water quality. This location at a higher elevation would also benefit the DHHL system by gravity flowing water into the system.

B. Accessibility:

1) Ease of delivering and hauling away the drill rig to and from the site by use of the existing internal road,

2) Minimal to no site grading necessary,

3) Turnaround ease and staging for testing equipment for efficient ingress and egress.

1.3 Selected Project Alternative And Project Description

The bore hole site is located at approximately 200 feet above mean sea level in the southern sector of the parcel near the eastern flank of Kalepa Ridge. The site is approximately 2,600 feet (0.25 mile) west (*mauka*) of Kūhiō Highway and 4,000 feet (0.75 mile) mauka of the coast. See Figure 1. The vacant project site is flat, measures 100 ft x 40 ft and is accessible via an existing cane haul road that connects with Kūhiō Highway. The drill rig and water testing equipment would occupy the 4,000 sf site with sufficient turnaround area for the vehicles to enter and exit the site. Photos below are of the east facing slope of Kalepa Ridge and surface conditions of the site.

View from bottom of Kalepa Ridge looking northwest.
Source: Waimea Water Services, Inc. 2009

Outcrop of Basaltic Rock near Well #1
Source: Waimea Water Service, Inc. 2009

Construction

Wa'alani Enterprises, LLC. was contracted by Waimea Water Services, Inc. to prepare the pad for exploratory drilling. Ground was broken June 22, 2009 and drilling of the 9 inch pilot hole began the following day by Derrick's Well Drilling and Pump Services, LLC. After water was encountered, drilling was stopped and a test pump was set at a depth of 114 feet. The first test resulted in a severe drawdown and pumping was stabilized at 85 gpm with a chloride salinity of 280 mgL (milligrams/liter). A decision was made to deepen the well an extra 20 ft to attain improved water quality as well as increasing gpm potential. The well was drilled to a final depth

of 137.7 ft. A static water level was recorded at a depth of 75.5 ft below the top of the conductor pipe. The elevation of the well was determined by Akinaka & Associates, Ltd. to be 84.69 ft. The water level stands at 9.19 ft above mean sea level in the bore hole. Final features of the test well and site are:

- Site size: 100' x 40' (4,000 sf)
- Existing access road: 2,500 ft long x 20 ft wide (50,000 sf)
- Well depth: 138'
- Well diameter: 9" to 10"

The following geologic log was recorded by Waimea Water Services, Inc.:

Depth in Feet	Geologic Description By: Stephen P. Bowles
0'-30'	Red Clay with boulders (talus)
30'-80'	Grey, thin bedded highly porous basalt (Waimea Series)
80'-105'	Some evidence of water @ ~95'
105'-110'	Hard grey basalt - slow drilling
110'-117'	Grey, thin bedded highly porous and permeable basalt (abundant water)
117'-125'	Yellow, orange, (firm but sticky clay when crumpled) clay- appears to be subaerial weathered ash
125'-137.7'	Grey, thin bedded highly porous basalt (Waimea Series)

Source: Waimea Water Services, Inc.

Testing

The first pump test of the exploratory Well No. 1 was performed on July 1, 2009. This test was intended to be a 24 hour test with the pump set at 150 gallons per minute. Unfortunately, this test was only able to run for 250 minutes because of a severe drawdown of the water level to the point where the pump was cavitating. Samples of the aquifer were taken and sent to the mainland for testing. Chloride testing was performed on site and determined to be 280 mg/L. Since 150 gpm could not be maintained, it was decided to deepen the pilot hole another 20 ft.

With the pump set at a depth of 129 ft, the second pump test was performed on July 2, 2009. This test ran for 400 minutes at 150 gpm and stabilization of water level was observed. Additional water samples were taken during the test and showed a drop in chlorides to 180 mg/L. After the water level had stabilized, the pump was turned off and water level was tracked and recorded until full recovery of the aquifer was observed. Tables 1 and 2 provide drawdown verses recovery test data below. Photos of Well No. 1 site follow.

Table 1
Drawdown Data

Suggested Time	Actual Time	DTW	Drawdown	Pumping Rate	EC	Chlorides	Temp.	Comments
0	10:48	75.55	0	150				**Start Pump**
1	10:50	82.4	6.85	150	907		80.2	
1.5				150				
2				150				
2.5	10:52	85.5	9.95	150				
3				150	898	180	77	
4	10:53	87.5	11.95	150				
5	10:54	88.1	12.55	150	898		77	
6	10:56	88.8	13.25	150				
7	10:57	89.2	13.65	150				
8	10:58	89.6	14.05	150	892		77.1	
9	10:59	90	14.45	150				
10	11:00	90.33	14.78	150				
11	11:01	90.6	15.05	150	892		77.1	
20	11:11	92.3	16.75	150	882		77.5	
30	11:21	93.2	17.65	150	876	180	77.3	
40	11:31	93.5	17.95	150	874		77.3	
50	11:41	93.71	18.16	150	875		76.8	
60	11:51	93.92	18.37	150	874		77.3	
70	12:01	94.05	18.5	150	878		77.3	
80	12:11	94.15	18.6	150	879		77	
90	12:21	94.2	18.65	150	879		77	
100	12:31	94.3	18.75	150	881		77.1	
150	1:21	94.4	18.85	150	873	180	77.7	
200	2:11	94.4	18.85	150	876		76.8	
250	3:01	94.4	18.85	150	873		76.8	
300	3:51	94.4	18.85	150	867		77	
400	4:30	94.4	18.85	150	867		76.8	**Stop Pump**

Source: Waimea Water Services, Inc. 2009

Table 2
Recovery Data

Suggested Time	Actual Time	DTW	Recovery
0			
1	4:30	93.3	17.8
2	4:31	93	17.5
3	4:33	92.6	17.1
4	4:34	92.1	16.6
5	4:35	91.5	16
6	4:36	91	15.5
7	4:37	90.5	15
8	4:38	90	14.5
10	4:40	89.5	14
15	4:45	87	11.5
20	4:50	81	5.5
25	4:55	78.5	3
30	5:00	77.4	1.9
40	5:10	76.3	0.8
50	5:20	76	0.5
60	5:30	75.8	0.3
70	5:40	75.6	0.1
80	5:50	75.5	0
90	6:00	75.5	0

Source: Waimea Water Services, Inc. 2009

Well no. 1 ground level looking south.
Source: Waimea Water Services, Inc.2009

Drill rig on well #1 site. Looking north.
Source: Waimea Water Services, Inc. 2009

Close up of drill rig operation, testing.
Source: Waimea Water Services, Inc. 2009

Completion

The next phase for the DHHL well is to bore Well No. 1, and encase the well before capping it. Future well development activity should be evaluated in environmental assessment(s) for the proposed action(s) or activity(s).

1.4 Consistency With Government Plans And Policies

1.4.1 Hawaii State Plan

The Hawai‘i State Plan, Chapter 226, HRS was developed as a guideline for the future growth of the State of Hawai‘i. The State Plan identifies goals, objectives, policies, and priorities for the development and growth of the State. It provides a basis for prioritizing and allocating the limited resources such as public funds, services, human resources, land, energy, and water. The State Plan establishes a system for the formulation and program coordination of State and County plans, policies, programs, projects, and regulatory activities. The State Plan also facilitates the integration of all major State and county activities.

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

• Objective a): Planning for the State’s facility systems with regard to water shall be directed towards achievement of the objective of the provision of water to adequately accommodate domestic, agricultural, commercial, industrial, recreational and other needs within resource capacities.

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

(1) Coordinate development of land use activities with existing and potential water supply.

(2) Support research and development of alternative methods to meet future water requirements well in advance of anticipated needs.

(3) Reclaim and encourage the productive use of runoff water and wastewater discharges.

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

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

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

The proposed project supports all relevant objectives and policies of the Hawai‘i State Plan related to water facilities.

1.4.2 Hawaii Water Plan

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

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

In particular, the following objectives are noteworthy:

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

The proposed project supports and is consistent with each objective of the plan.

1.4.3 Department Of Hawaiian Home Lands

DHHL Kaua‘i Island Plan. The Kaua‘i Island Plan (DHHL, 2005) provides recommendations for the future use of the Department of Hawaiian Home Lands (DHHL) 20,565 acres on Kaua‘i. The plan is intended to guide overall land use patterns and development on Kaua‘i for the next 20 years. The proposed project is consistent with the goals and objectives of this plan.

DHHL Wailua Regional Plan. The Wailua Regional Plan (DHHL, 2007) recommends the subject property for a combination of residential and revenue-generating uses. Specifically, the plan recommends timeshare units on the *makai* parcel and single-family residential on the *mauka* parcel, with the developer bearing the costs of infrastructure installation and improvement for the residential subdivision development. Wailua was deemed the most desirable place for residential homesteading in a survey of beneficiaries conducted in 2004 as part of the Kaua‘i Island Plan. The proposed Well No. 1 project is consistent with this plan.

The DHHL Kaua‘i Island Plan designates the following land uses within the boundaries of the project site: residential, special district, commercial, community use, and subsistence agriculture (DHHL, 2005b). The proposed project is consistent with these planned use designations.

DHHL Water Policy Plan. The plan goals are to provide access to quality water in the most cost-effective and efficient manner, and to ensure the availability of sufficient water to carry out Hawaiian Home Lands' mission.

The proposed project supports and is consistent with the goals and objectives of the plans.

1.4.4 County of Kaua‘i Plans and Policies

Kaua'i County General Plan. The General Plan for the County of Kaua‘i is a policy document that expresses the broad goals and policies for the long-range development of the island of Kaua‘i. The plan was adopted in 2000. The General Plan is organized into multiple elements, with policies, objectives, standards, and principles for each. There are also discussions of the specific applicability of each element to the nine judicial districts comprising the County of Kaua‘i. Section 3 of the Plan that relates to the proposed action is presented verbatim as follows:

> *(3.6) NATIVE HAWAIIAN RIGHTS*
> *Under the State Constitution and the County Charter, the County of Kaua'i is empowered to promote the health, safety and welfare of all inhabitants without discrimination as to ethnic origin. As part of carrying out its responsibilities under the Constitution and the Charter, the County recognizes the rights of native Hawaiians and the laws concerning lands and waters that have been established through the State Constitution, State and Federal laws, and State and Federal court decisions. No County ordinance or rule shall modify or diminish these rights.*

County Zoning. Zoning is a method by which the County of Kaua‘i regulates land use in accordance with the adopted land use policies mentioned above. The project site is located within DHHL's *mauka* lands that are situated entirely within the County's Agriculture zoning district. No rezoning actions will be necessary.

Special Management Area. The CZM Program promulgates the creation of SMAs. SMAs are specially designated areas governed by specific county guidelines. Any development within a SMA requires a SMA permit from the appropriate county. An accepted EA fulfills a portion of the information necessary to apply for a SMA permit. The project site is not located within the SMA that extends primarily along all shoreline areas, therefore, a SMA permit will not be required.

1.4.5 Kaua‘i County Water Development Plan

The purpose of the *Kaua'i County Water Development Plan 2020* was to 1) develop a long-range plan to guide 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 *Water Plan 2020* is to ensure a reliable future water supply.

In a letter dated August 16, 2007, the DOW reiterated that the proposed development is outside the full growth service area of the DOW, that the source and storage facilities for the Līhuʻe water system are operating at capacity, and that DHHL will be required to prepare and receive DOW approval of a Water Master Plan for full development of the lots (August 16, 2007 letter, DOW).

The DHHL continues to coordinate its development plans with the DOW to remain consistent with the goals and objectives of Water Plan 2020.

1.5 Project Costs

The estimated construction cost to complete Well No. 1 is $220,000. This total includes construction and testing tasks as discussed in section 1.3 above.

2.0 ENVIRONMENTAL ASSESSMENT PROCESS

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

This Environmental Assessment (EA) process was conducted in accordance with HEPA. According to HEPA and its implementing regulations, a Draft EA is prepared to document environmental conditions and impacts, to develop mitigation measures that avoid, minimize or compensate for adverse environmental impacts, and to determine whether or not an action has significant impacts upon the environment. Impacts are evaluated for significance according to thirteen specific criteria as presented in HAR 11-200-12. After review of public and agency comments received during a 30-day comment period, if the approving agency determines that no significant impacts would occur, it may issue a Final EA with a Finding of No Significant Impact (FONSI). When the approving agency determines that significant impacts could occur, then an Environmental Impact Statement (EIS) Preparation Notice is prepared, and the Final EA facilitates preparation of the EIS.

3.0 ENVIRONMENTAL SETTING AND IMPACTS

3.1 PHYSICAL ENVIRONMENT

3.1.1 SURFACE GEOLOGY, SOILS AND HAZARDS

The Island of Kauaʻi consists of a single shield volcano, which is deeply eroded and partly veneered with volcanics that occurred after shield-building. The primary veneer on the old shield is composed of the Koloa Series volcanics. Lava flows of the Koloa Series cover about half the surface of the eastern part of Kauaʻi, including the project area; they form the entire floor of the Līhuʻe basin except for two small kipuka (exposed mounds or depressions left uncovered by a lava flow) of Waimea Canyon Series volcanics (Macdonald et al., 1983).

As discussed in Section 1.2 the geology of the proposed Wailua Well is characterized as porous basalt of the "Waimea Series" soils. The advantage of drilling a well into the basalt of the Waimea Series would be related to the potential gpm that could be produced by the well. The permeability (rate at which water flows through rock) of the Waimea Series is known to be high and therefore is expected to provide adequate yield.

The project site is located on a coastal plain extending up to one mile inland from the shore that was formed from recent alluvial and beach deposits. Major soils in the project area include those in the Lihue, Kaena, Hanamaulu, Koloa, and Mokuleia Series. The surface soil within the project site consists of the following soil type: Līhuʻe silty clay, 8 to 15 percent slopes (LhC). Figure 3 illustrates the soil types also found in the vicinity of the project site area, based on soil maps from the Natural Resource Conservation Service (NRCS). See Figure 3 Soils.

Geologic Hazard

Strong earthquakes endanger people and property by shaking structures and by causing ground cracks, ground settling, and landslides. The size of an earthquake is commonly expressed by its magnitude on the Richter scale, which is a measure of the relative size of the earthquake wave recorded on seismographs. No strong earthquakes (magnitude 5 or greater) have been felt on Kauaʻi. The Uniform Building Code (UBC) seismic provisions classify seismic hazards related to building construction. The UBC seismic provisions contain seismic zones, ranging from 0 (no chance of severe ground shaking) to 4 (10% chance of severe shaking in a 50-year interval). The island of Kauaʻi is designated UBC Seismic Zone 1.

Potential Impacts and Mitigation

Geologic conditions at the project site impose no overriding constraints on the project and ~~no~~ mitigation measures are required.

The project will not result in potential erosion impact to soils due to the limited land area required and time required to conduct drilling and testing. It will take approximately 10 days to enter, conduct work activities and upon project completion, return the site to pre-construction and pre-testing conditions.

Figure 3 Soils Map

3.1.2 GROUNDWATER HYDROLOGY

Aquifer Characteristics

The project site overlies the Wailua aquifer system (Figure 4). According to Mink and Lau (1992), the northern portion of the project site is underlain by two aquifers. The upper aquifer, code 20103111 (21111), is listed as an unconfined (the aquifer is not confined under pressure beneath relatively impermeable rocks or soil), basal (fresh water in contact with seawater), dike-type (contained in horizontally extensive lavas) aquifer. This aquifer has potential use and is used as a drinking water source. This irreplaceable aquifer contains fresh water (less than 250 milligrams per liter of chlorine ions (mg/L Cl-) and highly vulnerable to contamination.

The lower aquifer, code 20102111 (21212), is listed as unconfined (the aquifer is not confined under pressure beneath relatively impermeable rocks or soil), basal (fresh water in contact with seawater), flank-type (contained in horizontally extensive lavas) aquifer. This aquifer has potential use as a drinking water source. This irreplaceable aquifer contains low salinity (250 to 1000 mg/L Cl-) and moderately vulnerable to contamination (Mink and Lau, 1992).

The Underground Injection Control (UIC) line in Wailua is located at about the mid-point between the project site and the coastline approximately 0.5 mile away (Figure 5). The well site and its recharge area are thus *mauka* of the UIC line, where underlying aquifers are considered drinking water sources and injection wells may be prohibited and if permitted are subject to stringent requirements to ensure they do not contaminate aquifers.

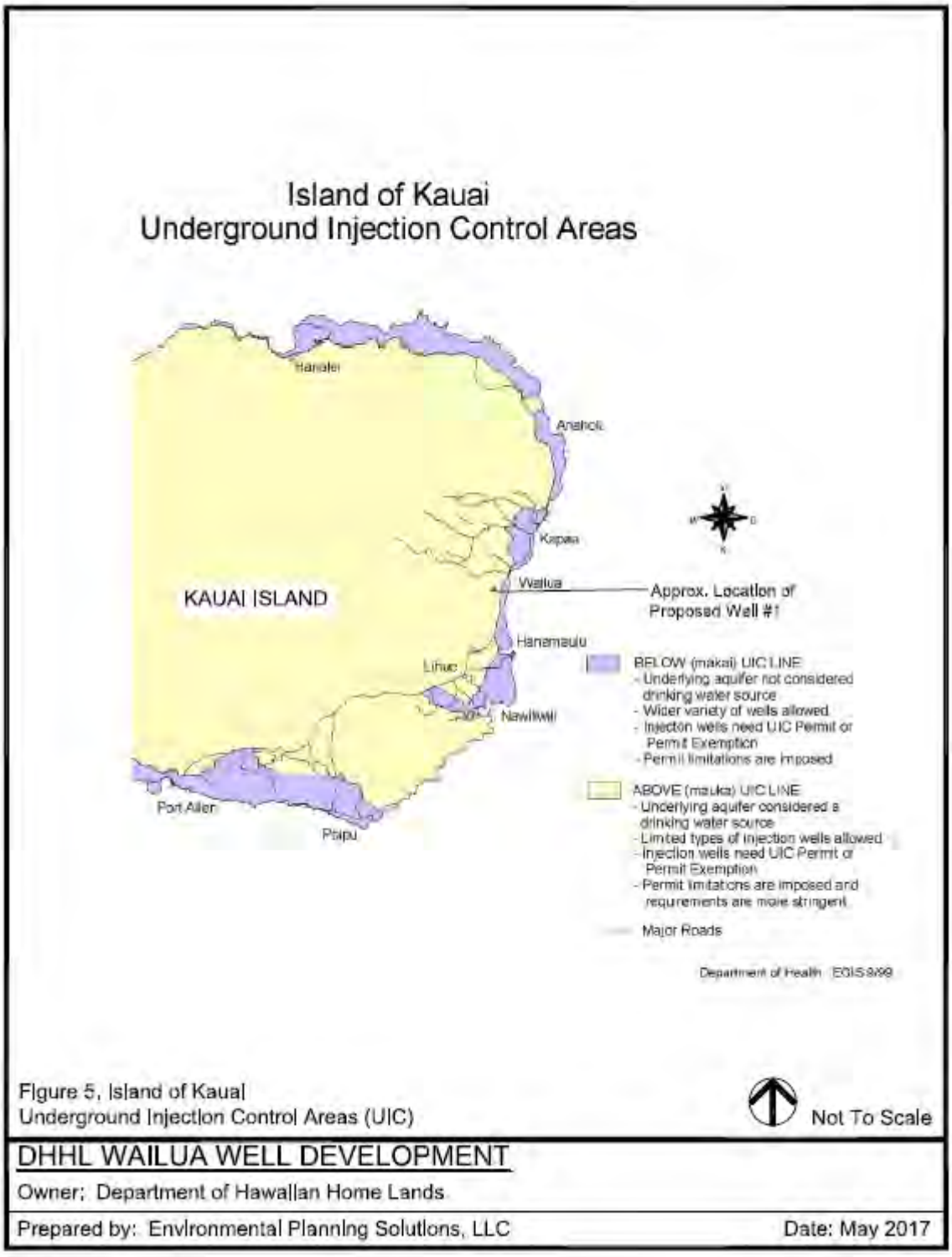
Groundwater Hydrologic Units and County Service Zone

The entire aquifer system is contained within the Wailua drainage basin divides. Median annual rainfall over the aquifer averages 146 inches, reflecting extremely high rainfall in the interior where the boundary reaches to Mount Waiʻaleʻale. Average annual rainfall at the project site is around 60 inches (Juvik, 1998).

The State Commission on Water Resource Management (CWRM) classification of aquifers locates the project site as being in the Wailua Aquifer System (20103) of the Lihue Aquifer Sector. The State Water Projects Plan (SWPP) Volume 3 (Island of Kauaʻi 2003) reported DHHL's cumulative average day demand for water in 2005 was 0.276 million gallons per day (mgd) and projected a year 2020 demand as 0.921 mgd. The Wailua Aquifer System No. 20103 would have a sustainable yield of 60 mgd in 2020, well above DHHL's projected demand for all of the island of Kauaʻi.

Figure 4 Aquifer Sectors and System

Figure 5 Island of Kauai Underground Injection Control Areas



Waimea Water Services, Inc. (2009) concluded that DHHL's Well No. 1 and a recommended second well would achieve a targeted 200 gpm maximum pumping rate. If Wailua Well No. 1 yields part of the targeted 200 gpm (0.29 MGD), it would help to satisfy the future needs of the DHHL affordable housing development.

The County of Kaua'i Department of Water (DOW) classifies the project site as within its Wailua-Kapaa service area. The County's Water Plan 2020 defines the Wailua-Kapaa service area as having hotel and business uses clustered along the coastal highway. Schools, hospitals, and urban residential neighborhoods are located along the highway, as well as along two major roads that extend inland towards the mountains at the north and south ends of the Wailua-Kapaa basin – Kuamo'o Road and Kawaihau Road. The central part of the basin is comprised of old agricultural homesteads that are gradually transitioning to residential use (County of Kaua'i, 2001). The Wailua-Kapaa build-out population in 2000 was 17,595, and is projected at 21,263 in year 2020. Along with this projected growth, water use for Wailua-Kapaa in 1999 was 3.22 mgd and is expected to increase to 3.65 mgd in year 2020.

Water source and storage needs identified through the level of service source and storage evaluations indicate current capacity for Wailua-Kapaa at 700 gallons per minute (gpm), with no supply (0 gpm) projected for the year 2020. As discussed in Section 1.4.5 DOW in 2007 stated in a letter to DHHL that its (DHHL's) proposed residential subdivision development is outside the full growth service area of the DOW, that the source and storage facilities for the Lihue water system are operating at capacity, and that DHHL will be required to prepare and receive DOW approval of a Water Master Plan for full development of the lots (August 16, 2007 letter, DOW). Thus, the proposed Wailua Well No. 1 project represents the first implementing action of its Water Policy Plan to develop a safe potable water system for its Wailua property. DHHL continues to coordinate its development plans with DOW to remain consistent with the goals and objectives of Water Plan 2020.

Water quality sampling of the proposed Well No. 1 yielded a chloride level of 180 mg/L, which compared to the salinity level which characterizes the lower aquifer, code 20102111 (21212) as having low salinity (less than 250 to 1,000 mg/L Cl-), water from proposed Well No. 1 will provide a higher quality supply due to its lower salinity level.

Potential Impacts and Mitigation

The Wailua Well No. 1 project, with its potential of yielding up to 0.29 MGD, will not adversely affect the Wailua Aquifer.

The proposed project will comply with all State requirements set forth under the terms of Chapter 20, Section 11-20-29.

With respect to water quality, the proposed Well No. 1 project will not adversely affect the water quality of the existing water system. Any activities related to further development of DHHL's Wailua Well No. 1 project will comply with State and County drinking water policies and regulations.

3.1.3 FLOODPLAINS AND WATER QUALITY

Surface Water

Surface runoff from the project site occurs by overland sheet flow to the east-southeast with the majority of the project site having gentle slopes. The ground cover generally consists of grasses, shrubs, and small trees.

The *mauka* parcel within which the project site is located, currently receives excess water that is discharged from an irrigation reservoir located above Kalepa Ridge via an old water tunnel on the western property boundary. This is reportedly due to a broken valve at the bottom of the reservoir. The volume of water currently being discharged from the water tunnel is estimated at 800 gallons per minute or over one million gallons per day. The excess water drains into the irrigation ditch system that was established during sugarcane cultivation; however, due to erosion and lack of maintenance, much of the ditch system is damaged and does not adequately contain the excess water being discharged from the water tunnel.

If the irrigation ditch system was properly maintained and managed the excess water being discharged from the water tunnel would be transported through a network of ditches and eventually drain into either holding reservoirs or the irrigation ditches along the Cane Haul Road, which flow into a stream within the undeveloped agricultural lands parcel. This stream flows southwest and then southeast into a drainage ditch on the *mauka* side of Kuhio Highway, which eventually crosses Kūhiō Highway and extends east toward the ocean.

The coastal waters off Wailua, Kaua`i are classified Class A open coastal waters. The objective of Class A waters is that their use for recreational purposes and aesthetic enjoyment be protected. Any other use shall be permitted as long as it is compatible with the protection and propagation of fish, shellfish, and wildlife, and with recreation in and on these waters (DOH Water Quality Classification Maps, DOH Water Quality Classification).

Potential Impacts and Mitigation

The proposed Wailua Well No. 1project will not adversely impact surface water characteristics due to its limited scope of work within a 4,000 sf area within a three-week construction and testing period at an existing flattened area near Kalepa Ridge.

It is not expected that the well construction project will have any adverse impact on water quality. The project site is located about 4,000 feet *mauka* of the coastline, and 200 ft above mean level at the foot of Kalepa Ridge which isolates it from possibly impacting Class A waters along the coast. In any case, as advised by the Hawai`i Department of Health Clean Water Branch (DOH CWB) (letter dated October 26, 2016) the driller will be required to minimize impacts to State waters by meeting the State's antidegradation policy (HAR Section 11-54-1.1), designated uses (HAR, section 11-54-3), and water quality criteria (HAR Sections 11-54-4 through 11-54-8).

Flood Hazard

The project site does not lie within either the 100-year or the 500-year flood zone, as defined by

the Federal Emergency Management Agency (FEMA). The DLNR-ED noted that the project site falls within Flood Zone X, and thus is not regulated by the National Flood Insurance Program (August 15, 2008 letter, DLNR-ED). See Figure 6.

Potential Impacts and Mitigation

The flood rating at the project site imposes no overriding constraints on the project and no mitigation measures will be required.

3.1.4 Hazardous and Toxic Materials Considerations

The *mauka* parcel of land was used for growing sugarcane between the early 1900's and 2002. On-site indications of this use included metal irrigation aqueducts left on the *mauka* parcel and an irrigation pump system with filtering/fertilizer tanks located near the northwestern corner of the property. The tanks were presumed to be a means for mixing fertilizer or pesticides into irrigation water to be distributed over the fields. Interviews conducted during the Phase I Environmental Site Assessment (ESA) (DHHL 2007) confirmed that herbicide and pesticide applications were conducted regularly and included three applications to each crop. Applied pesticide/herbicide chemicals included atrozin, pentamethyline, amatrine, and carmax.

A small section of the *mauka* portion of the project site adjacent to Kūhiō Highway was formerly used as a temporary debris dump following Hurricane Iniki in 1992. Underlying soil (to a depth of approximately three inches below grade surface) in the area of the onsite waste disposal site was reportedly removed after the termination of these activities. Under contract with the County, an environmental firm provided quality assurance/quality control (QA/QC) monitoring of all cleanup tasks performed by a construction contractor. The site was then cleared of all debris on the surface and from trenches. Area soils where debris was removed and excavated were tested to ensure that no residuals remained. Clean soil backfill was placed, grading occurred to restore original grades. The project was completed in 1995 (email communication, Troy Tanigawa, 2007).

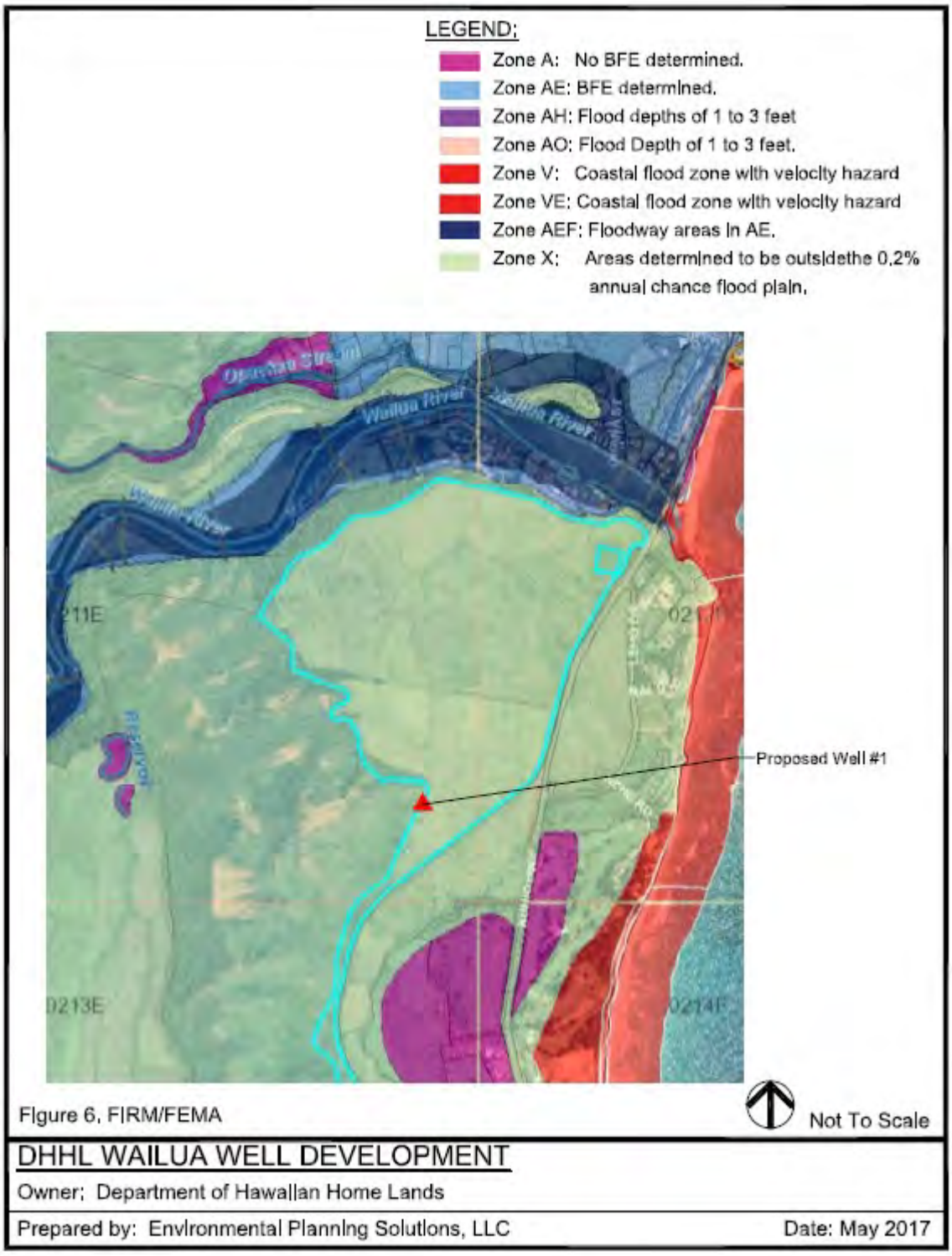
The project site reportedly receives excess runoff from an irrigation reservoir located above Kalepa Ridge via an old water tunnel. It is unknown whether this runoff contains hazardous chemicals/wastes or agricultural chemicals.

Review of a 1910 topographic map noted a railroad spur in the central portions of the *mauka* property side of the project site. Railroad spurs are typically considered environmental concerns because of the propensity for material dumping and spillage at these railroad dead ends.

Potential Impacts and Mitigation

Herbicide and pesticide application (reported to include atrozin, pentamethyline, amatrine, and carmax) was conducted regularly on the project site and included three applications to each crop. Although there were no visual indications of potential impacts at the project site or surrounding properties, it is possible that the application of pesticides applied to the sugarcane fields, over time, may have accumulated in the underlying soil both at the project site and surrounding properties.

Figure 6 FIRM/FEMA



The following have been identified as potential impacts:

- the project site's durational use for agricultural land and its planned development as

residential lots;

- the former presence of a railroad through the *mauka* portion of the property; and
- The potential for excess runoff from an upgradient irrigation tunnel to contain hazardous chemicals/wastes or agricultural chemicals.

No mitigation measures are necessary at this time due to the limited scope of work at the well site.

3.1.5 Climate And Air Quality

The regional and local climate together with the amount and type of human activity generally dictate the air quality of a given location. The climate of the project area is affected by its near coastal location. Prevailing winds are northeasterly trade winds, which are prevalent during the summer months rather than the winter. Temperatures in the project area are generally very consistent and moderate with average daily temperatures ranging from about 60 degrees Fahrenheit (°F) to 80°F. The closest air quality station is in Līhu‘e (DOH, 2005). The project area meets the standards of the Clean Air Act, and thus in considered to be within an attainment area (ibid).

Potential Impacts and Mitigation

The potential short-term air quality impact of the project will occur from the emission of fugitive dust during construction. Uncontrolled fugitive dust emissions from construction activities are estimated to roughly amount to about 1.2 tons per acre per month under conditions of “medium” activity (EPA, 1995). The need to control fugitive dust during construction was highlighted by DOH (October 26, 2016 letter, DOH Kaua’i District).

Monitoring dust at the project boundary during the period of construction could be considered as a means to evaluate the effectiveness of the project dust control program and to adjust the program if necessary.

Solid waste related air pollution would be reduced somewhat by the promotion of conservation and recycling programs within the proposed Wailua Well No. 1 work area (DOH letter October 26, 2016). This would reduce solid waste volumes, which would in turn reduce any related air pollution emissions proportionately.

3.1.6 Noise

Noise in the vicinity of the project site is not anticipated to be a finding of concern for the Wailua area. Current noise-generating activities in the area are limited to motor vehicle traffic along Kūhiō Highway and the Aloha Beach Resort, comprising a resort and condominiums. In the vicinity of the coastline, ambient noise levels will be affected by the sounds of ocean waves, although this noise tends to mask other less-favorable noises such as traffic. Proposed drilling and water testing at the project site will not generate significant increases in the noise levels of the area. No noise study was required.

Potential Impacts and Mitigation

The temporary increase in project induced noise is not expected to result in adverse impacts to surrounding areas because of the short period (three weeks) involving on-site drilling and testing activities.

3.2 BIOLOGICAL ENVIRONMENT

Flora

The primary objectives of the botanical field study conducted in 2007 were to:

- provide a general description of the vegetation on the 452-acre project site;
- inventory the flora;
- search for threatened and endangered species as well as species of concern; and
- identify areas for potential environmental problems or concerns and propose appropriate mitigation measures.

The project site is situated on a parcel that is dominated by non-native plant species, composed mostly of a koa haole (*Leucaena leucocephala*) and Guinea grass (*Panicum maximum*) scrub within the fallow agricultural fields (LeGrande, 2007). Large alien tree species dominate the natural drainages and edges of the fallow fields. A total of 88 plant species were observed within the survey area, 83 are alien, three are Polynesian introductions, and two are indigenous. Therefore, 98% of the plant species observed are alien (including the Polynesian introductions), and 2% are native.

Potential Impacts and Mitigation

None of the plants which occur on the project site is a threatened or endangered species or a species of concern (U.S. Fish and Wildlife Service (USFWS), 1999a, 1999b, 2004; Wagner et al., 1999) thus no special protection measures are warranted or proposed. A wetland exists within the area designated for undeveloped agricultural use, southeast of the *mauka* residential lands parcel. A potential wetland area was observed within the *mauka* parcel, although this has not been confirmed with a jurisdictional wetland delineation. See Figure 7. This area is currently proposed to remain undeveloped agricultural lands. If, in the future, this area is proposed for development, it is recommended that a jurisdictional wetland delineation be performed at the project site to assess whether any wetlands exist.

The survey area was utilized in the past for agriculture, thus the disturbance level is high within the property and dominated by alien vegetation. The three Polynesian introduced plant species found during the survey are ki or ti (*Cordyline fruticose*), niu or coconut palm (*Cocos nucifera*), and noni (*Morinda citrifolia*). Two native species observed within the survey area --- milo (*Thespesia populnea*) and uhaloa (*Waltheria indica*) --- are indigenous (native to Hawai‘i and elsewhere).

Figure 7 Wetlands Map

Other than the potential presence of an on-site wetland, no issues or concerns were observed that would require mitigation during the drilling and water testing of the project site.

Fauna

There are no critical habitat areas located on or in the near vicinity of the project site. An ornithological and mammalian survey of the proposed development was completed by Phillip Bruner (2007). The primary purpose of the survey was to determine if there were any federally listed endangered, threatened, proposed, or candidate avian or mammalian species on, or in the immediate vicinity of the project site, and to note any natural resources important to native and migratory species.

A field survey conducted in 2007 yielded findings that are consistent with the results of other surveys conducted within the lowland areas of Kapa‘a in the recent past. Evening searches for the endemic and endangered Hawaiian Hoary Bat or Ope‘ape‘a (*Lasiurus cinereus semotus*) were made using a Pettersson Elektronik AB Ultrasounds Detector D 100. No species either currently listed, or proposed for listing under either the USFWS or the State of Hawai‘i's endangered species programs were detected during the course of this survey.

Mammals encountered during this survey included feral cats (*Felis catus*) and pigs (*Sus scrofa*). Although no Hawaiian Hoary Bats were recorded during the course of this survey, it is likely that bats do use resources within the general area. In addition, it is likely that roof rats and house mice are present within the project site. A previous feral mammal study conducted 1 mile north of the project area in Kapa‘a (Bruner, 1994 in Kimura International (KI), 2002) reported the presence of cats, rats, and mice. This study also noted that the endemic and endangered Hawaiian Hoary Bat had been observed in the Wailua Bridge area.

A total of eighteen alien bird species were recorded during the survey. No native land birds were recorded, but the potential presence of the Pueo or short-eared Owl in the vicinity of the project site was noted. One native waterbird was recorded: a subadult Black-crowned Night Heron or ‘Auku‘u (*Nycticorax nyctocorax hoactli*). ‘Auku‘u are the only native waterbirds that are not listed as endangered or threatened. Two seabird species were observed flying over the property: the Great Frigatebird or ‘Iwa (*Fregata minor palmerstoni*) and the White-tailed Tropicbird or Koa‘e kea (*Phaethon lepturus dorotheae*). No migratory shorebirds were recorded, but the survey dates fell within the timeframe where these birds breed in the Arctic. The Pacific Golden-Plover or Kolea (*Pluvialis fulva*) is the most common migratory shorebird in Hawai‘i, and would be expected to forage along the roads and other open areas of the property between August and the end of April.

The 1994 Bruner study recorded twenty-one species of introduced (exotic) birds, but no resident endemic land birds (KI, 2002). The 1994 study also noted that the threatened Newell Shearwater (*Puffinus newelli*) may occur within the vicinity of the Wailua River. These birds travel from their nesting sites in the mountains to the open sea, where they forage. During this trek, the birds likely use the Wailua River area as a flight path. The threatened Newell Shearwater can be impacted by the presence of street lights. When young birds leave their burrows and make their first trip out to sea in late fall they sometimes are attracted to urban lights and may strike power lines and fall on highways.

In an November 16, 2016 letter the USFWS noted that several species are known to occur or transit the proposed project area, including the endangered band-rumped storm petrel, Newell's Shearwater, the Hawaiian Petrel, Hawaiian Hoary Bat, Hawaiian Goose, Hawaiian Duck, Hawaiian Moorhen, Hawaiian Coot, and Hawaiian Stiltt (USFWS letter, November 16, 2016).

Potential Impacts and Mitigation

The project site is not known to contain any threatened, endangered, or candidate avian or mammalian species; therefore, no adverse impacts are anticipated. The potential to introduce invasive species exists during construction activities. In light of these considerations, project completion should include closely monitoring any imported materials for invasive species such as coqui frogs.

Although wildlife surveys conducted did not detect the Hawaiian Hoary Bat within the project area, this species could possibly exist in the vicinity of the project area. The Hawaiian Hoary Bat is a federally listed endangered species. As a consideration for minimizing impacts to these species, if a Hawaiian Hoary Bat is sighted perched within the project area, the contractor shall temporarily suspend work activities in the immediate proximity of the animal until the bat moves on its own accord.

It is likely that small numbers of the endangered endemic Hawaiian Petrel and threatened Newell's Shearwater overfly the project site between the months of May and October. In order to reduce the potential for interactions between nocturnally flying Hawaiian Petrels and Newell's Shearwaters with external lights and man-made structures, it is recommended that any external lighting planned in conjunction with this development be shielded. No work will be conducted at night during the construction phase of the project in order to prevent potential collision injury with nocturnal avian species.

Wetlands

The USFWS 1978 National Wetland Inventory Map indicates the presence of wetlands due east and south of the project site (Figure 7, Wetlands Map). This wetland falls within the general agricultural lands parcel. The flora survey conducted within the project area indicated the presence of on-site wetland plants, although the other two criteria necessary for an area to be designated a jurisdictional wetland (i.e., the presence of hydric soils and indications of hydrology) were not evaluated as part of the flora survey. Because the potential wetland area is not within the Wailua Well project site, a wetland delineation is not required. If future plans involve development of this area, a jurisdictional wetland delineation should be conducted to determine whether a wetland exists.

Surface water and groundwater from on-site move eastward toward the ocean. Drainage improvements are currently limited to the *makai* side of Kūhiō Highway and along Leho Drive (DHHL, 2007). Surface water in the southern portion of the project area most likely drains into the stream running south and west between the mauka residential lands parcel and the wetland. This stream flows southwest and then southeast into a drainage ditch on the *mauka* side of Kūhiō Highway, which eventually crosses Kūhiō Highway and extends east toward the

ocean. The stream would act as a barrier to surface water from on-site reaching the wetland. Therefore any on-site activities are not likely to discharge into the wetland.

Potential Impacts and Mitigation

The known wetland area located south of the mauka development area is intended to remain in undeveloped agricultural lands. The potential wetland area identified during the botany survey is also to remain part of the undeveloped agricultural lands, thus a wetland delineation is not required.

3.2.1 Social Factors And Community Identity

Land Use Considerations

Existing tax records indicate that the affected parcels have been owned by the State of Hawai‘i since their establishment, and specifically by DHHL since 1995 (EI, 2007). Real property records dating back to 1939 indicate that portions of the project site have been leased to the Lihue Plantation Company primarily for agricultural purposes (DHHL, 2007).

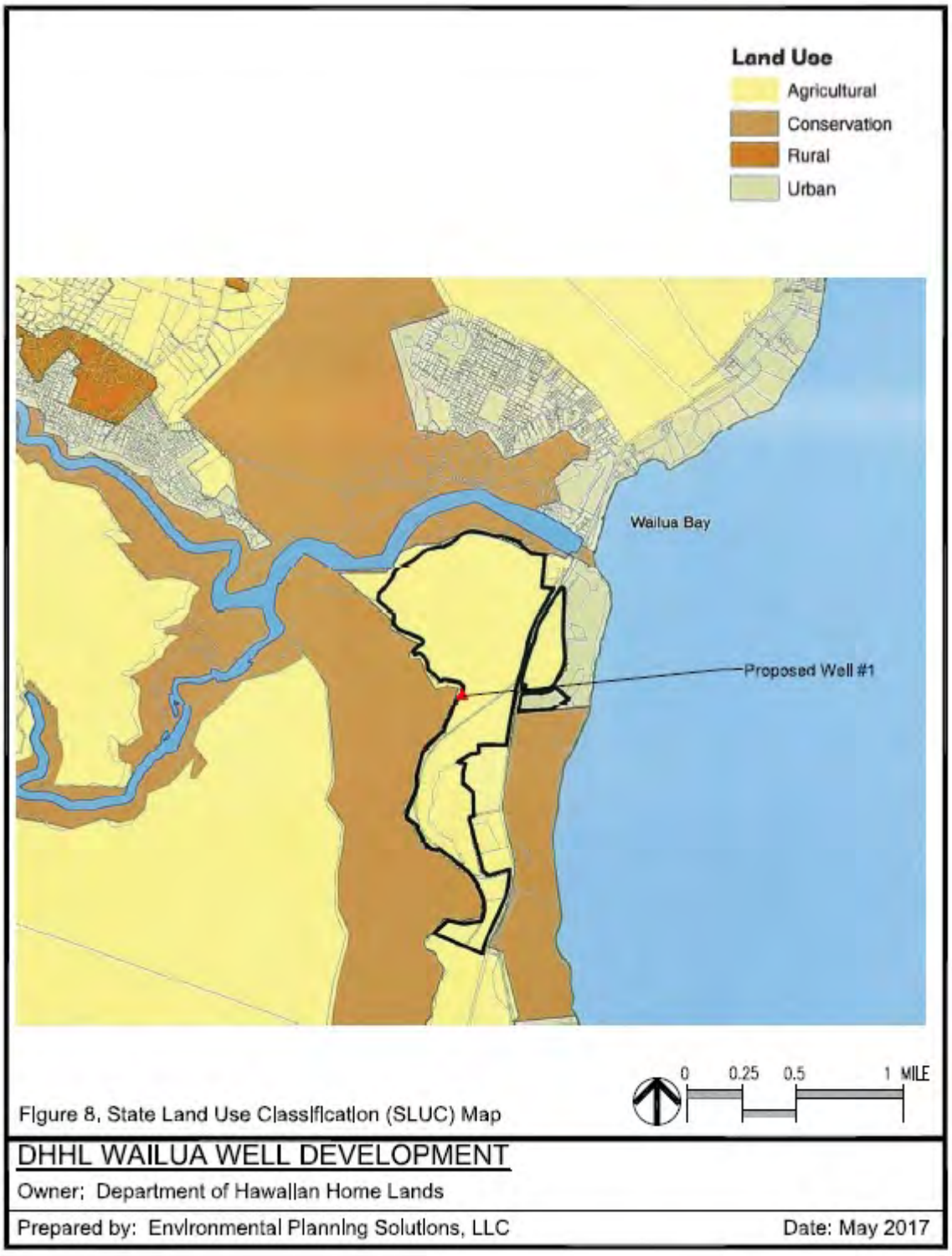
The earliest available aerial photograph from 1950 shows the project site as agriculturally cultivated land (DHHL, 2007). A roadway and railroad along with several cane haul roads and a network of aqueducts were visible on the project site. No significant development was shown in the surrounding area with the exception of the farm town known as Wailua, which is located approximately 2,500 feet to the north of the project site. Subsequent aerial photographs from 1959 and 1965 show the project site continued to remain in agricultural cultivation.

The surrounding property land uses include agricultural, recreational, and commercial/residential. Denser commercial and residential development begins in Kapa‘a, which is located roughly 0.75 mile north of the project site. The area surrounding the project site is sparsely populated and characterized by undeveloped and vacant land, small resort complexes, recreational parks and facilities, and lands utilized for grazing.

The project site falls within the State of Hawai‘i Land Use Commission (LUC) designation of Agricultural District (Figure 8). The LUC designations for surrounding areas include Conservation, Agricultural, and Urban. The proposed use of the project site for residential and revenue-generating uses is not consistent with this designation. The Hawaiian Homes Commission is the legal entity with authority regarding the use of Hawaiian home lands and has developed the proposed project plan that is consistent with its Wailua Regional Plan (DHHL, 2007) and Kaua‘i Island Plan (DHHL, 2004).

According to the County of Kaua‘i Planning Department, the project site is zoned as A-Agriculture District and O-Open District. The purpose of the Agriculture District is to: “1) protect the agriculture potential of lands within the County of Kauai‘i to ensure a resource base adequate to meet the needs and activities of the present and future; 2) assure a reasonable relationship between the availability of agriculture lands for various agriculture uses and the feasibility of those uses; and 3) limit and control the dispersal of residential and urban use within agriculture lands” (Kauai‘i County Code, Kauai‘i Board of Realtors website (http://Kauai‘i-realtor.com/czo.htm).

Figure 8 State Land use Classification (SLUC) Map



County zoning designations for the surrounding land uses consist of agricultural, conservation, open and urban. As discussed in section 1.4.4, the project site is not located within the SMA that extends primarily along all shoreline areas, therefore, a SMA permit will not be required. See Figure 9, Zoning and SMA.

Potential Impacts and Mitigation

DHHL Lands are exempt from land classification requirements for homestead development, thus no district boundary amendment will be necessary for the proposed project. DHHL has the full authority to designate land uses on DHHL lands. The planned development is in full accordance with the DHHL General Plan, the DHHL Kaua'i Island Plan, and the DHHL Wailua Regional Plan. No mitigation is required.

The County and DHHL share common goals in planning for the use of DHHL lands: both support the orderly development of those lands for the benefit of native Hawaiians and both are committed to the integration of planning by DHHL and Kaua'i County. The Hawaiian Homes Commission is responsible for determining land use on Hawaiian home lands, and has the full authority to do so. The County cannot use its land use and zoning powers to prevent the Hawaiian Homes Commission from controlling the use of Hawaiian home lands.

SOCIAL FACTORS AND COMMUNITY IDENTITY

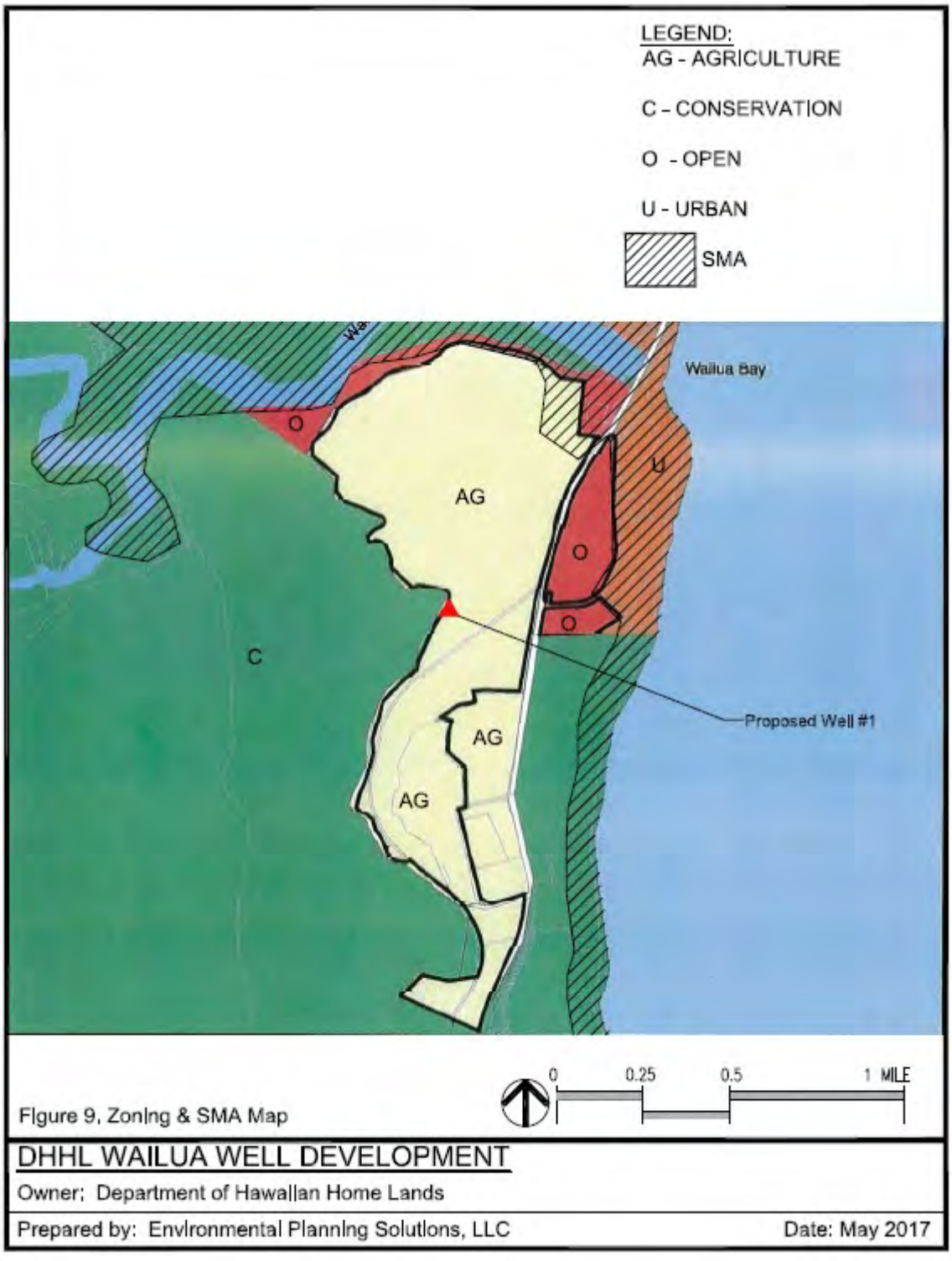
The project site is located within a region identified by the U.S. Census Bureau as the Puhi-Hanamaulu area. Not much census data are available for the Puhi-Hanamaulu region, as the subject property currently exists as undeveloped land. The nearest census division is the Wailua-Anahola Census County Division (CCD), immediately north of and adjacent to the subject property.

In comparison to the total Wailua-Anahola CCD as a whole, the native Hawaiian population subset has a lower median age (29.9 compared to 38.3), a slightly lower median household income ($40,815 compared to $44,482), a higher percentage of families (80.5% compared to 72.5%) and a larger average household size (3.57 compared to 2.85) (DHHL, 2007).

A second area used for comparison is the Wailua Homesteads Census Demographic Profile (CDP), also north of the project site. Home ownership rate in the Wailua Homesteads CDP area totaled 70.4% compared to 58.7% state-wide, and people per household in Wailua totaled 2.6% compared to 2.0% state-wide. The reported household income was higher in the Wailua Homesteads CDP area compared to the State as a whole ($77,132 vs. $67,116). (U.S. Census Fact Sheets, downloaded 2017).

A third area identified for further comparison is a narrowed 3.14 square mile geographic radius of the Wailua Well no. 1 site identified in the U.S. Environmental Protection Agency (EPA) EJScreen Report (Version 2016). The approximate population in the designated Wailua Well no. 1 radius is 487 persons. The average low income population of this area is higher than Hawaii's (36% vs. 26%). (EPA EJScreen Report 2016).

Figure 9 Zoning & SMA Map



The project site is located in a currently undeveloped, scenic area that defines the character and identity of this part of the community.

Potential Impacts and Mitigation

The Wailua Well Project will not in itself adversely impact the Wailua community because of the small scale (4,000 sf) of the exploratory well site. No adverse impacts are anticipated and no mitigation is required. DHHL's eventual planned development for the long term settlement of the area by native Hawaiians may be regarded as a benefit of the proposed project since the goal of the homesteading program is to improve the economic self-sufficiency of native Hawaiians through the provision of land.

Economic Considerations

Kaua'i's economy has transitioned from its former status as a plantation economy to one with a broader subset of industries, including agriculture, tourism, construction, retail, and professional businesses. The largest number of jobs for the island are found in retail/wholesale trade and services. The unemployment rate as of November 2016 was 3.1 (not seasonally adjusted), compared to an unemployment rate in the State of Hawai'i of 2.8 and a U.S. rate of 4.4 (Hawaii Department of Labor and Industrial Relations website, http://www.hiwi.org 2017).

The Wailua Well project will generate short-term economic vitality for the island by providing temporary construction opportunities for the duration of the project.

Potential Impacts and Mitigation

No adverse impacts are anticipated and no mitigation is required.

Recreational and Public Facilities

The public school system in Wailua is under the jurisdiction of the State Department of Education. The project area is serviced by King Kaumuali'i Elementary and Kapa'a Middle and High Schools. The 2005-2006 actual enrollment for these three schools was 532 (King Kaumuali'i Elementary), 719 (Kapa'a Middle), and 1,290 (Kapa'a High) (DHHL, 2007). No threshold for population growth has been set that would specify the need for additional schools (ibid), and it is envisioned that the State Department of Education would work with developers and other state agencies to determine if the need exists for additional schools.

Two hospital facilities in the vicinity of the project area are the Samuel Mahelona Memorial Hospital (1.5 miles north of the project site) and Wilcox Memorial Hospital (1 mile south of the project site) (DHHL, 2007).

The nearest police station to the proposed project site is the Līhu'e Police Station located roughly 3.4 miles south of the project area. The nearest fire station is the Kapa'a Fire Station, located approximately 2.6 miles north of the project site in Kapa'a. The present level of public facilities and services provides adequate services to handle the current demand.

Potential Impacts and Mitigation

Recreational and public facilities would not be affected by the project.

The proposed project is not expected to result in increased demand on the current capacities of facilities and services in the project area. No mitigation is required.

Visual and Aesthetic Resources

Views from along the project site boundaries are of the sparsely populated surrounding area, the golf course, Lydgate Park, Aloha Beach Resort, and the ocean to the east, the Wailua River and Wailua House Lots subdivision to the north, and undeveloped hills to the west. Kūhiō Highway from Lydgate Park to the coconut grove in Waipoli has been identified as a scenic roadway corridor (Kauaʻi General Plan, 2000; KI, 2007). Low-density residences, archaeological features, and lands utilized for agriculture contribute to the overall aesthetic quality of the project area.

Important views between the Malae Heiau and the Poliahu Heiau have been identified and discussed in Section 3.2.3.

Potential Impacts and Mitigation

The proposed Wailua Well project will not impact important visual and aesthetic resources of the project site and surrounding area such as *mauka- makai* view corridors, views of significant landmarks or natural resources, or ridge line views from outside or within the project boundaries. No mitigation is required.

3.2.2 Infrastructure Systems And Utilities

The project site is currently vacant and undeveloped; therefore, there are no existing infrastructure or utility systems within the area that are proposed for residential homesteads or timeshare units. The planned development will add the demand for potable water, wastewater conveyance, drainage, and solid waste collection, as well as the demand for utility services such as electricity, telephone, and cable television.

Current sources of potable water will not be able to support additional development in the area. The DOW has several improvement projects planned for the Wailua-Kapaʻa area. These proposed improvement projects include three wells within the Kapaʻa Homesteads area, a well and chlorination facility within the Wailua Homesteads, and a chlorination facility for the Nonou Well (DHHL, 2007). In a letter dated August 16, 2007, the DOW reiterated that the proposed development is outside the full growth service area of the DOW, that the source and storage facilities for the Lihue water system are operating at capacity, and that DHHL will be required to prepare and receive DOW approval of a Water Master Plan for full development of the lots (August 16, 2007 letter, DOW). According to the Wailua Regional Plan (DHHL, 2007), the additional residences and timeshare units will require their own water source, storage, and transmission/distribution system, or contribute its fair share to DOW projects to serve water commitments. In addition, DLNR-ED has requested that the DHHL provide them

with the water demands and calculations to be included in the State Water Projects Plan update (August 15, 2007 letter, DLNR-ED).

The Wailua WWTP has sewer capacity of 1.5 million gallons per day (mgd). The County's plans for a far-term upgrade will increase the daily capacity to 2.0 mgd (DHHL, 2007; County of Kauaʻi Department of Public Works Division of Wastewater Management (County-DWM), 2006).

The island of Kauaʻi currently has one landfill, located in Kekaha. Refuse collection is managed by the County of Kauaʻi, Department of Public Works, Solid Waste Division (KI, 2007). The County's proposed second landfill is to be situated mauka of Kalepa Ridge and more than 2,000 feet to the south west of DHHL's proposed Wailua well (Lyle Tabata, Acting County Engineer, November 2016). Mr. Tabata referred to prior communication to DHHL in April 2012 which identified the County's proposed landfill project, and requested information about DHHL's proposed well locations.

Mr. Tabata stated that while it appears DHHL considered the proposed location of the County's project relative to the location of the subject Wailua Well site, he stated that if proximity of the proposed landfill creates any perception of increased risk of DHHL's planned groundwater well being contaminated, factors to consider include:

a. Hydrogeology in the subsurface region between the two projects is largely unknown, it would be difficult to reasonably conclude that the Landfill would pose a significant risk of impacting the quality of water drawn from a future production well, particularly since the proposed water well is located more than 2,000 feet side gradient assuming a Mauka to Makai (west to east) groundwater flow direction.

b. The baseliner design would be prescriptive or better, providing protection against leachate contamination to the subsurface region beneath the landfill.

c. HAR 58.1 (Regulations for Site evaluation of LF's which mirror EPA requirements) does not provide minimum distance from a landfill to a water production well.

Electrical power to island residents is currently provided by Kauaʻi Island Utility Cooperative (KIUC). There are two substations in the vicinity of the subject property: the Lydgate Substation and the Kapa'a Substation. A major pole-line system runs overhead along the Kuhio Highway corridor in the vicinity of the project area. Power is distributed either under- or aboveground from the pole-line system to individual pole-mounted or pad-mounted transformers.

Land line telecommunication services in the vicinity of the project area are provided by Hawaiian Telcom (formerly Verizon Hawaiʻi).

Traffic signal cables are owned and operated by the DOT Highways Division, but are routed overhead on poles shared by Hawaiian Telcom and/or KIUC.

Wired cable television is provided by Oceanic Time Warner Cable. The distribution system for this service generally consists of overhead lines (coaxial and fiber optic) routed on utility poles running the length of Kuhio Highway.

Potential Impacts and Mitigation

The proposed Wailua Well project will not result in increased demand on existing infrastructure and utilities.

The proposed project is considered to be consistent with long-term planning objectives pertaining to infrastructure. No adverse impacts are anticipated and no mitigation is required.

Circulation and Traffic

The project area includes several major roadways that serve regional trips within Kauaʻi, as well as local roads that provide access to the commercial and residential areas adjacent to the project area.

Kapule Highway is a two-lane roadway that extends north-to-south between northeast Lihue and Kūhiō Highway. It provides one lane in each direction and allows traffic on this roadway to travel at 50 miles per hour (mph).

Kūhiō Highway (Highway 56) acts as a two-lane roadway south of Kapule Highway and a three-lane roadway north of Kapule Highway. It is one of the major roadways that connects Līhuʻe with the eastern and northern sections of the island.

The existing local roadway system in the vicinity of the project site comprises four local roads. Leho drive is a two-lane, looped arterial with one lane in each direction. It provides direct access to Kūhiō Highway at both its origin and terminus, and also provides local access to the Aloha Beach Hotel resort. Kuamoʻo Road is a two-lane collector road providing access to the Wailua Homesteads Area from Kūhiō Highway, and local access to Kamokila Village Haleilio road is a two-lane, east-to-west collector roadway extending from Kaulana Road to Kūhiō Highway. Wailua Marina Driveway is an east-west roadway that connects with Kūhiō Highway and provides access to the Wailua Marina and River.

Potential Impacts and Mitigation

The project will not result in any adverse impact to roadway circulation or traffic. The transport of the drill rig and testing equipment onto and off of the project site will be accomplished within a time period of 3 weeks, and no long term traffic congestion is expected to result.

3.2.3 Cultural And Historic Resources

A. Historical and Archaeological Considerations

The proposed project falls within the Wailua ahupuaʻa, in an area known for its historical and cultural significance to the island. The Wailua River, along both shores, was the pre-contact

royal center where royalty entertained visitors and conducted business (Scientific Consultant Services, Inc. (SCS), 2007a; KI, 2007).

In a preconsultation letter dated November 28, 2016, the State of Hawai‘i Historic Preservation Division requested the environmental assessment include:

- a narrative description of the proposed project, including total area in acres, and nature of any land alteration, new construction, demolition or modifications of existing structures;
- TMK map showing the full extent of the project area within the affected parcel, a
- Description and photographs of current vegetation cover and condition of the project area, including structures, roads, walls or other features within the project area;
- Summary of land use history, such as previous intensive cultivation, grubbing or grading; and
- Copies or dates of previously approved permits, survey reports, and/or prior SHPD review letters that pertain to the property.

This section contains a summary of findings of archaeological and cultural resources of the project area. A copy of the SCS 2007 draft Archaeological Inventory Survey report completed for DHHL's proposed Residential Subdivision project, can be found in the Appendix of this environmental assessment.

Decision-making and religious activities were conducted in the seven heiau in the area, one of which (the Malae Heiau) is located immediately adjacent to the mauka parcel but not within the 4,000 sf Wailua Well project site. See Figure 11 Archaeological and Cultural Resources.

The archaeological designation of the Wailua Complex of Heiau National Historic Landmark (1988) consists of five discontinuous properties: Site -104, Malae Heiau; Site -105, Hikinaakala Heiau (and petroglyphs); Site -106, Holoholoku (Kalaeokamanu) Heiau and Pohaku Ho‘ohanau, Site -107, Poli‘ahu Heiau; and Site -335, the Wailua Bellstone(s). The arbitrary designation of these properties for the National Register/National Historic Landmark listing is five circles each centered in the middle of each of the sites but only slightly greater than the radius of the sites themselves. The Wailua petroglyph site can also be considered a contributing element of the Wailua Complex of Heiau. However, mo‘olelo mention the sacredness and connection of areas not included under this designation.

The project's Archaeological Inventory Survey, conducted by SCS, included a full pedestrian survey of the property, with backhoe excavated subsurface testing, mapping of test units with reference to existing surface features, site analysis, interpretation and reporting. The draft report identified three sites: Plantation era agricultural water diversion (ditches, culverts, and a haul road), a scatter of prehistoric stone artifacts covering approximately three acres northwest of Malae Heiau, and a possible traditional Hawaiian terrace located along the southern edge of the project area (SCS, 2007b). None of these sites appear to warrant preservation and all

appear to be significant under Criterion D (of The National Register of Historic Places (Title 36, part 60 of the Code of Federal Regulations (CFR)).

The cultural importance of the Malae Heiau and its line of sight with other heiau, especially Poli‘ahu, was noted in letters from multiple parties during the 2007 preconsultation phase, including the OED, DLNR State Historic Preservation Division (DLNR-SHPD), the DLNR Division of State Parks (DLNR-SP), and Hui Kako‘o ‘Aina Ho‘opulapula. The approximate visual corridor between the two Heiau is shown in Figure 10.

Potential Impacts and Mitigation

No adverse impact to known cultural sites in the project vicinity or in the existing cane haul road is anticipated in the construction and testing of the Wailua Well No. 1 project.

The proposed Wailua Well project does not represent a potential impact to the Malae Heiau. The line of sight between the Malae Heiau and its companion heiau, Poli‘ahu Heiau, would also be retained and unaffected.

In the event that cultural artifacts or human remains are inadvertently encountered during the construction and testing on the project site, all operations in the vicinity of the discovery will immediately cease. The discovery and its surrounding area will be secured and protected from further damage. The SHPD will be notified of the discovery, and immediate consultation with the Kaua‘i Island Burial Council will be sought before commencement of construction activities.

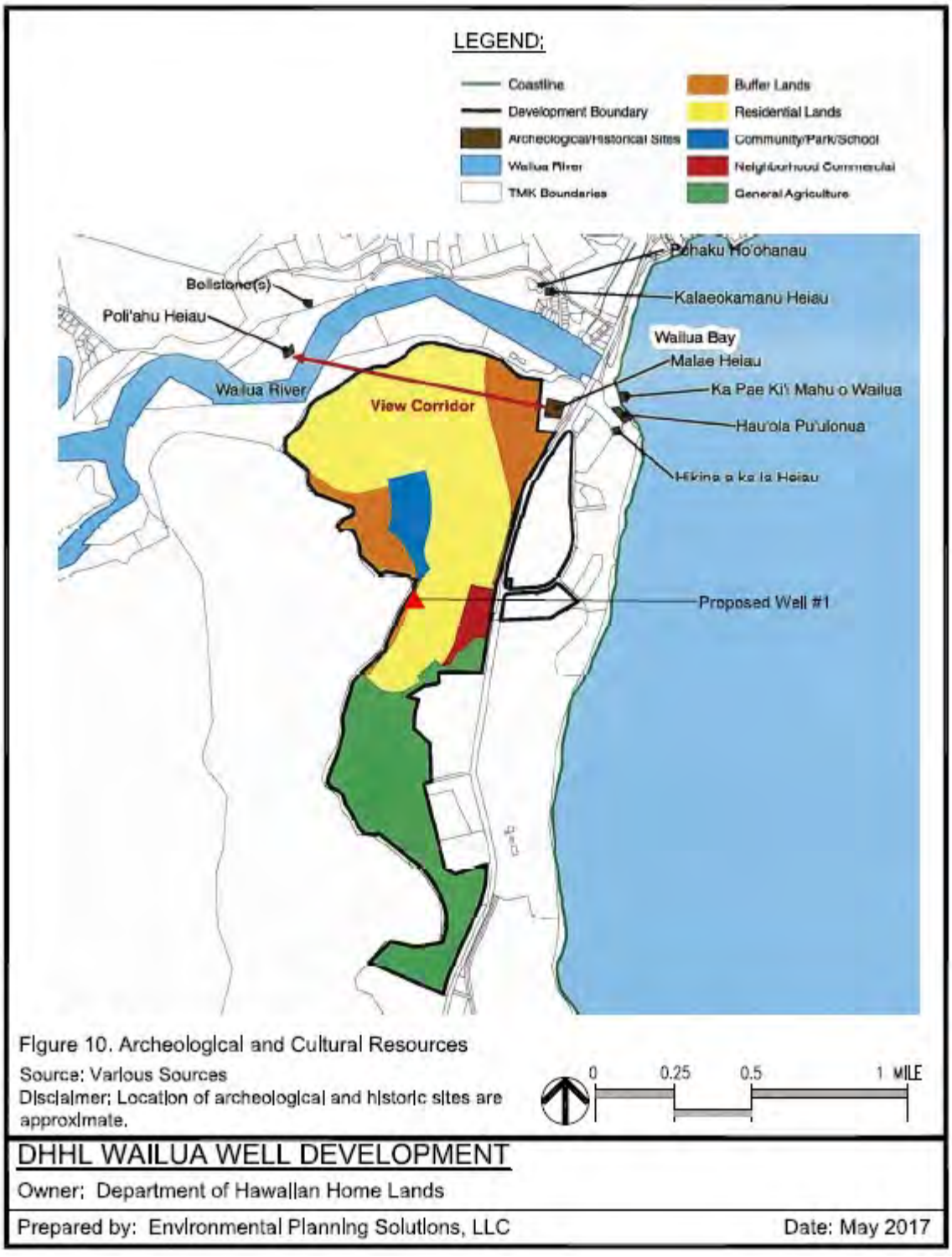
B. Cultural Resources, Practices Consultation

A cultural impacts assessment (CIA) conducted by SCS pursuant to Act 50, approved by the Governor on April 26, 2000, and in accordance with the OEQC Guidelines for Assessing Cultural Impacts, adopted by the Environmental Council in 1997 is included in Appendix E. The assessment involved evaluation the probability of impacts on identified cultural resources, including values, rights, beliefs, objects, records, properties, and stories occurring within the project area and its vicinity. The assessment included archival research as well as interviews with knowledgeable individuals. The CIA identified the Wailua ahupua‘a as one of the most important cultural regions in the Hawaiian Islands, with components spanning all phases of Hawaiian culture. The complex of heiau mentioned in the section above were specifically mentioned as culturally important features.

The CIA discussed the visual impact of the proposed project on the cultural resources of the area, notably the Heiau, finding it to be a major concern for the proposed project. The study expressed the concern that “native Hawaiian cultural beliefs and practices are continually being affected by the loss of land to development that intrudes into the natural setting” (SCS, 2007a). Letters from Hui Kako‘o ‘Aina Ho‘opulapula and Kipukai Kuali‘i expressed concerns that use of trust lands for timeshare and resort development is not an acceptable use of trust lands, and that this use compromises the intent of the trust purpose. The CIA specifically found that the makai project area “impacts the integrity of the experience of anyone wishing to perform ‘constitutionally protected’ … native Hawaiian activities, such as traditional ceremonies and protocol at these sacred sites.” The ultimate finding of the CIA is that the proposed project may be reasonably

assumed to affect Hawaiian cultural activities such that there is an adverse effect upon cultural resources, practices, and beliefs. The CIA recommended consultation with the developers, the DLNR-SP, the OHA Kauaiʻi Branch, the Queen Debra Kapule Hawaiian Civic Club, and Na Kahu Hikina A Ka La.

Figure 10 Archaeological and Cultural Resources



Potential Impacts and Mitigation

The proposed Wailua Well No. 1 project will not result in adverse impact to known archaeological or cultural resources. Therefore, no mitigation measures are warranted at this time. In order to ensure that the integrity of the cultural sites is protected throughout the development, DHHL will continue to consult with all affected parties throughout the EA process.

3.3 Growth-Inducing, Cumulative And Secondary Impacts

3.3.1 Secondary And Growth Inducing Impacts

Infrastructure expansion projects, sewage treatment plants, school construction, or water supply, can induce secondary physical and social impacts that are only indirectly related to the project. The primary mechanism for these secondary impacts from infrastructure projects is through the induction of growth that would otherwise not occur or whose pace would be significantly accelerated because of the infrastructure.

The proposal to complete the drilling and testing of Wailua Well No. 1 on DHHL's Wailua lands is to enable DHHL to take initial steps to develop a potable water system to support its long range plans to develop Wailua for residential and community facilities so that Native Hawaiian beneficiaries will be able to reside and raise their families here.

The growth planned for DHHL's property is orderly growth that is consistent with the General Plan of the County and DHHL's Kaua`i Island, Wailua Regional and Water Policy Plans, and would thus not be considered induced growth. Furthermore, it has been and/or would be subject to extensive environmental reviews on the State and County levels, and there are many mechanisms to impose mitigation for environmental impacts. It should be noted that for almost all of the development discussed above, separate environmental documents that have been prepared previously or will be prepared in the future, when plans for the lands are ready, will serve as the primary documentation in the context of Chapter 343, HRS. Concerning the DHHL Wailua Subdivision development, a Draft Environmental Assessment was prepared in 2008.

3.3.2 Cumulative Impacts

Cumulative impacts are two or more individual effects which, when considered together, compound or increase the overall impact. Cumulative impacts can arise from the individual effects of a single action or from the combined effects of past, present, or future actions. Thus, cumulative impacts can result from individually minor but collectively significant actions taken over a period of time. The cumulative impacts of implementing the proposed action along with past and reasonably foreseeable future projects proposed were assessed based upon available information.

As discussed in section 3.2.2 the County's second sanitary landfill is planned to be located mauka of Kalepa Ridge and more than 2,000 feet to the south west of DHHL's proposed well. Planned developments in the vicinity of the proposed action include the Hanamaulu Triangle and the Coco Palms Resort. Both will introduce additional traffic in the vicinity of the project site. The Kapa'a Bypass Route could be constructed in the near vicinity of the proposed project, but no estimated date of construction is planned.

3.3.3 Probable Adverse Impacts Which Cannot be Avoided

As stated in previous sections, temporary minor noise and dust impacts during construction are unavoidable. Noise and dust problems will be mitigated to the extent possible through the use of BMPs during construction.

3.3.4 Irreversible and Irretrievable Commitment of Resources

DHHL believes that the project should not be avoided due to the need to provide necessary potable water infrastructure for its planned development of affordable housing for qualified native Hawaiians who have been on DHHL's waiting list for years. No long term impacts are anticipated for the Wailua Well project.

3.4 Required Permits And Approvals

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

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

Kaua'i Planning Department
1. Plan Approval

No other permits or approvals would be required prior to implementation of the project. However, final determination will be made until the environmental review process (HRS) Chapter 343 is completed.

4.0 COMMENTS AND COORDINATION

4.1 Agencies And Organizations Contacted

36 Pre-assessment letters were mailed October 13, 2016. Nine (9) response letters from agencies and responses were sent in January 2017. The table below contains a list of consulted agencies and organizations.

	Consulted Agency or Group	Response Received
Federal Agencies	U.S. Army Corps of Engineers	
	U.S. Fish and Wildlife Service	11-17-16
	U.S. Geological Survey	
State Agencies	Department of Health – EPO, CWB	10-25-16, 10-28-16
	Department of Health Kaua`i District	10-29-16
	DLNR – Land Division	
	DLNR – State Historic Preservation Division	11-28-16
	DLNR – Engineering Division	
	DLNR – Division of Forestry and Wildlife	
	DLNR – Division of State Parks	
	DLNR – Forestry and Wildlife, Kaua‘i	
	DLNR – Land Division, Kaua‘i District	
	DLNR – Commission on Water Resource Management	
	DLNR – Division of Aquatic Resources	
	Department of Transportation	
	DHHL Kauai District	
	DHHL Commissioner Chin	
County of Kaua‘i	Planning Department	
	Department of Parks and Recreation	11-2-16
	Department of Public Works	2 received 11-16-16
	Office of Economic Development	
	Department of Water	12-5-16
	Council Services	
Individuals and Groups	Sierra Club	
	Kaua‘i Council Chairman	
	Kaua‘i Island Utility Cooperative	
	Hawaiian Telcom	
	Office of Hawaiian Affairs – O‘ahu	
	Office of Hawaiian Affairs – Kaua‘i	
	Kaua‘i Community College	
	Kipukai Kuali‘i	
	Anahola Hawaiian Home Association	
	Kalalea/Anahola Farmers’ Hui	
	Pi‘ilani Mai Kekai Community Association	
	Kekaha Hawaiian Homestead Association	
	West Kaua‘i Hawaiian Homestead Association	
	Homestead Community Development Corp.	

5.0 STATE OF HAWAI'I ENVIRONMENTAL ASSESSMENT FINDINGS

In accordance with the provisions set forth in Chapter 343, HRS, this EA has preliminarily determined that the project will not have significant adverse impacts on the environment. DHHL is considering the issuance of a FONSI. Anticipated impacts will be temporary and will not adversely impact the environmental quality of the area. Therefore, it is recommended that an Environmental Impact Statement (EIS) not be required.

A review of the "Significance Criteria" used as a basis for the above determination is presented below. An action is determined to have a significant impact on the environment if it meets any one of the thirteen (13) criteria.

(1) Involves an irrevocable commitment to loss or destruction of any natural or cultural resources.

The project will not involve an irrevocable commitment or loss or destruction of any natural or cultural resources. The well pad and access road are supportive of alien species, and no significant natural resources will be irrevocably committed or lost. Cumulative impacts related to development are discussed in No. 8, below.

(2) Curtails the range of beneficial uses of the environment.

The project will not curtail the range of beneficial uses of the environment. Future beneficial uses of the environment will in general be maintained by the proposed project. Sufficient water will remain, well within the sustainable yield of the aquifer, to promote other beneficial withdrawals of groundwater

(3) Conflicts with the State's long-term environmental policies or goals and guidelines as expressed in Chapter 343, HRS; and any revisions thereof and amendments thereto, court decisions, or executive orders.

The broad goals of Chapter 344, HRS are to conserve natural resources and enhance the quality of life. The project's goals of providing potable water to support adequate supply and orderly development of planned growth while working with resource agencies to conserve natural resources, including other beneficial uses of groundwater, complies with the State's environmental policies.

(4) Substantially affects the economic or social welfare of the community or state.

The project will not substantially affect the economic or social welfare of the community or State. The improvements will benefit the social and economic welfare of Hawai'i by improving the potable water supply system in DHHL's Wailua property.

(5) Substantially affects public health.

The project does not substantially affect public health in any detrimental way. No adverse effects to public health are anticipated. Public health will be benefited by improving the potable water supply system for DHHL's Wailua property.

(6) Involves substantial secondary impacts, such as population changes or effects on public facilities.

No adverse secondary effects are expected. The project will not involve substantial secondary impacts, such as population changes or effects on public facilities. The project will not enable development in itself, but will instead assure adequate supply of an improved source of water to DHHL and serve growth that has explicitly been specified in the Kaua'i County General Plan and Wailua Regional Plan.

(7) Involves a substantial degradation of environmental quality.

The project will not involve a substantial degradation of environmental quality. The implementation of best management practices for limited disturbance at the project site will ensure that the project will not degrade environmental quality in any substantial way.

(8) Is individually limited but cumulatively has considerable effect on the environment, or involves a commitment for larger actions.

Cumulative impacts result when implementation of several projects that individually, have minor impacts, but combined can produce more severe impacts or conflicts among mitigation measures. No cumulative impacts as a result of the proposed project are anticipated.

It can be argued that as a result of growth that will be partially enabled by the project, cumulative impacts to certain coastal ecosystems, the visual landscape, cultural resources, energy use, and public services and facilities may occur. These impacts will require both systemic approaches such as regulation and policies, and case-by-case examination when each new development is proposed. Because of the multi-stage land use approval process and additional environmental permit regulations, there are sufficient safeguards in place to address and mitigate for cumulative impacts, which will be disclosed over time, although there will undoubtedly be conflict and controversy as this process occurs. The construction and testing of a new exploratory well, although necessary for development, are by no means sufficient. While it is important to take stock of the big picture of how infrastructure relates to cumulative impacts of development, it is inappropriate and impractical to mitigate for the such broad regional impacts as part of minor infrastructure improvement projects such as Wailua Well.

(9) Substantially affects a rare, threatened or endangered species or its habitat.

No endangered species of flora or fauna are known to exist on the project site or would be affected in any way by the project. Therefore, the proposed project is not anticipated to have any effect on a rare, threatened, or endangered species, or any critical habitat.

(10) Detrimentally affects air or water quality or ambient noise levels.

The project will have negligible on water quality, air quality and noise levels.

(11) Affects or is likely to suffer damage by being located in an environmentally sensitive area, such as a flood plain, tsunami zone, beach, erosion-prone area, geologically hazardous land, estuary, freshwater, or coastal waters.

The project is not anticipated to affect environmentally sensitive areas within an environmentally sensitive area such as flood plains, tsunami zones, erosion- prone areas, geologically hazardous lands, estuaries, fresh waters or coastal waters because these features do not occur in the area planned for development. A discussion of these issues can be found section 3.1 of this EA.

(12) Substantially affects scenic vistas and view planes identified in county or state plans or studies.

The proposed exploratory well construction and testing will not affect the scenic view of the coast from Kūhiō Highway nor the Malae Heiau and its line of sight with other heiau, especially Poli'ahu, discussed in section 3.2.3 of this EA.

(13) Requires substantial energy consumption.

The proposed project will not require substantial energy consumption. Portable generators will provide energy for drilling the exploratory well and operating the test pump.

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APPENDICES

APPENDIX A

PRE-ASSESSMENT PHASE:
PRE-ASSESSMENT LETTER,
COMMENTS AND RESPONSES

October 14, 2016

DHHL Kauai District
3060 Eiwa Street, Room 203
Lihue, Hawaii 96766

Dear Kaua`i District Office:

Subject: Pre-Assessment Consultation to Prepare a Chapter 343 HRS Environmental Assessment for proposed Well Development, Wailua, Kaua‘i, Hawai‘i, TMK No. (4) 3-9-02:012 (por)

The State of Hawaii Department of Hawaiian Home Lands (DHHL) is in the process of preparing a Chapter 343 HRS Environmental Assessment for the drilling, casing and pump testing of its exploratory well on its property in Wailua, on the Island of Kaua‘i. The proposed well location is near Kälepa Ridge in the southern portion of the DHHL property that is situated in the Wailua ahupua‘a in the Lïhu‘e District on the east side of the island, approximately 6 miles north of Lïhu‘e town (see enclosed Location Map). The purpose of the project is to develop a potable water well to help DHHL provide potable water to its lands in Wailua for homesteading and other related uses. Exploratory well drilling was conducted June 22, 2009 to July 2, 2009 at the 84.69 foot elevation near Kalepa Ridge. The drilled well measures 9 to 10 inches in diameter and is about 138 feet in depth.

The need for an HRS Chapter 343 EA is triggered because the project is being conducted on State lands, as well as by OEQC’s “Guidelines for Assessing Water Well Development Projects” dated May 1998. As indicated in OEQC’s 1998 referenced “Guidelines,” an EA that complies with all information requirements is needed when, “the exploratory well yields positive results and demonstrates production capability.”

To help us make this a successful project, we are requesting any written comments and/or information with respect to your area(s) of expertise and knowledge of the project location. Please send your written comments to me within 30 days of receipt of this letter.

Sincerely,

Colette M. Sakoda

cc: Department of Hawaiian Home Lands

Attachment: Regional Location Map

945 Makaiwa Street, Hon., HI 96816 | Phone: 808-732-8602 | Fax: 808-356-1914 | Mobile: 808-748-1529

DEPARTMENT OF HAWAIIAN HOME LANDS WAILUA WELL DEVELOPMENT

DRAWING

LOCATION MAP

PREPARED BY: AKINAKA & ASSOCIATES, LTD. CONSULTING ENGINEERS

Date: 01/27/2014

File Location: G:\DHHL 1201T Wailua Well\800 GIS\810 Maps
File Name: Well Location Map.mxd

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Islands Fish and Wildlife Office
300 Ala Moana Boulevard, Room 3-122
Honolulu, Hawaii 96850

NOV 17 2016

In Reply Refer To:
01EPIF00-2017-TA-0021

Ms. Colette M. Sakoda
Environmental Planning Solutions, LLC
945 Makaiwa Street
Honolulu, Hawaii 96816

Subject: Technical Assistance on the Wailua Well Development Project, Kauai

Dear Ms. Sakoda:

The U.S. Fish and Wildlife Service (Service) received your letter, dated October 14, 2016, requesting our comments on the proposed Well Development Project, as a pre-consultation in accordance with Hawaii Revised Statutes Chapter 343. The State of Hawaii Department of Hawaiian Home Lands (DHHL) is in the process of preparing a draft Environmental Assessment (EA) for the drilling, casing, and pump testing of its exploratory well on DHHL property in Wailua on the island of Kauai (TMK: 3-9-02:12). The drilling of an exploratory well measuring 9 to 10 inches in diameter and approximately 138 feet deep was conducted in 2009 near Kalepa Ridge. We offer the following comments to assist you in preparing your environmental documents in accordance with the Endangered Species Act of 1973 (ESA), as amended (16 U.S.C 1531 *et seq.*).

We reviewed the information you provided and pertinent information in our files, including data compiled by the Hawaii Biodiversity and Mapping Program, as it pertains to federally listed species and designated critical habitat. The following species are known to occur or transit through the proposed project area: the endangered band-rumped storm-petrel (*Oceanodroma castro*) and Hawaiian petrel (*Pterodroma sandwichensis*), and the threatened Newell's shearwater (*Puffinus newelli*) (hereafter collectively referred to as seabirds); the endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*); and the endangered Hawaiian goose (*Branta sandvicensis*). There is no designated critical habitat within the vicinity of the project area.

To aid in the drafting of your environmental documents, we provide the following recommendations to avoid and minimize project impacts to listed species and candidate species.

Hawaiian Hoary Bat
The Hawaiian hoary bat roosts in both exotic and native woody vegetation and, while foraging, will leave young unattended in "nursery" trees and shrubs when they forage. If trees or shrubs suitable for bat roosting are cleared during the breeding season, there is a risk that young bats could inadvertently be harmed or killed. To minimize impacts to the endangered Hawaiian

hoary bat, woody plants greater than 15 feet tall should not be disturbed, removed, or trimmed during the bat birthing and pup rearing season (June 1 through September 15). Site clearing should be timed to avoid disturbance to Hawaiian hoary bats in the project area. In addition, Hawaiian hoary bats forage for insects from as low as three feet to higher than 500 feet above the ground. When barbed wire is used for fencing, bats can become entangled. Barbed wire should not be used for fencing as part of the proposed project.

Hawaiian Goose

In order to avoid impacts to Hawaiian geese, we recommend a biologist familiar with the nesting behavior of the Hawaiian goose survey the area prior to the initiation of any work, or after any subsequent delay in work of three or more days (during which birds may attempt nesting). If a nest is discovered, work should cease immediately and our office should be contacted for further guidance. Furthermore, all on-site project personnel should be apprised that Hawaiian geese may be in the vicinity of the project at any time during the year. If a Hawaiian goose (or geese) appears within 100 feet of ongoing work, all activity should be temporarily suspended until the Hawaiian goose (or geese) leaves the area of its own accord.

Seabirds

Seabirds, including the Newell's shearwater, Hawaiian petrel, and band-rumped storm petrel fly at night and are attracted to artificially-lighted areas resulting in disorientation and subsequent fallout due to exhaustion. Seabirds are also susceptible to collision with objects that protrude above the vegetation layer, such as utility lines, guy-wires, and communication towers. Additionally, once grounded, they are vulnerable to predators and are often struck by vehicles along roadways. Construction activities should only occur during daylight hours. Any increase in the use of nighttime lighting, particularly during peak fallout period (September 15 through December 15), could result in additional seabird injury or mortality. If lights cannot be eliminated due to safety or security concerns, then they should be positioned low to the ground, be motion-triggered, and be shielded or full cut-off. Effective light shields should be completely opaque, sufficiently large, and positioned so that the bulb is only visible from below.

The environmental documents should address all potential impacts to federally listed species and should outline conservation measures to avoid and minimize these impacts. We appreciate your efforts to conserve endangered species. Please contact Adam Griesemer, Endangered Species Biologist (phone: 808-285-8261, email: adam_griesemer@fws.gov) should you have any questions pertaining to this response.

Sincerely,

Aaron Nadig
Island Team Manager
Oahu, Kauai, Northwestern Hawaiian Islands and American Samoa

January 26, 2017

Aaron Nadig, Island Team Manager
Pacific Islands Fish and Wildlife Office
U.S. Fish and Wildlife Service
300 Ala Moana Boulevard, Room 3-122
Honolulu, Hawai'i 96850

Dear Mr. Nadig:

Subject: Pre-Assessment Consultation to Prepare a Chapter 343 HRS Environmental Assessment for proposed Well Development, Wailua, Kaua'i, Hawai'i, TMK No. (4) 3-9-02:012 (por)

We have received your letter of November 17, 2016 in which you offered information and comments. The following has been prepared in response to information and recommendations as follows.

1. Hawai`i Biodiversity and Mapping Program data: Species and your finding that no designated critical habitat exists within the vicinity and project area will be included in the draft environmental assessment.

2. Recommendations: Your recommendations to avoid and minimize project impacts will be taken under advisement.

The Department of Hawaiian Home Lands is seeking to develop this well so that it can deliver needed water to beneficiaries in a manner that balances cost, efficiency measures, and Public Trust uses of water in the short and long term. Your pre-consultation comments on this effort will help us in this regard, and we look forward to working with you throughout this process.

We appreciate your participation in the environmental assessment phase of this important project.

Sincerely,

Colette M. Sakoda

cc: Stewart Matsunaga, Department of Hawaiian Home Lands

945 Makaiwa Street, Hon., HI 96816 | Phone: 808-732-8602 | Fax: 808-356-1914 | Mobile: 808-748-1529

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

STATE HISTORIC PRESERVATION DIVISION
KAKUHIHEWA BUILDING
601 KAMOKILA BLVD, STE 555
KAPOLEI, HAWAII 96707

November 28, 2016

IN REPLY REFER TO:
Log No. 2016.02466
Doc No. 1611GC11
Archaeology

Norman Sakamoto, Administrator
Land Development Division
Department of Hawaiian Home Lands
91-542 Kapolei Parkway
Kapolei, HI 96707

Dear Mr. Sakamoto:

SUBJECT: **Chapter 6E-8 Historic Preservation Review –**
Pre-Assessment Consultation – Proposed Well Development
Wailua Ahupua'a, Puna District, Island of Kaua'i
TMK: (4) 3-9-002:012

Thank you for your submittal requesting comments in anticipation for preparation of a draft Environmental Assessment. Environmental Planning Solutions, LLC, on behalf of the Department of Hawaiian Home Lands (DHHL), proposes to drill an exploratory well near Kalepa Ridge, Wailua, Kaua'i. The project will occur within a 320-acre parcel of State-owned lands identified as TMK: (4) 3-9-002:012. SHPD received this submittal on October 18, 2016.

A SHPD records review indicates that no archaeological inventory survey has been conducted within the subject parcel. Our records also indicate that the subject parcel is surrounded by numerous documented pre- and post-contact historic properties. These properties consist of surface and subsurface including human burials, *lo'i*, several *heiau*, agricultural terraces, rice paddies, and historic buildings.

At this time SHPD, has insufficient information to make a determination for the proposed project and its effect to potential historic properties. The **SHPD requests the following information:**

(1) Narrative description of the proposed project, including total area in acres and nature of any land alteration, new construction, demolition or modifications of existing structures;

(2) TMK map showing the full extent of the project area within the affected parcel;

(3) Description and photographs of current vegetation cover and condition of the project area, including structures, roads, walls or other features within the project area;

(4) Summary of land use history, such as previous intensive cultivation, grubbing or grading; and

(5) Copies or dates of previously approved permits, survey reports, and/or prior SHPD review letters that pertain to the property.

Please contact me at Susan.A.Lebo@hawaii.gov or at (808) 692-8019 for any questions regarding this letter.
Aloha,

Susan A. Lebo

Susan A. Lebo, PhD
Archaeology Branch Chief

cc: Stewart T. Matsunaga, DHHL (Stuart.T.Matsunaga@hawaii.gov)
Colette Sakoda, Env. Planning Solutions, LLC (sakodacolette@aol.com)

January 26, 2017

Susan A. Lebo, Ph.D.
Archaeology Branch Chief
State Historic Preservation Division
Department of Land and Natural Resources
601 Kamokila Blvd., Suite 555
Kapolei, Hawai'i 96707

Dear Dr. Lebo:

Subject: Pre-Assessment Consultation to Prepare a Chapter 343 HRS Environmental Assessment for proposed Well Development, Wailua, Kaua'i, Hawai'i, TMK No. (4) 3-9-02:012 (por)

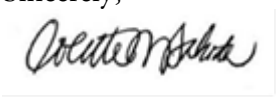
We have received your letter of November 28, 2016 addressed to Mr. Norman Sakamoto of the Department of Hawaiian Home Lands in which you offered information and comments. The following has been prepared in response to information and recommendations as follows.

1. Project description. A narrative description of the proposed project will be included in the environmental assessment.
2. TMK map. One will be included in the environmental assessment.
3. Photographs. Description and photographs of the current vegetation cover and condition of the project area will be included.
4. Land use history. Summary of the land use history of the project area will be included.
5. Survey reports, SHPD correspondence. Any previously completed reports, and/or SHPD correspondence pertaining to the property will be included.

The Department of Hawaiian Home Lands is seeking to develop this well so that it can deliver needed water to beneficiaries in a manner that balances cost, efficiency measures, and Public Trust uses of water in the short and long term. Your pre-consultation comments on this effort will help us in this regard, and we look forward to working with you throughout this process.

We appreciate your participation in the environmental assessment phase of this important project.

Sincerely,



Colette M. Sakoda

cc: Stewart Matsunaga, Department of Hawaiian Home Lands

945 Makaiwa Street, Hon., HI 96816 | Phone: 808-732-8602 | Fax: 808-356-1914 | Mobile: 808-748-1529

DAVID Y. IGE
GOVERNOR OF HAWAII

VIRGINIA PRESSLER, M.D.
DIRECTOR OF HEALTH

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

In reply, please refer to:
File:

EPO 16-374

October 25, 2016

Ms. Colette M. Sakoda
Environmental Planning Solutions, LLC
945 Makaiwa Street
Honolulu, Hawaii 96816

Dear Ms. Sakoda:

SUBJECT: Pre-Assessment Consultation (PAC) for Proposed Well Developent, Wailua, Kauai
TMK: (4) 3-9-02: 012 (por)

The Department of Health (DOH), Environmental Planning Office (EPO), acknowledges receipt of your PAC to our office on October 17, 2016.

In the development and implementation of all projects, EPO strongly recommends regular review of State and Federal environmental health land use guidance. State standard comments and available strategies to support sustainable and healthy design are provided at: http://health.hawaii.gov/epo/landuse. Projects are required to adhere to all applicable standard comments.

EPO has recently updated the environmental Geographic Information System (GIS) website page. It now compiles various maps and viewers from our environmental health programs. The eGIS website page is continually updated so please visit it regularly at: http://health.hawaii.gov/epo/egis.

EPO also encourages you to examine and utilize the Hawaii Environmental Health Portal at: https://eha-cloud.doh.hawaii.gov. This site provides links to our e-Permitting Portal, Environmental Health Warehouse, Groundwater Contamination Viewer, Hawaii Emergency Response Exchange, Hawaii State and Local Emission Inventory System, Water Pollution Control Viewer, Water Quality Data, Warnings, Advisories and Postings.

We suggest you review the requirements of the Clean Water Branch (HAR, Section 11-54-1.1, -3, 4-8) and/or the National Pollutant Discharge Elimination System (NPDES) permit (HAR, Chapter 11-55) at: http://health.hawaii.gov/cwb. If you have any questions, please contact the Clean Water Branch, Engineering Section at (808) 586-4309 or cleanwaterbranch@doh.hawaii.gov. If your project involves waters of the U.S., it is highly recommended that you contact the Army Corps of Engineers, Regulatory Branch at: (808) 835-4303.

Please note that all wastewater plans must conform to applicable provisions of the Department of Health's Administrative Rules, Chapter 11-62, "Wastewater Systems". We reserve the right to review the detailed wastewater plans for conformance to applicable rules. Should you have any questions, please review online guidance at: http://health.hawaii.gov/wastewater and contact the Planning and Design Section of the Wastewater Branch at (808) 586-4294.

EPO recommends you review the need and/or requirements for a Clean Air Branch permit. The Clean Air Branch can be consulted via e-mail at: Cab.General@doh.hawaii.gov or via phone: (808) 586-4200.

You may also wish to review the draft Office of Environmental Quality Control (OEQC) viewer at: http://eha-web.doh.hawaii.gov/oeqc-viewer. This viewer geographically shows where some previous Hawaii Environmental Policy Act (HEPA) {Hawaii Revised Statutes, Chapter 343} documents have been prepared.

In order to better protect public health and the environment, the U.S. Environmental Protection Agency (EPA) has developed a new environmental justice (EJ) mapping and screening tool called EJSCREEN. It is based on nationally consistent data and combines environmental and demographic indicators in maps and reports. EPO encourages you to explore, launch and utilize this powerful tool in planning your project. The EPA EJSCREEN tool is available at: http://www.epa.gov/ejscreen.

We request that you utilize all of this information on your proposed project to increase sustainable, innovative, inspirational, transparent and healthy design. Thank you for the opportunity to comment.

Mahalo nui loa,

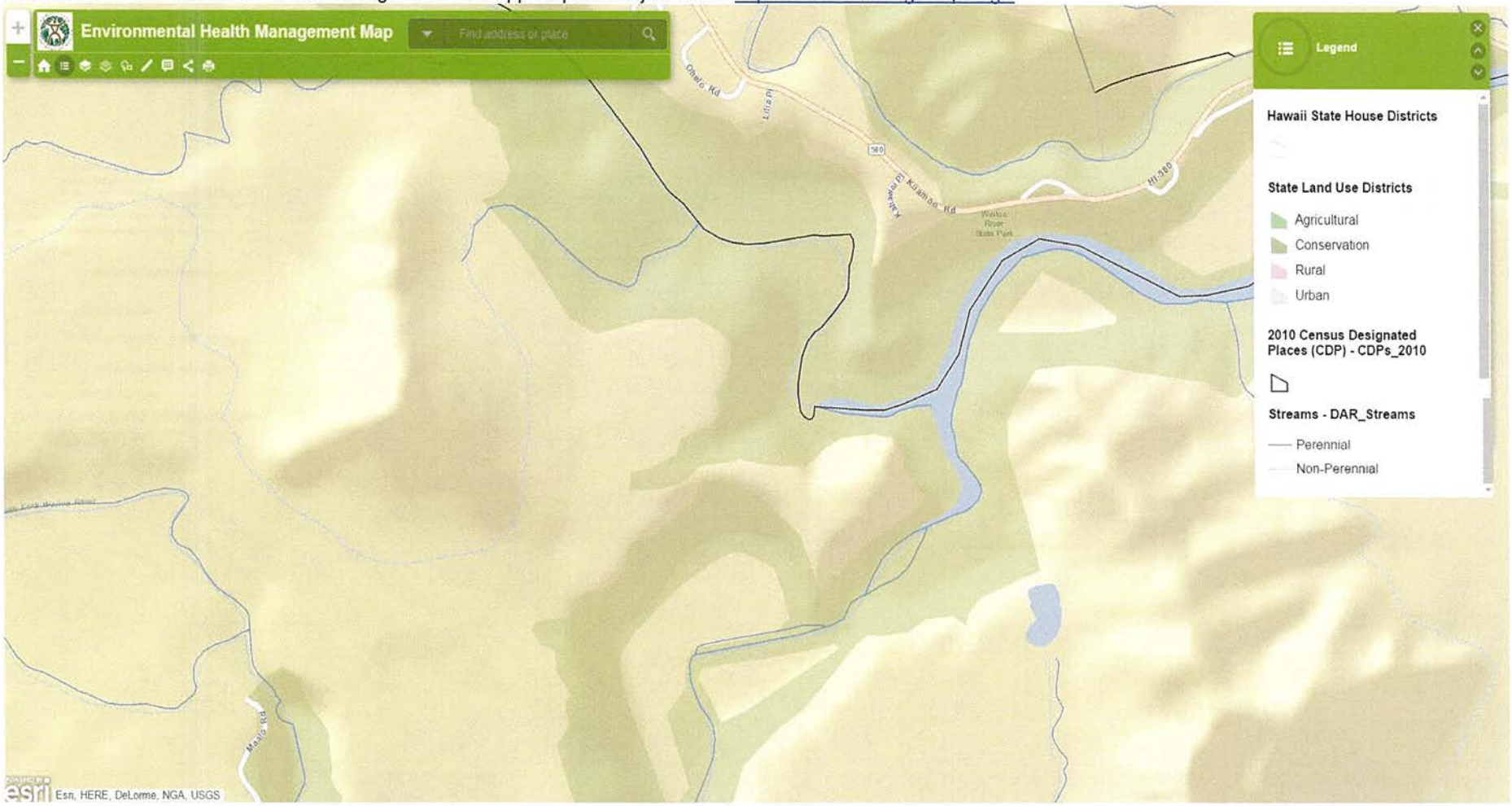
Laura Leialoha Phillips McIntyre, AICP
Program Manager, Environmental Planning Office

LM:nn

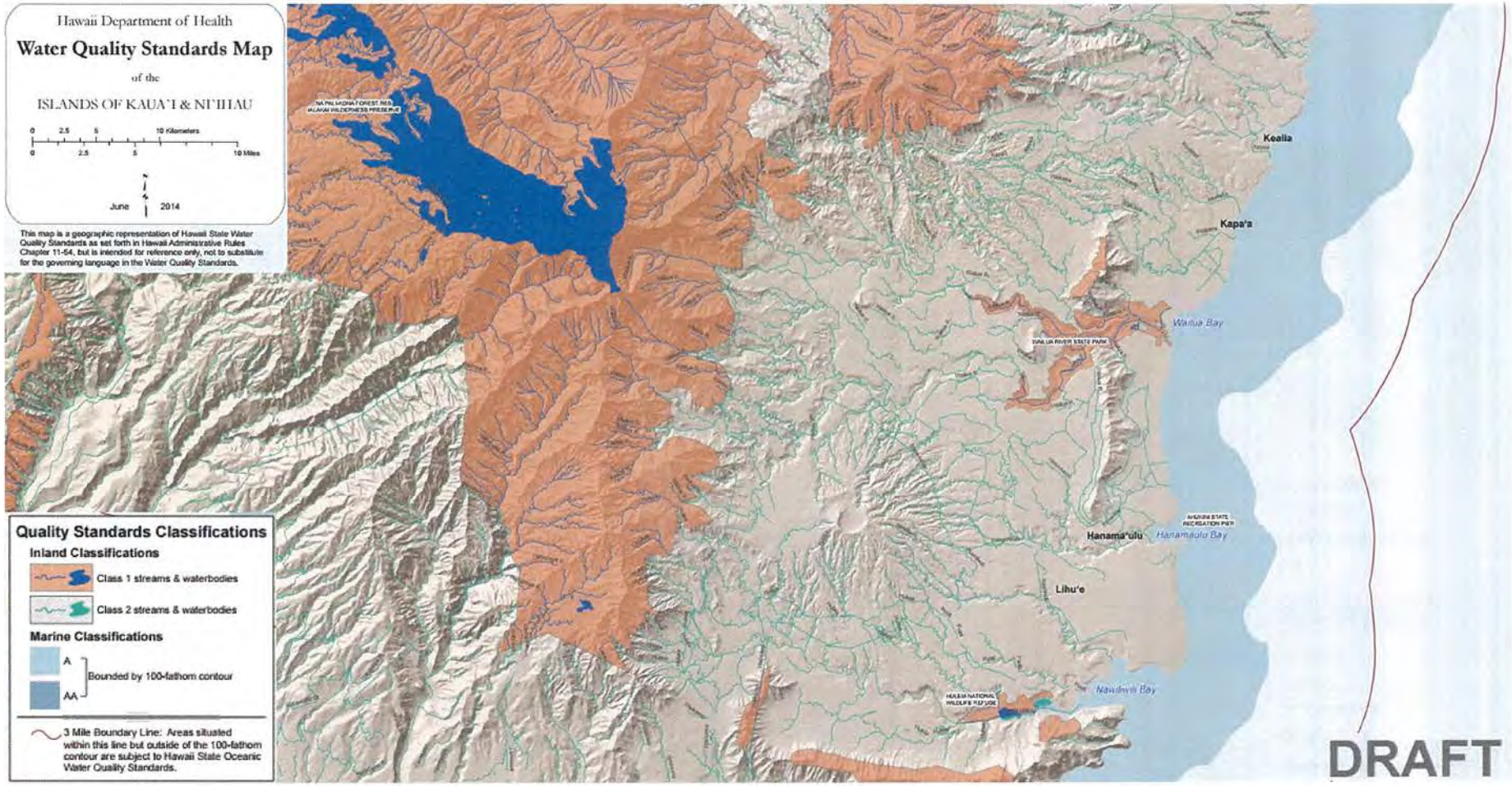
Attachment 1: Environmental Health Management Web App Snipit of Project Area: http://health.hawaii.gov/epo/egis
Attachment 2: Clean Water Branch: Water Quality Standards Map - Kauai
Attachment 3: Wastewater Branch: Act 120 Cesspool Tax Credit Web App Snipit of Project Area
Attachment 4: Wastewater Branch: Recycled Water Use Map of Project Area
Attachment 5: Historic Sugarcane Map of Project Area
Attachment 6: U.S. EPA EJSCREEN Report for Project Area

c: Stewart T. Matsunaga, DHHL {via email: stewart.t.matsunaga@hawaii.gov}
DOH: DHO Kauai, EMD, DDEH, EHSD, CAB, SDWB, CWB, WWB, SHWB, HEER {via email only}

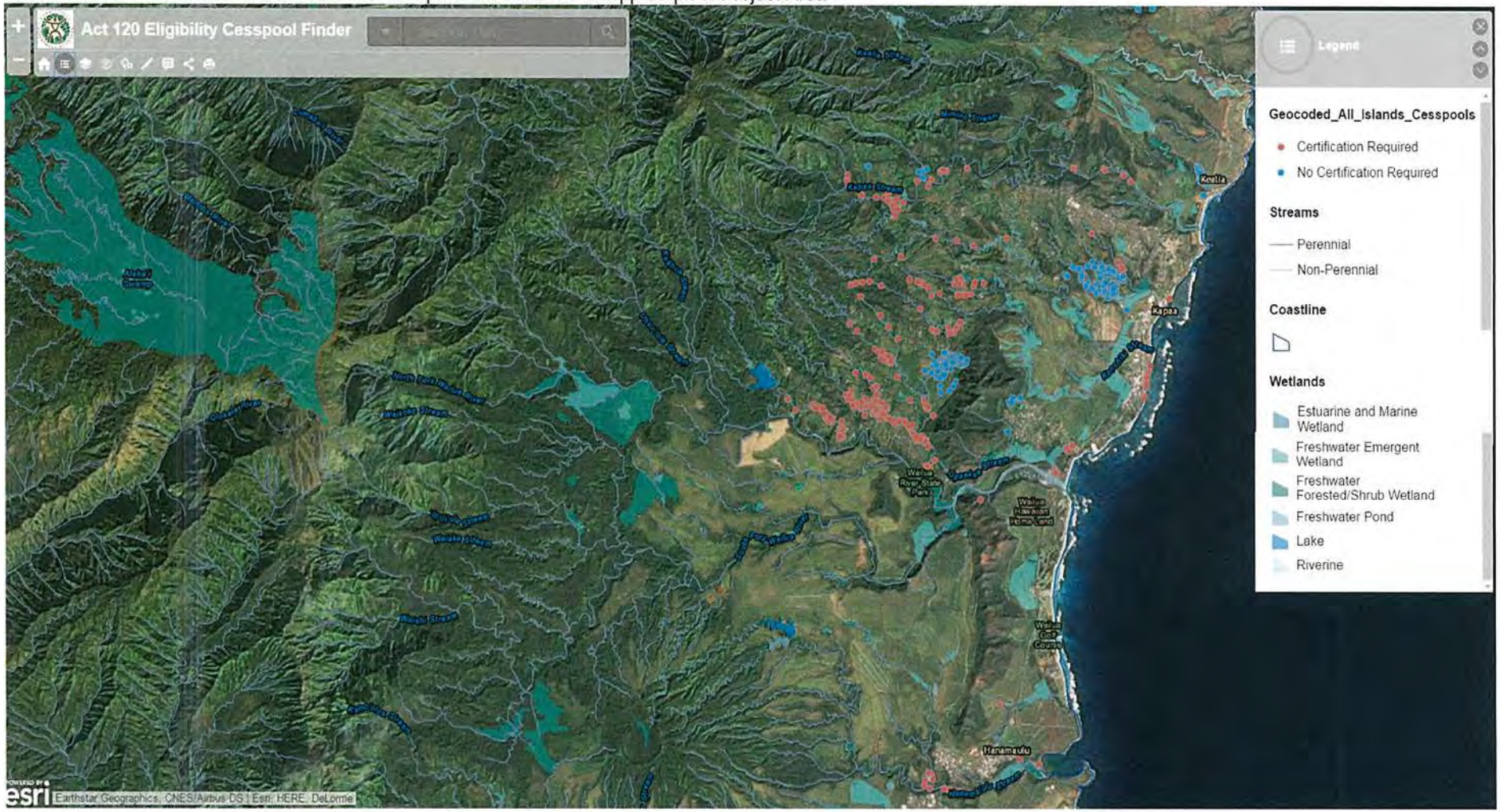
Attachment 1: Environmental Health Management Web App Snipit of Project Area: http://health.hawaii.gov/epo/egis



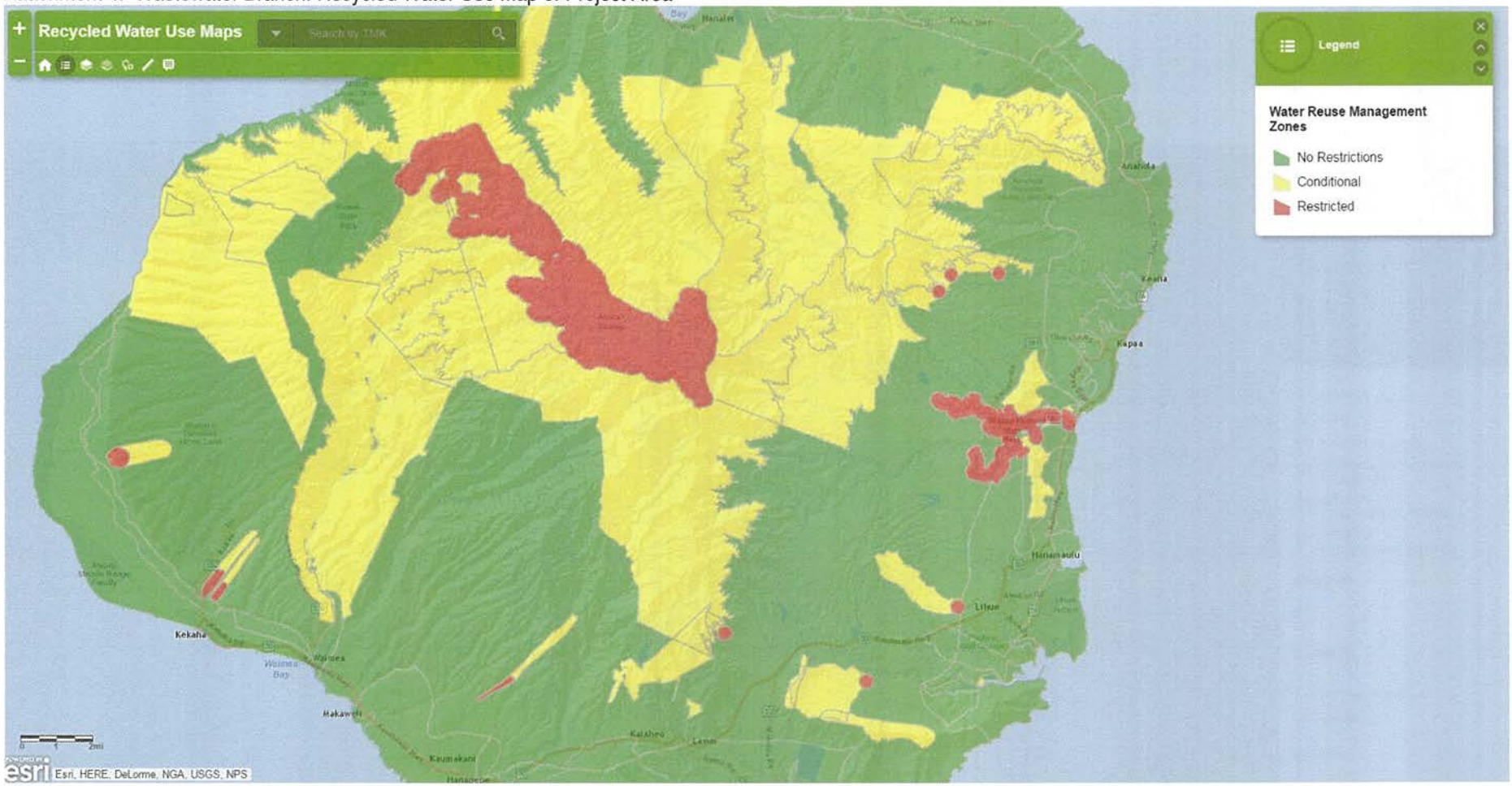
Attachment 2: Clean Water Branch: Water Quality Standards Map – Kauai



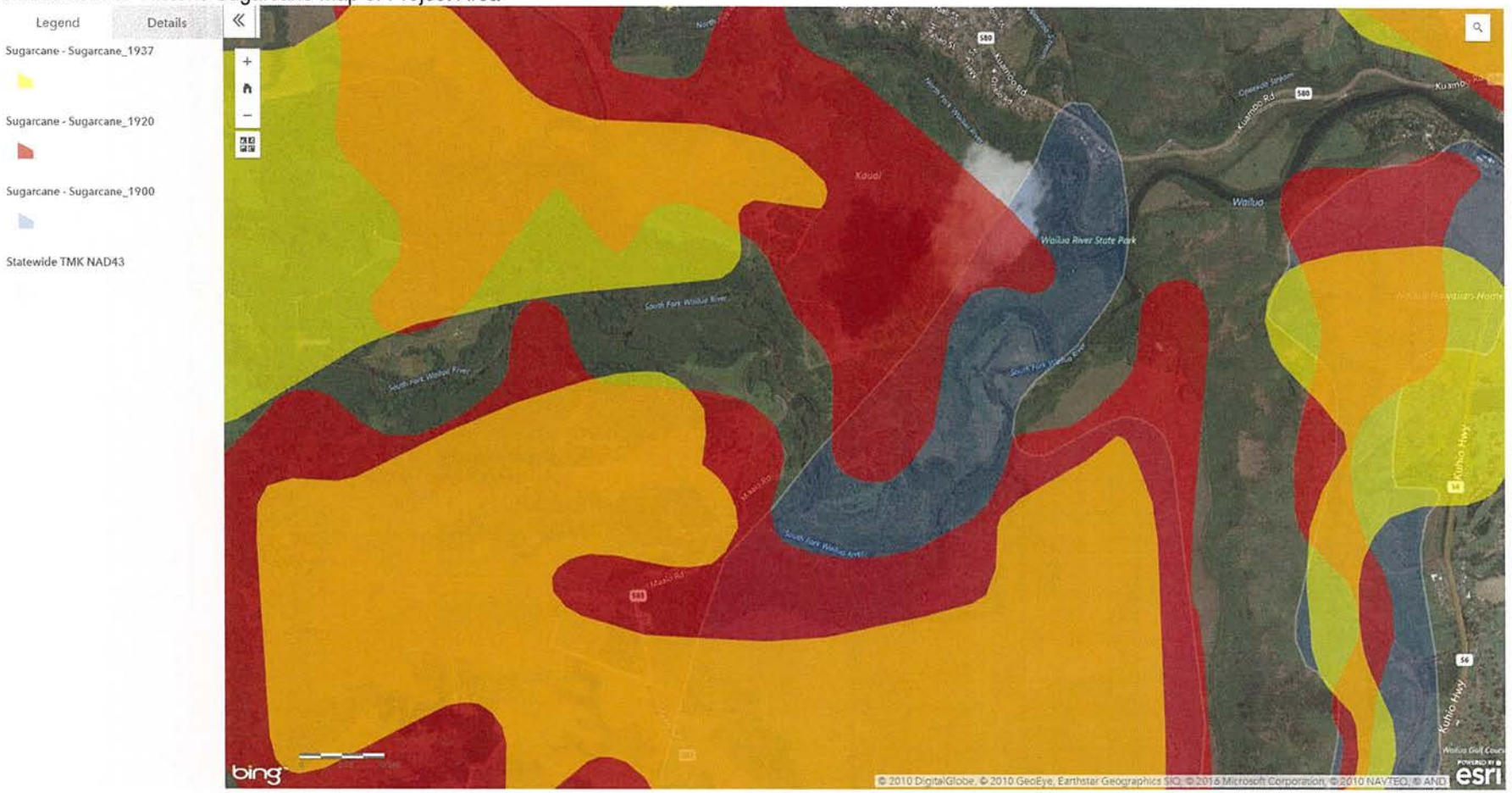
Attachment 3: Wastewater Branch: Act 120 Cesspool Tax Credit Web App Snipit of Project Area



Attachment 4: Wastewater Branch: Recycled Water Use Map of Project Area



Attachment 5: Historic Sugarcane Map of Project Area



Attachment 6: U.S. EPA EJSCREEN Report for Project Area

EJSCREEN Report (Version 2016)

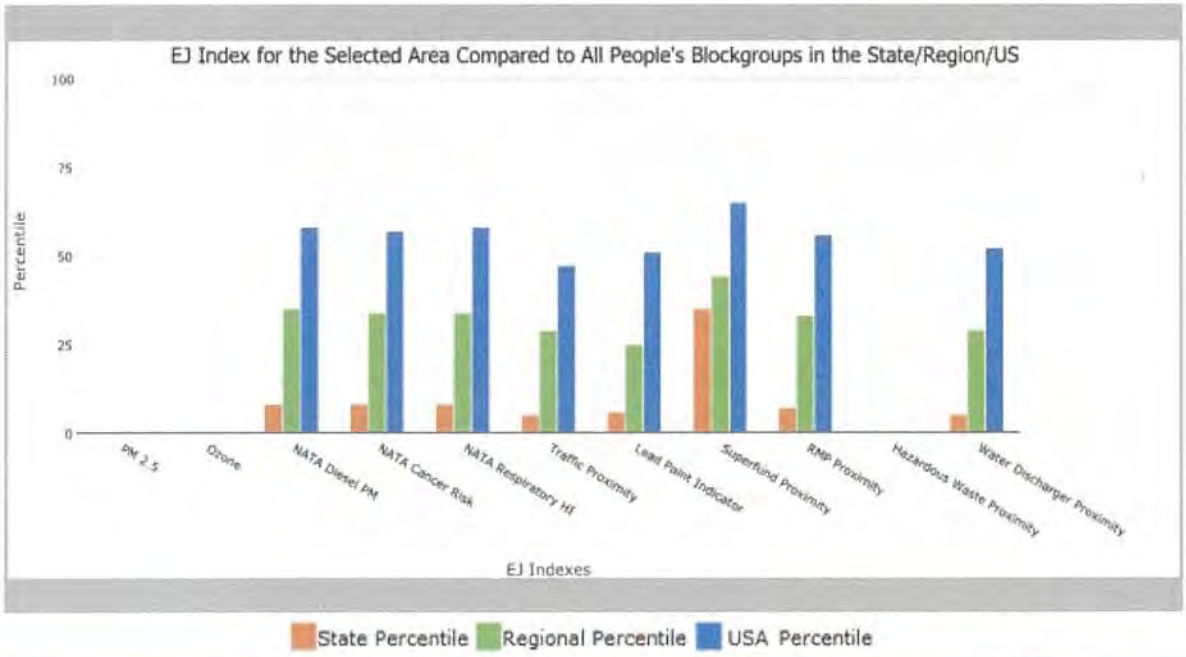
1 mile Ring Centered at 22.039311,-159.362985, HAWAII, EPA Region 9

Approximate Population: 487

Input Area (sq. miles): 3.14

Wailua Well, Kauai

Selected Variables	State Percentile	EPA Region Percentile	USA Percentile
EJ Indexes			
EJ Index for PM2.5	N/A	N/A	N/A
EJ Index for Ozone	N/A	N/A	N/A
EJ Index for NATA* Diesel PM	8	35	58
EJ Index for NATA* Air Toxics Cancer Risk	8	34	57
EJ Index for NATA* Respiratory Hazard Index	8	34	58
EJ Index for Traffic Proximity and Volume	5	29	47
EJ Index for Lead Paint Indicator	6	25	51
EJ Index for Superfund Proximity	35	44	65
EJ Index for RMP Proximity	7	33	56
EJ Index for Hazardous Waste Proximity*	N/A	N/A	N/A
EJ Index for Water Discharger Proximity	5	29	52



This report shows the values for environmental and demographic indicators and EJSCREEN indexes. It shows environmental and demographic raw data (e.g., the estimated concentration of ozone in the air), and also shows what percentile each raw data value represents. These percentiles provide perspective on how the selected block group or buffer area compares to the entire state, EPA region, or nation. For example, if a given location is at the 95th percentile nationwide, this means that only 5 percent of the US population has a higher block group value than the average person in the location being analyzed. The years for which the data are available, and the methods used, vary across these indicators. Important caveats and uncertainties apply to this screening-level information, so it is essential to understand the limitations on appropriate interpretations and applications of these indicators. Please see EJSCREEN documentation for discussion of these issues before using reports.

EJSCREEN Report (Version 2016)

1 mile Ring Centered at 22.039311,-159.362985, HAWAII, EPA Region 9

Approximate Population: 487

Input Area (sq. miles): 3.14

Wailua Well, Kauai

Sites reporting to EPA	
Superfund NPL	0
Hazardous Waste Treatment, Storage, and Disposal Facilities (TSDF)	0
National Pollutant Discharge Elimination System (NPDES)	0

EJSCREEN Report (Version 2016)

1 mile Ring Centered at 22.039311,-159.362985, HAWAII, EPA Region 9

Approximate Population: 487

Input Area (sq. miles): 3.14

Wailua Well, Kauai

Selected Variables	Value	State Avg.	%ile in State	EPA Region Avg.	%ile in EPA Region	USA Avg.	%ile in USA
Environmental Indicators							
Particulate Matter (PM 2.5 in µg/m³)	N/A	N/A	N/A	9.37	N/A	9.32	N/A
Ozone (ppb)	N/A	N/A	N/A	51	N/A	47.4	N/A
NATA* Diesel PM (µg/m³)	0.0348	0.149	21	0.978	<50th	0.937	<50th
NATA* Cancer Risk (lifetime risk per million)	26	34	20	43	<50th	40	<50th
NATA* Respiratory Hazard Index	0.61	1	21	2	<50th	1.8	<50th
Traffic Proximity and Volume (daily traffic count/distance to road)	77	990	41	1100	33	590	47
Lead Paint Indicator (% Pre-1960 Housing)	0.043	0.16	34	0.24	34	0.3	24
Superfund Proximity (site count/km distance)	0	0.098	29	0.15	13	0.13	16
RMP Proximity (facility count/km distance)	0.11	0.19	57	0.57	23	0.43	32
Hazardous Waste Proximity+ (facility count/km distance)	N/A	0.14	N/A	0.14	N/A	0.11	N/A
Water Discharger Proximity (facility count/km distance)	0.28	0.34	61	0.2	83	0.31	73
Demographic Indicators							
Demographic Index	34%	52%	6	47%	31	36%	55
Minority Population	55%	77%	13	58%	45	37%	71
Low Income Population	12%	26%	22	36%	15	35%	16
Linguistically Isolated Population	8%	6%	75	9%	59	5%	80
Population With Less Than High School Education	8%	9%	56	17%	36	14%	41
Population Under 5 years of age	4%	6%	22	7%	23	6%	24
Population over 64 years of age	29%	15%	93	13%	94	14%	94

* The National-Scale Air Toxics Assessment (NATA) is EPA's ongoing, comprehensive evaluation of air toxics in the United States. EPA developed the NATA to prioritize air toxics, emission sources, and locations of interest for further study. It is important to remember that NATA provides broad estimates of health risks over geographic areas of the country, not definitive risks to specific individuals or locations. More information on the NATA analysis can be found at: https://www.epa.gov/national-air-toxics-assessment.

+ The hazardous waste environmental indicator and the corresponding EJ index will appear as N/A if there are no hazardous waste facilities within 50 km of a selected location.

For additional information, see: www.epa.gov/environmentaljustice

January 26, 2017

Laura McIntyre, AICP
Program Manager, Environmental Planning Office
State of Hawaii Department of Health
P.O. Box 3378
Honolulu, HI 96801-3378

Dear Ms. McIntyre:

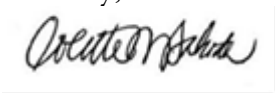
Subject: Pre-Assessment Consultation to Prepare a Chapter 343 HRS Environmental Assessment for proposed Well Development, Wailua, Kaua'i, Hawai'i, TMK No. (4) 3-9-02:012 (por)

We have received your letter of October 25, 2016 and appreciate your comments relevant to the preparation of the project Environmental Assessment (EA). Your recommended reference websites as well as illustrative examples included as attachments are appreciated. For your information, the Army Corps of Engineers, Regulatory Branch is included as a consulted party in our pre-assessment phase.

The Department of Hawaiian Home Lands is seeking to develop this well so that it can deliver needed water to beneficiaries in a manner that balances cost, efficiency measures, and Public Trust uses of water in the short and long term. Your pre-consultation comments on this effort will help us in this regard, and we look forward to working with you throughout this process.

We appreciate your participation in the environmental assessment phase of this important project.

Sincerely,



Colette M. Sakoda

cc: Stewart Matsunaga, Department of Hawaiian Home Lands

945 Makaiwa Street, Hon., HI 96816 | Phone: 808-732-8602 | Fax: 808-356-1914 | Mobile: 808-748-1529

EPO 14-374
NOV -1 2016

DAVID Y. IGE
GOVERNOR OF HAWAII

VIRGINIA PRESSLER, M.D.
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
KAUAI DISTRICT HEALTH OFFICE
3040 UMI STREET
LIHUE, HAWAII 96766

ANTONETTE A. TORRES
ACTING DISTRICT HEALTH OFFICER

October 26, 2016

Ms. Colette M. Sakoda, Principal
Environmental Planning Solutions, LLC
945 Makaiwa Street
Honolulu Hawaii, 96816

Dear Ms. Sakoda,

SUBJECT: **Pre- Assessment Consultation**
Project: **Consult for Proposed Well Development (EPO-374)**
TMK: **(4) 3-9-02: 012 (por.)**
Applicant: **Department of Hawaiian Home Lands**

Dear Ms. Sakoda,

We have reviewed the subject proposal submitted and have the following environmental health concerns to offer for your consideration at this time.

1. The noise generated during the construction and demolition phases of this project shall not exceed the applicable maximum permissible sound levels as stated in Title 11, Hawaii Administrative Rules (HAR), Chapter 11-46, "Community Noise Control", unless a noise permit is obtained from the Hawaii State Department of Health (DOH).

2. Temporary fugitive dust emissions could be emitted when the project site is prepared for construction and when construction activities occur. In accordance with Title 11, HAR, Chapter 11-60.1, "Air Pollution Control", effective control measures for air pollution shall be provided to prevent or minimize any fugitive dust emissions caused by construction work from affecting the surrounding areas. This includes the off-site roadways used to enter/exit the project

3. Well drilling sometimes requires the use of water and surfactants to clear the hole of grit. The discharge of the water and surfactant to State waters may require an NPDES permit. There are remnants of the former sugar irrigation ditches in the area that lead to State waters. Without any more information on

construction method and BMP's, the NPDES comments should be attached and reads as follows:

The Department of Health, Clean Water Branch (CWB) has reviewed the subject document and offers these comments on your project. Please note that our review is based solely on the information provided in the subject document and its compliance with HAR, Chapters 11-54 and 11-55. You may be responsible for fulfilling additional requirements related to our program. We recommend that you also read our standard comments on our website at http://www.hawaii.gov/health/environmental/env-planning/landuse/CWB-standardcomment.pdf.

I. Any project and its potential impacts to State waters must meet the following criteria:

   a. Antidegradation policy (HAR, Section 11-54-1.1), which requires that the existing uses and the level of water quality necessary to protect the existing uses of the receiving State water be maintained and protected.

   b. Designated uses (HAR, Section 11-54-3), as determined by the classification of the receiving State waters.

   c. Water quality criteria (HAR, Sections 11-54-4 through 11-54-8).

II. Please call the Army Corps of Engineers at (808) 438-9258 to see if this project requires a Department of the Army (DA) permit. Permits may be required for work performed in, over, and under navigable waters of the United States. Projects requiring a DA permit also require a Section 401 Water Quality Certification (WQC) from our office.

III. You are required to obtain a National Pollutant Discharge Elimination System (NPDES) permit for discharges of wastewater, including storm water runoff, into State surface waters (HAR, Chapter 11-55). For the following types of discharges into Class A or Class 2 State waters, you may apply for NPDES general permit coverage by submitting a Notice of Intent (NOI) form:

   a. Storm water associated with industrial activities, as defined in Title 40, Code of Federal Regulations, Sections 122.26(b)(14)(i) through 122.26(b)(14)(ix) and 122.26(b)(14)(xi).

   b. Storm water associated with construction activities, including clearing, grading, and excavation, that result in the disturbance of equal to or greater than one (1) acre of total land area. The total land area includes a contiguous area where multiple separate and distinct construction activities may be taking place at different times on different schedules under a larger common plan of development or sale. **An NPDES permit is required before the start of the construction activities.**

c. Treated effluent from leaking underground storage tank remedial activities.

d. Once through cooling water less than one (1) million gallons per day.

e. Hydrotesting water.

f. Construction dewatering effluent.

g. Treated effluent from petroleum bulk stations and terminals.

h. Treated effluent from well drilling activities.

i. Treated effluent from recycled water distribution systems.

j. Storm water from a small municipal separate storm sewer system.

k. Circulation water from decorative ponds or tanks.

4. You must submit a separate NOI form for each type of discharge at least 30 days prior to the start of the discharge activity, except when applying for coverage for discharges of storm water associated with construction activity. For this type of discharge, the NOI must be submitted 30 before to the start of construction activities. The NOI forms may be picked up at our office or downloaded from our website at: http://www.hawaii.gov/health/environmental/water/cleanwater/forms/genl-index.html.

5. For types of wastewater not listed in Item 3 above or wastewater discharging into Class 1 or Class AA waters, you must obtain an NPDES individual permit. An application for an NPDES individual permit must be submitted at least 180 days before the commencement of the discharge. The NPDES application forms may be picked up at our office or downloaded from our website at http://www.hawaii.gov/health/environmental/water/cleanwater/forms/indiv-index.html.

6. You must also submit a copy of the NOI or NPDES permit application to the State Department of Land and Natural Resources, State Historic Preservation Division (SHPD), or demonstrate to the satisfaction of the CWB that SHPD has or is in the process of evaluating your project. Please submit a copy of your request for review by SHPD or SHPD's determination letter for the project along with your NOI or NPDES permit application, as applicable.

7. Please, note that all discharges related to the project construction or operation activities, whether or not NPDES permit coverage and/or Section 401 WQC are required, must comply with the State's Water Quality Standards. Noncompliance with water quality requirements contained in HAR, Chapter 11-54 and/or permitting requirements, specified in HAR, Chapter 11-55 may be subject to penalties of $25,000 per day per violation.

If you have any questions, please visit our website at http://www.hawaii.gov/health/environmental/water/cleanwater/index.html, or contact the Engineering Section, CWB, at (808) 586-4309.

8. The applicant must contact the CWB Permitting Section at (808) 586-4309.

Although we submit the previously mentioned concern, the Office of Environmental Quality Control is the Department of Health's authority for the review of environmental assessments and environmental impact statements.

Should you have any questions, please call me at 241-3323.

Sincerely,

Gerald N. Takamura

Gerald N. Takamura, Chief
District Environmental Health Program Kaua'i

GNT: DTT

CC: Laura McIntyre, Environmental Planning Office

January 26, 2017

Gerald N. Takamura, Chief
District Environmental Health Program, Kaua`i
State of Hawaii Department. of Health
3040 Umi Street
Lihue, HI 96766

Dear Mr. Takamura:

Subject: Pre-Assessment Consultation to Prepare a Chapter 343 HRS Environmental Assessment for proposed Well Development, Wailua, Kaua'i, Hawai'i, TMK No. (4) 3-9-02:012 (por)

We have received your letter of October 26, 2016 and appreciate your comments relevant to the preparation of the project Environmental Assessment (EA). The following was prepared in response to your comments:

1 & 2. Noise and Dust Controls During Construction. The Draft EA will address how the project construction activities will adhere to DOH rules regarding potential noise and dust emissions.

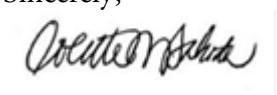
3, 4, 5 & 6. State Receiving Waters, NPDES Requirements: Classification of State receiving waters and precautionary measures to be utilized to ensure protection of this resource will be included in the Draft EA. We have included the Army Corps of Engineers as a consulted party in this pre-assessment phase, and plan to continue to consult with the Corps' Regulatory Branch through the EA process. Additionally, as prescribed and if applicable, a copy of the NOI or NPDES application will be submitted to the DLNR State Historic Preservation Division.

7. Compliance with State Water Quality Standards: Project compliance measures with State Water Quality Standards will be described and assessed in the Draft EA.

The Department of Hawaiian Home Lands is seeking to develop this well so that it can deliver needed water to beneficiaries in a manner that balances cost, efficiency measures, and Public Trust uses of water in the short and long term. Your pre-consultation comments on this effort will help us in this regard, and we look forward to working with you throughout this process.

We appreciate your participation in the environmental assessment phase of this important project.

Sincerely,



Colette M. Sakoda

cc: Stewart Matsunaga, Department of Hawaiian Home Lands
Laura McIntyre, DOH-EPO

Leonard A. Rapozo, Jr.
Director

Ian K. Costa
Deputy Director

DEPARTMENT OF PARKS & RECREATION
County of Kaua'i, State of Hawai'i
4444 Rice Street, Suite 105, Līhu'e, Hawai'i 96766
TEL (808) 241-4460 FAX (808) 241-5126

October 31, 2016

Colette M. Sakoda
Environmental Planning Solutions, LLC
945 Makaiwa Street
Honolulu, Hawai'i 96816

Dear Ms. Sakoda:

RE: Pre-Assessment Consultation to Prepare a Chapter 343 HRS Environmental Assessment for proposed Well Development, Wailua, Kaua'i, Hawai'i, TMK No. (4) 3-9-02:012 (por)

Thank you for allowing the County of Kaua'i Department of Parks and Recreation (DOPR) to comment on the DHHL project regarding the development of water for the future DHHL homesteads in the Wailua area. The DOPR has no negative comments regarding this project. DOPR supports the DHHL efforts to develop needed housing for Kaua'i's people.

Should you have further questions, please contact me at 241-4456.

Sincerely,

Leonard A. Rapozo, Jr.
Director

January 26, 2017

Leonard A. Rapozo, Jr.
Director, Department of Parks & Recreation (DOPR)
County of Kaua`i
4444 Rice Street, Room 105
Lihu`e, HI 96766

Dear Mr. Rapozo:

Subject: Pre-Assessment Consultation to Prepare a Chapter 343 HRS Environmental Assessment for proposed Well Development, Wailua, Kaua'i, Hawai'i, TMK No. (4) 3-9-02:012 (por)

We have received your letter of October 31, 2016 in which you indicated that your department has no negative comments and that the DOPR supports the DHHL efforts to develop needed housing for Kaua`i's residents.

The Department of Hawaiian Home Lands is seeking to develop this well so that it can deliver needed water to beneficiaries in a manner that balances cost, efficiency measures, and Public Trust uses of water in the short and long term. Your pre-consultation comments on this effort will help us in this regard, and we look forward to working with you throughout this process.

We appreciate your participation in the environmental assessment phase of this important project.

Sincerely,

Colette M. Sakoda

cc: Stewart Matsunaga, Department of Hawaiian Home Lands

945 Makaiwa Street, Hon., HI 96816 | Phone: 808-732-8602 | Fax: 808-356-1914 | Mobile: 808-748-1529

Department of Water
County of Kaua'i

Water has no substitute.....Conserve it

December 5, 2016

Ms. Collette Sakoda
Environmental Planning Solutions, LLC.
945 Makaiwa Street
Honolulu, HI 96816

Dear Ms. Sakoda:

Subject: Pre-Assessment Consultation to Prepare a Chapter 343 HRS Environmental Assessment for Proposed Well Development, TMK: 3-9-02:012, Wailua, Kauai

This is in regard to your letter dated October 14, 2016. We have no objections to the proposed drilling, casing, and pump testing of the Department of Hawaiian Home Lands' exploratory well on TMK: 3-9-02:012.

If you have any questions please contact Ms. Regina Flores at (808) 245-5418.

Sincerely,

Edward Doi

Edward Doi
Chief of Water Resources and Planning Division

c: sakodacollette@aol.com (email)

EA, 3-9-02-012, T-18546, Collette Sakoda/RF:mlm

4398 Pua Loke St., P.O. Box 1706, Lihue, HI 96766 Phone: 808-245-5400
Engineering and Fiscal Fax: 808 245-5813, Operations Fax: 808-245-5402, Administration Fax: 808-246-8628

January 26, 2017

Edward Doi
Chief of Water Resources and Planning Division
Department of Water (DOW)
County of Kaua`i
P.O. Box 1706
Lihu`e, HI 96766

Dear Mr. Doi:

Subject: Pre-Assessment Consultation to Prepare a Chapter 343 HRS Environmental Assessment for proposed Well Development, Wailua, Kaua'i, Hawai'i, TMK No. (4) 3-9-02:012 (por)

We have received your letter of December 5, 2016 in which you indicated that your department has no objections to the Department of Hawaiian Home Lands' exploratory well project on the subject TMK.

The Department of Hawaiian Home Lands is seeking to develop this well so that it can deliver needed water to beneficiaries in a manner that balances cost, efficiency measures, and Public Trust uses of water in the short and long term. Your pre-consultation comments on this effort will help us in this regard, and we look forward to working with you throughout this process.

We appreciate your participation in the environmental assessment phase of this important project.

Sincerely,

Colette M. Sakoda

cc: Stewart Matsunaga, Department of Hawaiian Home Lands

945 Makaiwa Street, Hon., HI 96816 | Phone: 808-732-8602 | Fax: 808-356-1914 | Mobile: 808-748-1529

Bernard P. Carvalho, Jr.
Mayor

Wallace G. Rezentes, Jr.
Managing Director

Lyle Tabata
Acting County Engineer

DEPARTMENT OF PUBLIC WORKS
County of Kaua'i, State of Hawai'i
4444 Rice Street, Suite 275, Līhu'e, Hawai'i 96766
TEL (808) 241-4992 FAX (808) 241-6604

November 16, 2016

Ms. Collette Sakoda
Environmental Planning Solutions, LLC
945 Makiawa street
Honolulu, Hawai'i 96816

SUBJECT: Chapter 343, Hawai'i Revised Statutes Pre-Consultation for
Well Development
Wailua, Kaua'i, Hawai'i
TMK (4) 3-9-002-012 (por)

Dear Ms. Sakoda:

The Engineering Division of the Department of Public Works (DPW) received the subject Pre-Consultation letter dated October 14, 2016. We appreciate the opportunity to review and comment on the proposed project which intends to drill, encase, and pump test an exploratory well on Department of Hawaiian Home Lands (DHHL) in Wailua.

We have no comments at this time.

We look forward to being part of the consultation process and to the receipt of further details on the project. If you have any questions or need additional information, please contact Stanford Iwamoto, Engineering Division at (808) 241-4896 or siwamoto@kauai.gov.

Very truly yours,

MICHAEL MOULE, P.E.
Chief, Engineering Division

SI/MM

Copies to: DPW-Design & Permitting

January 26, 2017

Michael Moule, P.E.
Chief, Engineering Division
Department of Public Works (DPW)
County of Kaua`i
4444 Rice Street, Suite 275
Lihu`e, HI 96766

Dear Mr. Moule:

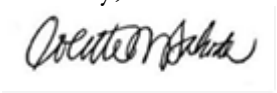
Subject: Pre-Assessment Consultation to Prepare a Chapter 343 HRS Environmental Assessment for proposed Well Development, Wailua, Kaua'i, Hawai'i, TMK No. (4) 3-9-02:012 (por)

We have received your letter of November 16, 2016 in which you indicated that your department has no comments and that the DPW looks forward to being part of the consultation process as the project proceeds.

The Department of Hawaiian Home Lands is seeking to develop this well so that it can deliver needed water to beneficiaries in a manner that balances cost, efficiency measures, and Public Trust uses of water in the short and long term. Your pre-consultation comments on this effort will help us in this regard, and we look forward to working with you throughout this process.

We appreciate your participation in the environmental assessment phase of this important project.

Sincerely,



Colette M. Sakoda

cc: DPW-Design & Permitting
Stewart Matsunaga, Department of Hawaiian Home Lands

Bernard P. Carvalho, Jr.
Mayor

Wallace G. Rezentes, Jr.
Managing Director

Lyle Tabata
Acting County Engineer

DEPARTMENT OF PUBLIC WORKS
County of Kaua'i, State of Hawai'i
4444 Rice Street, Suite 275, Līhu'e, Hawai'i 96766
TEL (808) 241-4992 FAX (808) 241-6604

November 16, 2016

Colette Sakoda
Environmental Planning Solutions, LLC
945 Makaiwa Street
Honolulu, HI 96816

Subject: Pre-Assessment Consultation to Prepare a Chapter 343 HRS Environmental Assessment for proposed Well Development, Wailua, Kaua'i, Hawai'i, TMK No. (4) 3-9-002:012

Dear Ms. Sakoda,

Thank you for the opportunity to comment on the proposed Well Development for the State of Hawai'i Department of Hawaiian Homelands (DHHL). As mentioned by Mari of my staff, these comments are in addition to our comments sent to you separately by Michael Moule, Chief of Engineering Division, County of Kaua'i.

1. If spoils from well drilling activity will be disposed at the landfill, requirements are:
    a. The material would have to pass the paint filter test pursuant to the US EPA approved test method (EPA 9095 per Publication # SW-846), to ensure materials have no free liquids.
    b. A waste characterization would need to be done based on prior land use of the area where the well will be developed. Representative samples may need to be collected and analyzed based on the site specific information. It is recommended the Developer contact the landfill at 337-1416 to get clarification on waste characterization requirements.

2. The County's proposed landfill project is situated on the opposite (mauka) side of the Kalepa Ridge and more than 2,000 feet to the south west of DHHL's proposed well. Prior communication to DHHL back in April 2012 identified the County's project and requested information about their proposed well locations. It appears the proposed well was located considering the County's project however if proximity of proposed landfill creates perception of increased risk of DHHL's planned groundwater well being contaminated, factors to consider include:
    a. Hydrogeology in the subsurface region between the two projects is largely unknown, it would be difficult to reasonably conclude that the Landfill would pose a significant risk of impacting the quality of water drawn from a future

production well, particularly since the proposed water well is located more than 2,000 feet side gradient assuming a Mauka to Makai (west to east) groundwater flow direction.

b. The baseliner design would be prescriptive or better, providing protection against leachate contamination to the subsurface region beneath the landfill.
c. HAR 58.1 (Regulations for Site evaluation of LF's which mirror EPA requirements) does not provide minimum distance from a landfill to a water production well.

Please let me know if you have any questions.

Yours truly,

Lyle Tabata
Acting County Engineer

January 26, 2017

Lyle Tabata
Acting County Engineer
Department of Public Works (DPW)
County of Kaua`i
4444 Rice Street, Suite 275
Lihu`e, HI 96766

Dear Mr. Tabata:

Subject: Pre-Assessment Consultation to Prepare a Chapter 343 HRS Environmental Assessment for proposed Well Development, Wailua, Kaua'i, Hawai'i, TMK No. (4) 3-9-02:012 (por)

We have received your letter of November 16, 2016 in which you offered information and comments. The following has been prepared in response to your comments relative to well drilling activity and to the County's proposed landfill.

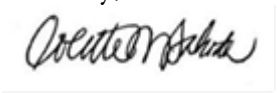
1. Well drilling activity requirements. Compliance with US EPA requirements for spoils disposal as well as waste characterization for the well development site will be discussed.

2. County's proposed landfill project. Potential impacts, mitigation measures and preventive measures as offered in your letter will be included in the cumulative impacts section.

The Department of Hawaiian Home Lands is seeking to develop this well so that it can deliver needed water to beneficiaries in a manner that balances cost, efficiency measures, and Public Trust uses of water in the short and long term. Your pre-consultation comments on this effort will help us in this regard, and we look forward to working with you throughout this process.

We appreciate your participation in the environmental assessment phase of this important project.

Sincerely,



Colette M. Sakoda

cc: Stewart Matsunaga, Department of Hawaiian Home Lands

DAVID Y. IGE
GOVERNOR OF HAWAII

VIRGINIA PRESSLER, M.D.
DIRECTOR OF HEALTH

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

In reply, please refer to:
EMD/CWB

10039PGH.16

October 26, 2016

Ms. Collette M. Sakoda
Environmental Planning Solutions, LLC
945 Makaiwa Street
Honolulu, Hawaii 96816

Dear Ms. Sakoda:

SUBJECT: Comments on Pre-Assessment Consultation to Prepare a Chapter 343 HRS Environmental Assessment for Proposed Well Development Wailua, Kauai, Hawaii, TMK No. (4) 3-9-02:012 (por)

The Department of Health (DOH), Clean Water Branch (CWB), acknowledges receipt of your letter, dated October 21, 2016, requesting comments on your project. The DOH-CWB has reviewed the subject document and offers these comments. Please note that our review is based solely on the information provided in the subject document and its compliance with the Hawaii Administrative Rules (HAR), Chapters 11-54 and 11-55. You may be responsible for fulfilling additional requirements related to our program. We recommend that you also read our standard comments on our website at: http://health.hawaii.gov/epo/files/2013/05/Clean-Water-Branch-Std-Comments.pdf

1. Any project and its potential impacts to State waters must meet the following criteria:

   a. Antidegradation policy (HAR, Section 11-54-1.1), which requires that the existing uses and the level of water quality necessary to protect the existing uses of the receiving State water be maintained and protected.

   b. Designated uses (HAR, Section 11-54-3), as determined by the classification of the receiving State waters.

   c. Water quality criteria (HAR, Sections 11-54-4 through 11-54-8).

2. You may be required to obtain National Pollutant Discharge Elimination System (NPDES) permit coverage for discharges of wastewater, including storm water runoff, into State surface waters (HAR, Chapter 11-55). Also, any discharge to State waters of treated process wastewater effluent (including well drilling slurries, lubricating fluids wastewater, and well purge wastewater) requires NPDES permit coverage.

For NPDES general permit coverage, a Notice of Intent (NOI) form must be submitted at least 30 calendar days before the commencement of the discharge. An application for a NPDES individual permit must be submitted at least 180 calendar days before the commencement of the discharge. To request NPDES permit coverage, you must submit the applicable form ("CWB Individual NPDES Form" or "CWB NOI Form") through the e-Permitting Portal and the hard copy certification statement with the respective filing fee ($1,000 for an individual NPDES permit or $500 for a Notice of General Permit Coverage). Please open the e-Permitting Portal website located at: https://eha-cloud.doh.hawaii.gov/epermit/. You will be asked to do a one-time registration to obtain your login and password. After you register, click on the Application Finder tool and locate the appropriate form. Follow the instructions to complete and submit the form.

3. NPDES permit coverage is not required for well pump testing. The discharger shall take all measures necessary to prevent the discharge of pollutants from entering State waters. Such measures shall include, if necessary, containment of initial discharge until the discharge is essentially free of pollutants. If the discharge is entering a stream or river bed, best management practices shall be implemented to prevent the discharge from disturbing the clarity of the receiving water. If the discharge is entering a storm drain, the discharger must obtain written permission from the owner of the storm drain prior to discharge. Furthermore, best management practices shall be implemented to prevent the discharge from collecting sediments and other pollutants prior to entering the storm drain.

4. If your project involves work in, over, or under waters of the United States, it is highly recommended that you contact the Army Corp of Engineers, Regulatory Branch (Tel: 835-4303) regarding their permitting requirements.

   Pursuant to Federal Water Pollution Control Act [commonly known as the "Clean Water Act" (CWA)], Paragraph 401(a)(1), a Section 401 Water Quality Certification (WQC) is required for "[a]ny applicant for Federal license or permit to conduct any activity including, but not limited to, the construction or operation of facilities, which may **result** in any discharge into the navigable waters..." (emphasis added). The term "discharge" is defined in CWA, Subsections 502(16), 502(12), and 502(6); Title 40 of the Code of Federal Regulations, Section 122.2; and Hawaii Administrative Rules (HAR), Chapter 11-54.

5. Please note that all discharges related to the project construction or operation activities, whether or not NPDES permit coverage and/or Section 401 WQC are required, must comply with the State's Water Quality Standards. Noncompliance with water quality requirements contained in HAR, Chapter 11-54, and/or permitting requirements, specified in HAR, Chapter 11-55, may be subject to penalties of $25,000 per day per violation.

6. It is the State's position that all projects must reduce, reuse, and recycle to protect, restore, and sustain water quality and beneficial uses of State waters. Project planning should:

   a. Treat storm water as a resource to be protected by integrating it into project planning and permitting. Storm water has long been recognized as a source of irrigation that will not deplete potable water resources. What is often overlooked is that storm water recharges ground water supplies and feeds streams and estuaries; to ensure that these water cycles are not disrupted, storm water cannot be relegated as a waste product of impervious surfaces. Any project planning must recognize storm water as an asset that sustains and protects natural ecosystems and traditional beneficial uses of State waters, like community beautification, beach going, swimming, and fishing. The approaches necessary to do so, including low impact development methods or ecological bio-engineering of drainage ways must be identified in the planning stages to allow designers opportunity to include those approaches up front, prior to seeking zoning, construction, or building permits.

   b. Clearly articulate the State's position on water quality and the beneficial uses of State waters. The plan should include statements regarding the implementation of methods to conserve natural resources (e.g. minimizing potable water for irrigation, gray water re-use options, energy conservation through smart design) and improve water quality.

   c. Consider storm water Best Management Practice (BMP) approaches that minimize the use of potable water for irrigation through storm water storage and reuse, percolate storm water to recharge groundwater to revitalize natural hydrology, and treat storm water which is to be discharged.

   d. Consider the use of green building practices, such as pervious pavement and landscaping with native vegetation, to improve water quality by reducing excessive runoff and the need for excessive fertilization, respectively.

   e. Identify opportunities for retrofitting or bio-engineering existing storm water infrastructure to restore ecological function while maintaining, or even enhancing, hydraulic capacity. Particular consideration should be given to areas prone to flooding, or where the infrastructure is aged and will need to be rehabilitated.

If you have any questions, please visit our website at:http://health.hawaii.gov/cwb/, or contact the Engineering Section, CWB, at (808) 586-4309.

Sincerely,

Alec Wong

ALEC WONG, P.E., CHIEF
Clean Water Branch

GH

c: DOH-EPO
[via e-mail Noella.Narimatsu@doh.hawaii.gov, laura.mcintyre@doh.hawaii.gov, DOH.EPO@doh.hawaii.gov only]
Mr. Stewart T. Matsunaga, DHHL
[via e-mail stewart.t.matsunaga@hawaii.gov only]

Environmental Planning Solutions, LLC

January 26, 2017

Alec Wong, P.E., Chief
Clean Water Branch
State of Hawaii Department. of Health
919 Ala Moana Blvd., Rm. 312
Honolulu, HI 96814

Dear Mr. Wong:

Subject: Pre-Assessment Consultation to Prepare a Chapter 343 HRS Environmental Assessment for proposed Well Development, Wailua, Kaua'i, Hawai'i, TMK No. (4) 3-9-02:012 (por)

We have received your letter of October 26, 2016 and appreciate your comments relevant to the preparation of the project Environmental Assessment (EA). The following was prepared in response to your comments:

1. State Receiving Waters: Classification of State receiving waters and precautionary measures to be utilized to ensure protection of this resource will be included in the Draft EA.

2. & 3. National Pollutant Discharge Elimination System (NPDES) permit coverage: NPDES permit requirements will be discussed relative to anticipated construction activities and their potential impacts.

4 & 5. Army Corps of Engineers Consultation and State Water Quality Standards: We have included the Army Corps of Engineers as a consulted party in this pre-assessment phase, and plan to continue to consult with the Corps' Regulatory Branch through the EA process.

6. State's position to reduce, reuse, and recycle: Project planning, design and construction phases will reflect the State's position to reduce, reuse and recycle whenever and wherever possible.

The Department of Hawaiian Home Lands is seeking to develop this well so that it can deliver needed water to beneficiaries in a manner that balances cost, efficiency measures, and Public Trust uses of water in the short and long term. Your pre-consultation comments on this effort will help us in this regard, and we look forward to working with you throughout this process.

We appreciate your participation in the environmental assessment phase of this important project.

Sincerely,

Colette M. Sakoda

cc: Stewart Matsunaga, Department of Hawaiian Home Lands
Laura McIntyre, DOH-EPO

945 Makaiwa Street, Hon., HI 96816 | Phone: 808-732-8602 | Fax: 808-356-1914 | Mobile: 808-748-1529

APPENDIX B

DRAFT
ARCHAEOLOGICAL INVENTORY SURVEY

SCS Project Number 864-1

-DRAFT-

AN ARCHAEOLOGICAL INVENTORY SURVEY REPORT FOR THE PROPOSED WAILUĀ RESIDENTIAL SUBDIVISION LOCATED ADJACENT TO THE WAILUĀ RIVER STATE PARK WAILUĀ AHUPUA`A, PUNA DISTRICT, KAUA`I ISLAND, HAWAI`I [TMKs: (4) 3-9-02: 12, 24, 25 AND 3-9-06: 09]

Prepared by:
Trisha M. Drennan, M.Sc.
October 2007

Prepared for:
Environet, Inc.
2850 Pa`a Street, Suite 212
Honolulu, HI 96819

ABSTRACT

At the request of Environet, Inc., Scientific Consultant Services, Inc. (SCS) conducted an Archaeological Inventory Survey on Department of Hawaiian Home Lands (DHHL) parcels in Wailuā, Wailuā Ahupua`a, Puna District, Kaua`i Island, Hawai`i [TMKs: (4) 3-9-02: 12, 24, 25 and 3-9-06: 09]. The project area encompassed approximately 240 acres. The overall project included an Archaeological Inventory Survey (covered here) and a Cultural Impact Assessment (under separate cover). The archaeological work consisted of 100 percent pedestrian survey of the project area, revealing mostly charred sugarcane fields (roughly 70% of project area) and selected survey of unburned and peripheral areas.

The survey led to the identification of three new archaeological sites comprised of nine features. In addition, a historic feature (rock wall) was identified through archival research, and was later relocated as an earthen berm heavily obscured by vegetation. Site TS-1 is an historic site (agricultural water diversion and irrigation features) associated with the Plantation Era on Kaua`i. Site TS-2 consists of a prehistoric surface lithic (stone tool) scatter. TS-3 is composed of one rock wall (TS-3, Feature 1) with traditional construction, two rock terrace remnants (TS-3, Features 2 and 3), and one multi-tiered enclosure (TS-3, Feature 4). Subsurface testing at these sites and selected sections of the project area yielded only negative results. One significant, previously identified site occurs just outside the project boundary (northeast corner) Malae Heiau (Site -104).

Sites TS-1 and TS-2 are significant under Criteria D of the State Register of Historic Places; no further work is recommended for TS-1. However, further investigation into extending the boundary of Site-104 to include TS-2, Locus A, is required. Site TS-3 is significant under Criteria D and possibly E. In addition, Data Recovery is recommended for Sites TS-2 and TS-3 to investigate possible connections between Site -502 and *kapu* lands, which the attending commercial development may affect. Data Recovery should include testing at the historic wall site to verify its existence and location. Further, construction activities immediately outside the Buffer Zone (100 m) of Site -104 (Malae Heiau) at Site TS-2, as well as the northern border of the project area which includes areas of lithic concentrations and TS-1 Feature 5, are recommended for Monitoring.

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INTRODUCTION

At the request of Environet, Inc., Scientific Consultant Services, Inc. (SCS) conducted an Archaeological Inventory Survey of Hawaiian Home Lands (DHHL) parcels in Wailuā, Wailuā Ahupua`a, Puna District, Kaua`i Island, Hawai`i [TMKs: (4) 3-9-02: 12, 24, 15 and 3-9-06: 09]. This survey was conducted in conjunction with an Environmental Assessment of the proposed Wailuā Residential Subdivision (Figures 1 and 2). The Inventory Survey consisted of historical background and archival research; a full pedestrian survey of the parcels; backhoe-excavated subsurface testing; mapping of test units; and the analysis, interpretation, and reporting of all relevant data. Fieldwork was conducted by SCS archaeologists, including Jim Powell, B.A., Randy Ogg, B.A., Guerin Tome, B.A, and Sonya Niess, B.A., on several visits to the project areas from July through August 2007. Analysis of artifacts was conducted by Guerin Tome, B.A. and Dr. Robert Spear. The Principal Investigator for this project was Michael Dega, Ph.D.

Portions of TMK: 3-9-02: 12, 24 and 25 contain 30+ acres zoned for commercial use along Kuhio Highway. Proposed use for this land includes 700–1,000 Single Family Residential lots, 12 acres for a school/park site, a 120-foot wide by-pass road, and 18 acres being set aside for a community center and park site. The proposed development related to TMK: 3-9-06: 9 contains 52 acres of land zoned for commercial development (800–1,000 units).

The Wailuā River State Park includes one archaeological site, the Malae Heiau, (listed on the National and State Registers of Historic Places, Site 50-30-08-502), which borders the project area. A large variety, and number, of traditional and historic sites have been documented in Wailuā Ahupua`a, and this is an important area for Kaua`i history and traditions. No previous archaeological survey or subsurface testing has occurred within the immediate project area; however, the project area is adjacent to one of the four *heiau* (Malae) that comprise the Wailuā Complex of Heiau, Malae Heiau, a National Historic Landmark. The *heiau*, which has been previously documented, contains a 100-foot wide buffer on the east and west sides and a 300-foot buffer on its north and south sides (Figure 3) (Yent 2005: 1).

INVENTORY SURVEY SUMMARY

The present Inventory Survey research led to the identification of three new archaeological sites that were assigned temporary site numbers TS-1, TS-2, and TS-3 (see Figure 1) (Table 1). Nine total features were identified in these three sites. Archival research identified the existence of an historic rock wall that was not evident through pedestrian survey but its location is shown on an historic map (Figure 4); the approximate location of this historic wall

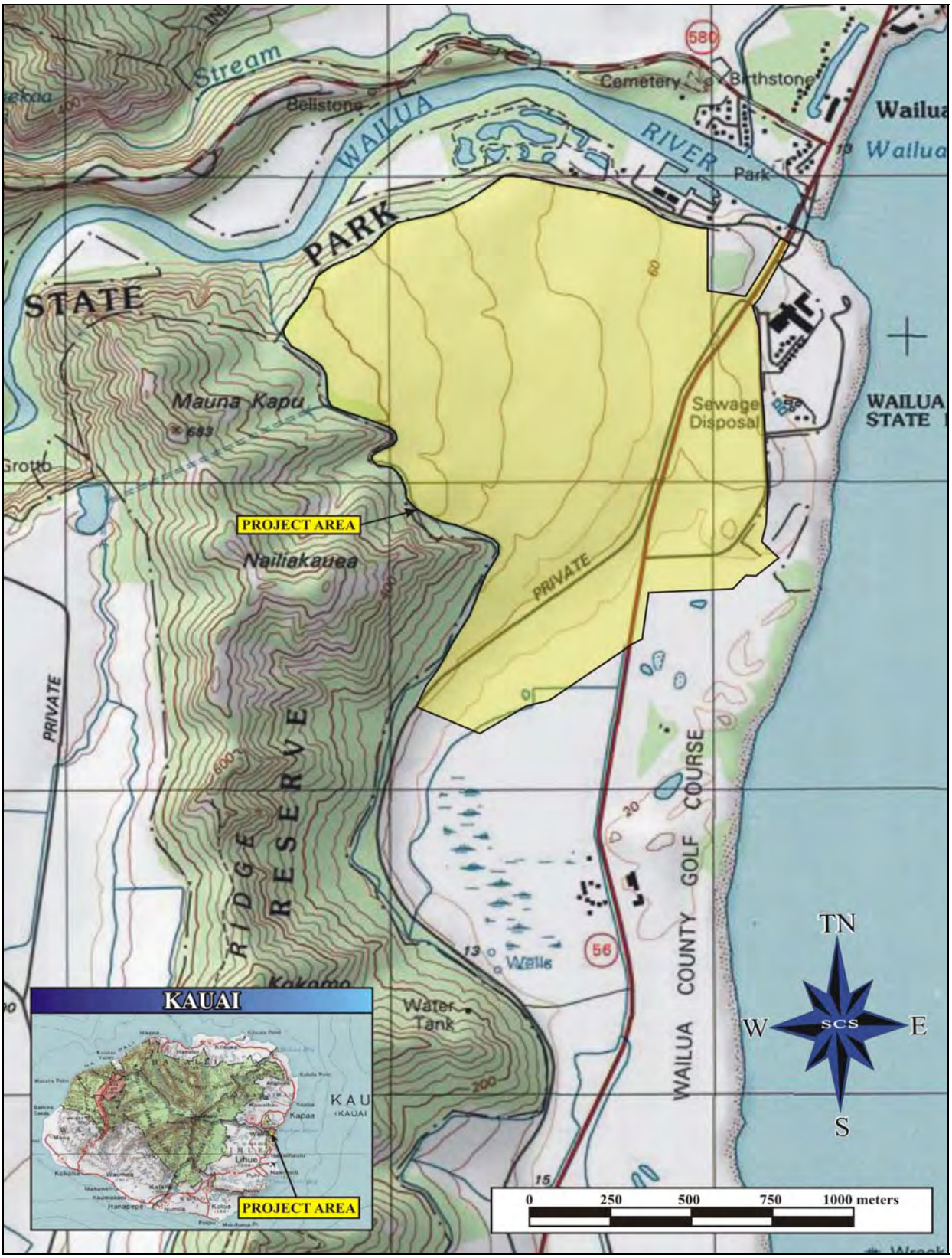


Figure 1: USGS Wailuā Quadrangle Map Showing Project Area.

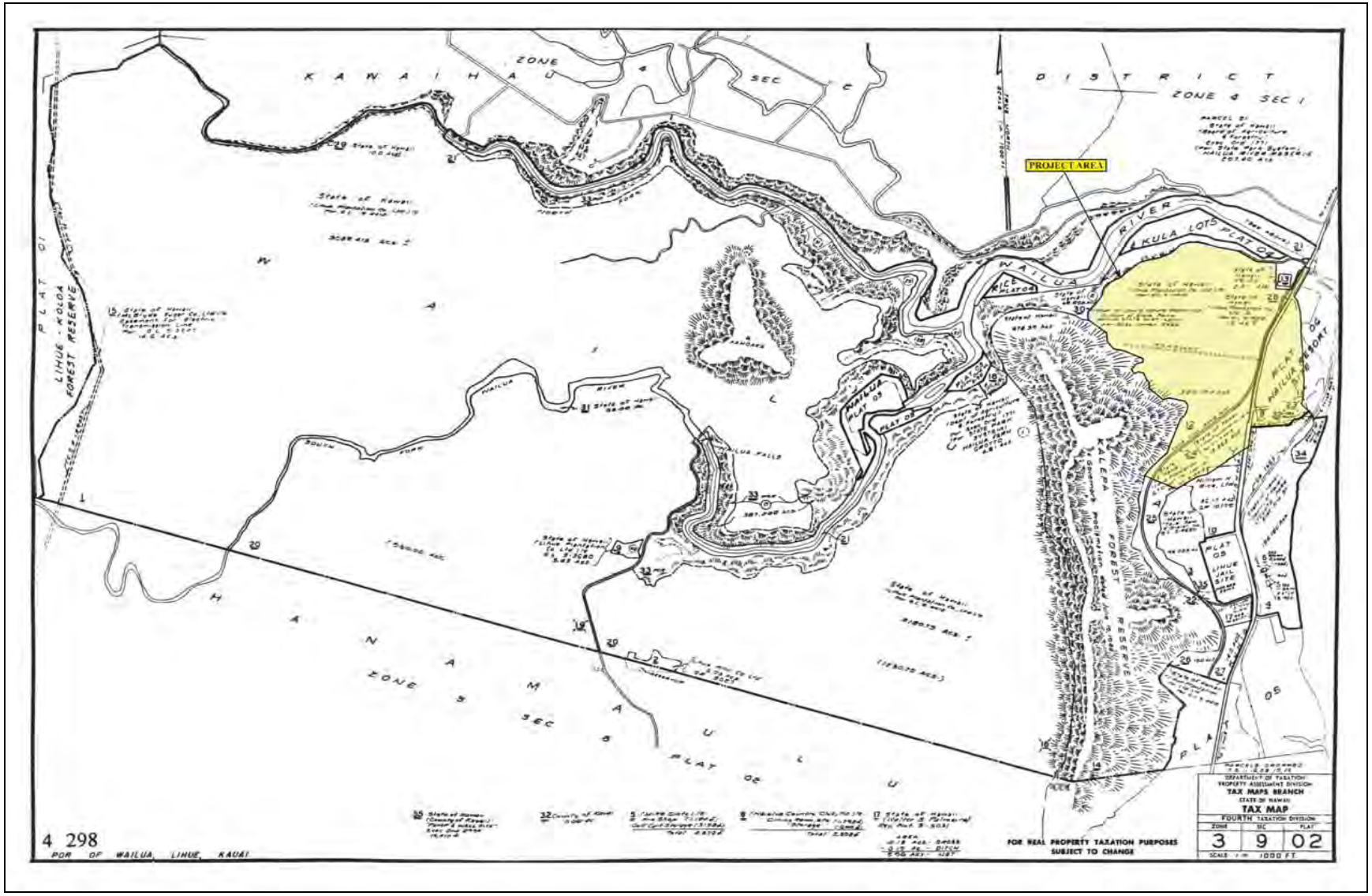


Figure 2: Tax Map Key [TMK] Showing Project Location.

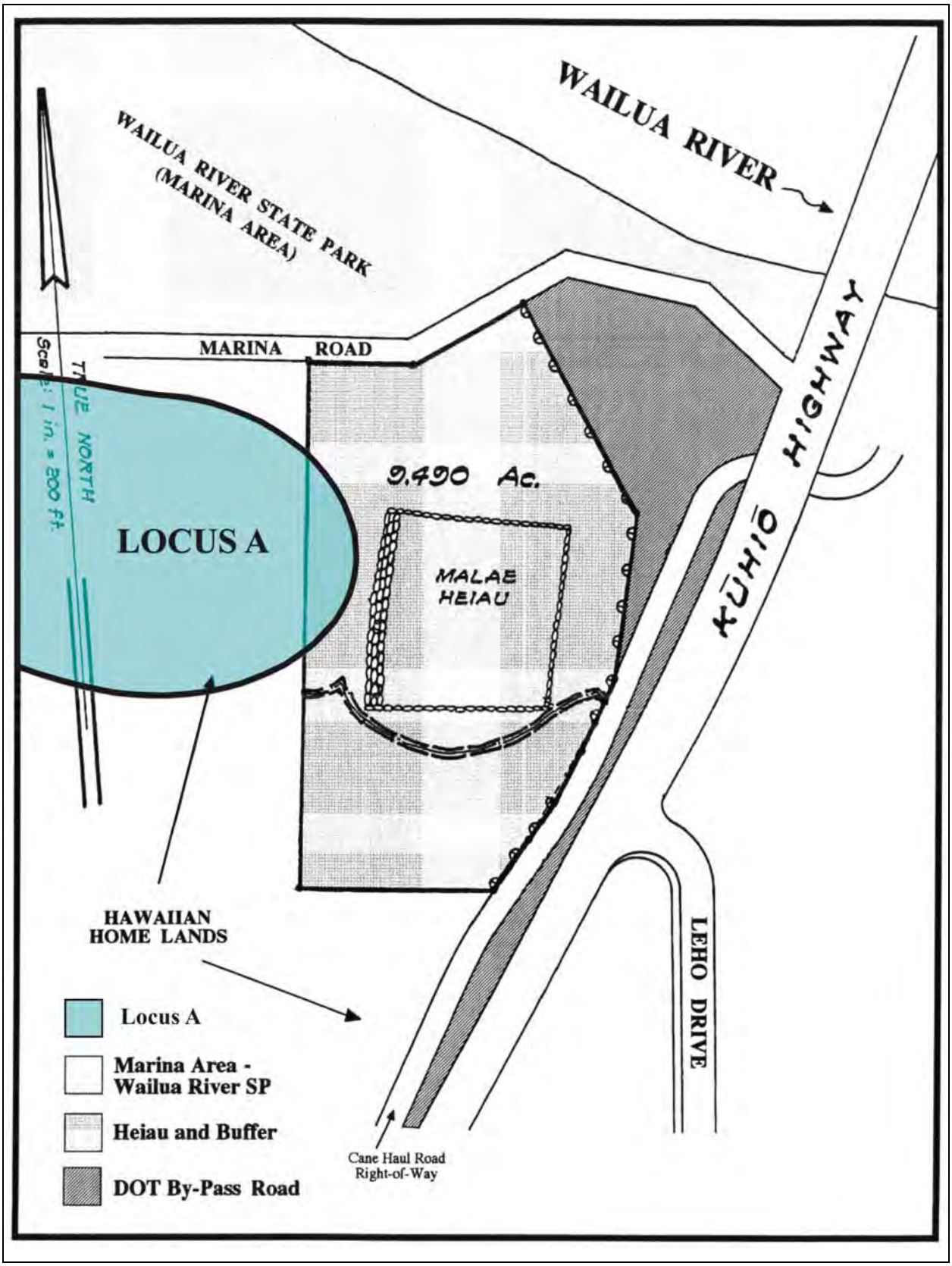


Figure 3: Malae Heiau and current buffer delineation. (Adapted from Yent 2005: Fig. 5).

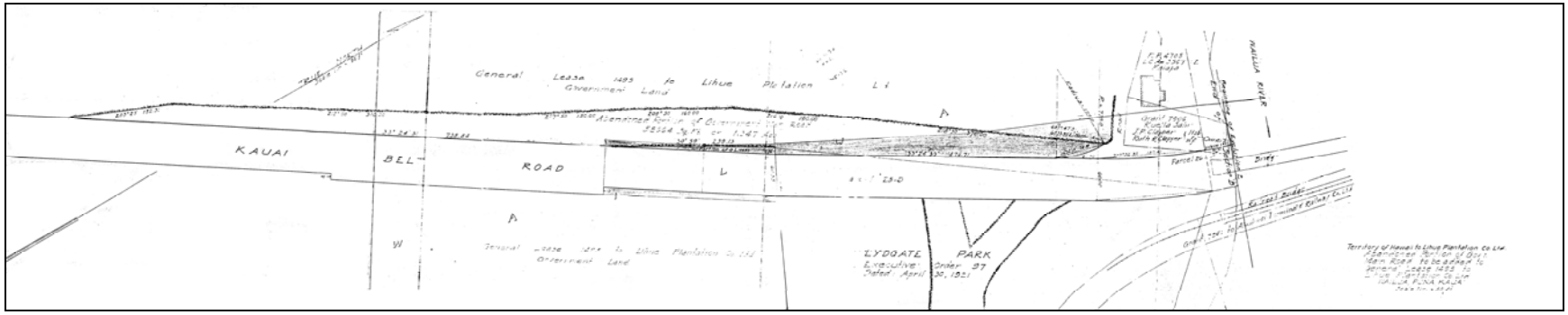


Figure 4: Historical Map ca. 1933, Conveyance of Abandoned Government Road, Territory of Hawaii, to The Lihue Plantation Co., LTD.

Table 1: Wailua DHHL Project Summary Data.

ARS (SCS Temp Site No.)	State Site No. 50-30-08	Feature(s)	Site Form	Function	Time Period	Test	Significance Assessments	Comments
TS-1		5	1A) Earthen reservoir 1B) Earthen reservoir 1C) Concrete watergate 2) Watergate 3) Watergate with culvert 4) Bridge with irrigation diversion ditch 5) Ditch	Water transportation	Plantation Era	N	Criteria D	No further work required
TS-2		4 Loci + 1 outlier	Lithic scatters	Lithic Workshop and Chipping Stations	Pre-Contact	Y	Criteria D	Data Recovery
TS-3		4	1) Rock wall 2) Rock terrace remnant 3) Rock terrace remnant 4) Rock enclosure	Agriculture; Habitation	Pre-Contact To Plantation Era	N	Criteria D/ Criteria E?	Data Recovery

was later verified on the ground as an earthen berm after the conclusion of the field portion of the survey (Figure 5). Twenty-eight backhoe trenches (ST-1 through ST-28) were excavated at two locations during field survey (e.g. Site TS-2 (Test Area 1) at the northeastern boundary of the project area, and Test Area 2 at the southeastern corner of the project area) (Figure 6).

The first site, TS-1, an agricultural water diversion, contained five features and three sub-features. Site TS-1 was an historic site associated with the Plantation Era in Kaua`i. Since Site TS-1 contained historic construction typifying water transportation features, no test units were placed in this site.

Site TS-2 consisted of a prehistoric surface lithic (stone tool) scatter. The artifacts occurred within four main locations and one outlier. Locus A contained the highest concentration of lithics (N=111); the remaining loci consisted of a total 25 artifacts. The artifacts are associated with pre-Contact times. Five backhoe trenches were placed in Locus A; no cultural materials were recovered (see Figure 4). All cultural resources associated with Site TS-2 were from a surface context.

Site TS-3 consisted of three features and nine sub-features: two rock terrace remnants (Features 2 and 3) and one rock wall (Feature 1). A fourth feature, a substantial enclosure with

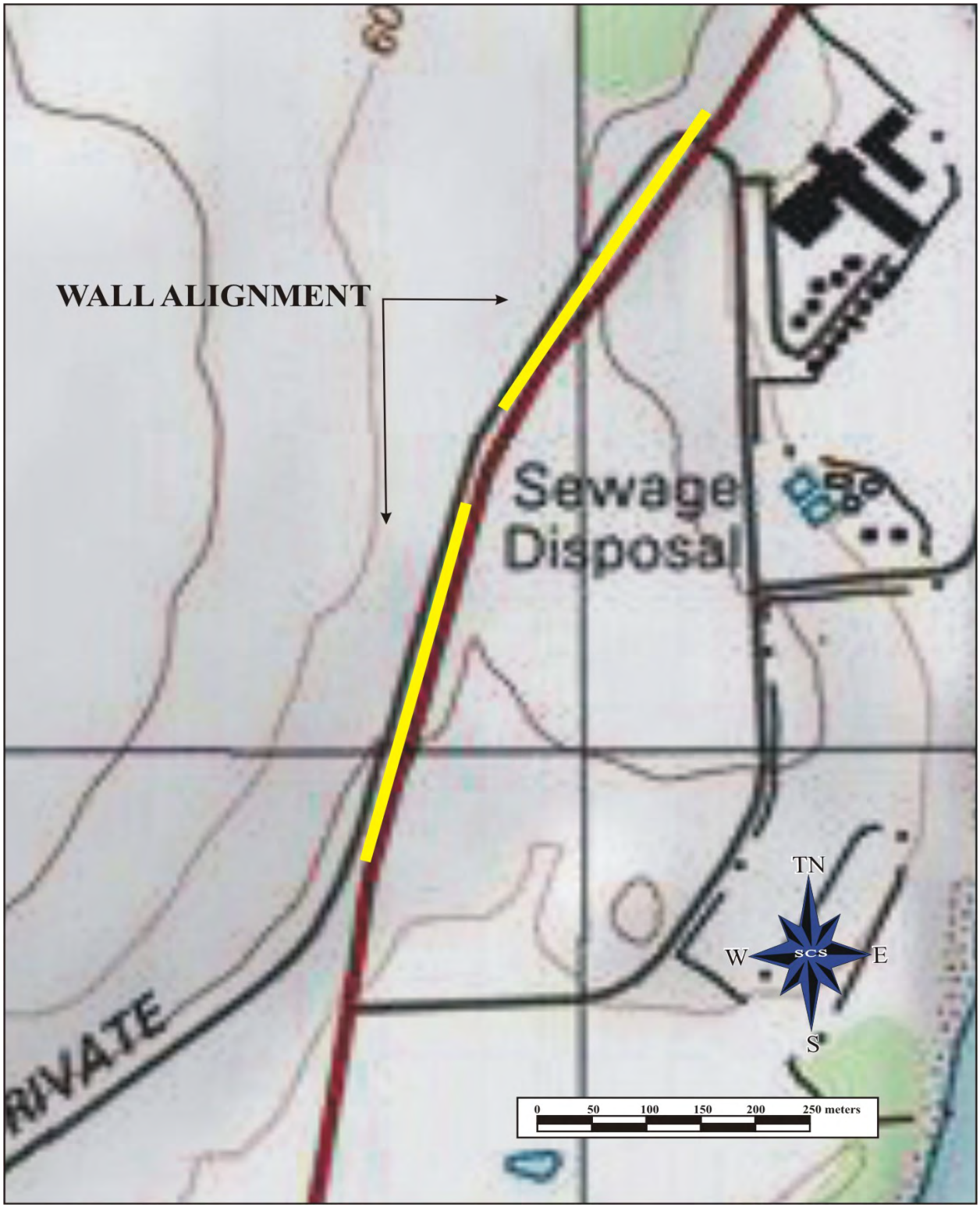


Figure 5: USGS Wailua Quadrangle Map Showing Probable Location of Historic Rock Wall.

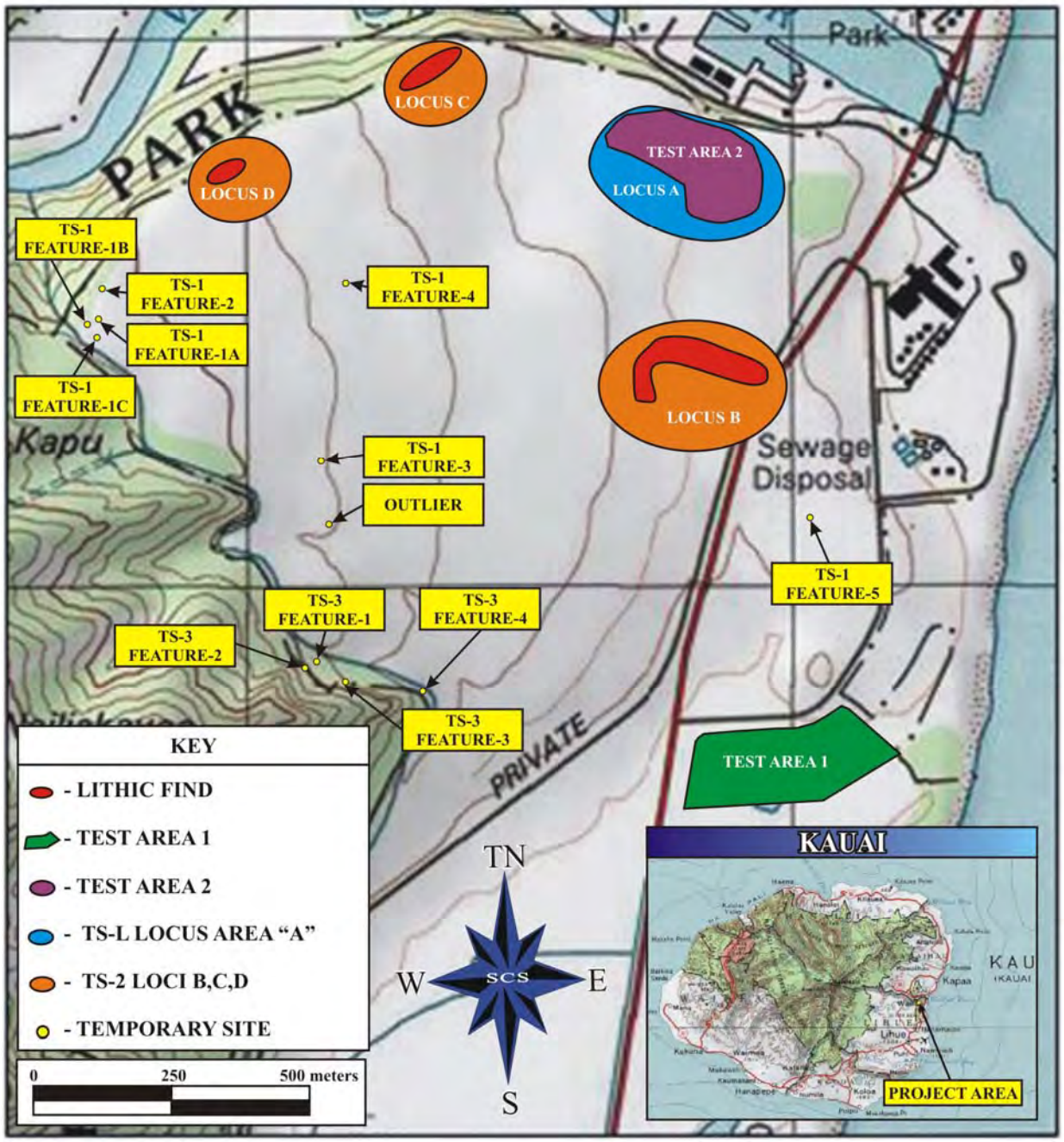


Figure 6: USGS Wailua Quadrangle Map Showing Site and Testing Locations.

abutting terracing, appeared just outside the project boundaries; however, was minimally recorded due to its complex construction and perceived uniqueness and association with Features 1 through 3. No archaeological test units were placed in Site TS-3.

Nine features were identified at three sites. An historic 1933 map provides the location of an historic rock wall which lies between the Lihue Plantation leased land on its western boundary, and the abandoned Government Rd. property and Kauai Belt Road on its eastern side (Kaua`i Historical Society) (see Figure 4). Twenty-three stratigraphic trench (ST) units were excavated in the southeastern portion of the project area adjacent to the golf course and closest to the shoreline (see Figure 6). The results for trench excavations again produced negative results.

BACKGROUND

PROJECT AREA LOCATION

The project area is situated on the eastern side of the island of Kaua`i, on sloping lands below Kālepa Ridge, parallel to the coastal plain and upslope of the southern banks of the Wailuā River. The Wailuā River is one of the largest in the Hawaiian Islands, with a broad floodplain primarily composed of overbank sediments transported by the river.

Wailuā River State Park, established in 1954, is composed of 1,092.6 acres and is located immediately north-northwest of the project area (see Figure 1). Seven *heiau* (places of worship) extend from the mouth of the Wailuā River to Mt. Wai`ale`ale. The Park contains four *heiau* that comprise the Wailuā Complex of Heiau (National Historic Landmark); one borders the project area. At this important seat of chiefly power lie the remains of these *heiau*; the Complex also contains *pu`uhonua* (places of refuge), birthstones at Holoholokū (Pōhaku Ho`ohānau), and the Bell Stone. The Park hosts river fishing, restaurants, and picnicking along a riverside coconut grove and boating from its marina.

The western portion of the project area is bounded by Kālepa Ridge. Two prominent landmarks mark the horizon: Sleeping Giant to the north, in the Nounou Forest Reserve, and the topographical feature Mauna Kapu, part of the Kālepa Forest Reserve to the south. Leho Drive and Nehe Road mark the eastern boundary of the project area. Kuhio Highway, a major north-south transportation artery, passes through the project area. A cane-haul road, which once facilitated transport of sugarcane during harvest, runs between Malae Heiau and Kuhio Highway. Directly east is the shoreline, once a part of State Parks, is now a part of Kaua`i County Parks.

PROJECT AREA DESCRIPTION

In geological terms, the *mokupuni* (island) of Kaua`i is described as a dissected basaltic dome of a single large shield volcano; it is the oldest of the major, inhabited Hawaiian Islands. According to Clague and Dalrymple (1994), the age of the shield-building phase of Kaua`i is approximately 3.9–5.8 million years ago (mya). Starting approximately 1.4 mya, post-shield eruptions from volcanic vents centered on Kōloa spread surface lava flows over half of the eastern portion of the island, including the project area. The Kōloa flows occurred on top of the older (shield-phase) Waimea lava flows. A large cinder cone, Hanahanapuni, is located in the upper drainage basin of the Wailuā River. Wailuā Falls was formed from the Wailuā River over a thick lava flow of the Kōloa volcanic series, where the river undercut the weak underlying tuff, mudflow, and pillow lavas (Stearns 1966).

The project area is situated on the Lihue flood plain (Elevation: 9' to 270' amsl) along the southern banks of the Wailuā River (see Figures 1 and 2). The terrain has been modified in historic times by the planting of sugar cane. This remodeling of the landscape has extended up to several feet deep into the subsurface, in some places, as confirmed in testing by SCS (see TESTING).

VEGETATION

In June of 2007, approximately 225 acres of land burned in a series of brush fires; most of this land was part of the Department of Hawaiian Home Land (current project area). The rest of the damage was sustained in the Kālepa Mountain Forest Reserve; however, rainfall stopped the fire from reaching the top of the Kālepa ridgeline.

Approximately 70 percent of the vegetation in the project area has been burned or affected by the fire. Several plants were identified in the project area: banyan (*Ficus benghalensis* L.), Java plum (*Eugenia jambolana* Lam.), umbrella tree (*Brassaia actinophylla*), common guava (*Psidium guajava* L.*)*, Christmas berry (*Schinus terebinthifolius*), *koa haole* (*Leucaena glauca*), various species of exotic palms (Arecaceae), ferns, (Felicides), *Boervahia* sp. *lantana* (*Lantana camara*) and *`aki`aki haole* (buffalo grass, *Buchloe dactyloides*), and various miscellaneous grasses, vines, and weeds. A botanical survey conducted of Malae Heiau (outside northeast corner of project area) in 1991 showed a variety of exotic plants and trees (Flynn 1991).

HYDROLOGY

Compared with other locations in Windward Kaua`i, the project area is only moderately wet, with an average annual rainfall between 50 and 60 inches (1270–1520 mm) (Armstrong

1983). Particularly in pre-Contact times, a much greater amount of through-flowing, fresh water would have been locally available in the Wailuā River that drain the uplands to the west of the project area.

SOILS

The soils dominating the majority of the project area were contained in the Lihue Series, but also portions of which encountered were of the Kalapa, Kaena and Hanamaulu Series (Foote *et al.* 1972:39, 50–51, 55–56, 82–83) (Figure 7).

The soils of the Lihue Series consists of well-drained soils located in the uplands of Kaua`i Island and are formed in materials weathered from igneous rock. The slope ranges from gentle to steep, and elevations extend from around sea level to 300 feet amsl. Rainfall ranges from 40 to 60 inches annually and the mean soil temperature is 73 degrees Fahrenheit. Soils in this series area used for commercial agriculture including, sugarcane, pineapple, pasture, truck crops, orchards, wildlife habitat, and home sites (*ibid*: 82–83).

Lihue silty clay soils (LhB, LhC, and LhD) are the three types of soils of the Lihue Soil Series present in the current project area. The basic difference between these soils is the slope percentage, the rate of runoff, and the erosion hazard. LhB soils contain slopes that range from 0 to 8 percent and are found on the tops of broad interfluves in the uplands. In a representative profile, the surface layer of these soils is approximately 12 inches thick, the subsoil is more than 48 inches thick, and the substratum consists of soft, weathered rock. In this type of soil, permeability is moderately rapid, runoff is slow, and the erosion hazard is slight. LhC soils have a slope ranging from 8 to 15 percent, slow runoff, and pose a slight erosion hazard. The LhD soils have slopes ranging from 15 to 25 percent, medium runoff, and are a moderate erosion hazard (*ibid*: 82–83).

The Hanamaulu Series consist of well-drained soils on stream terraces and steep terrace breaks on the island of Kaua`i. These soils were developed in alluvium washed from upland soils (*ibid*: 39–40).

The surface layer of Hanamaulu silty clay (HsD) is brown and very dark grayish-brown silty clay about 11 inches thick. The subsoil is 60 inches thick is dark brown and dark reddish brown subangular blocky silty clay. Runoff is medium, the slope is 15 to 25 percent, and the erosion hazard is moderate. This soil is used for sugarcane, pasture, water supply and wildlife habitat (*ibid*).

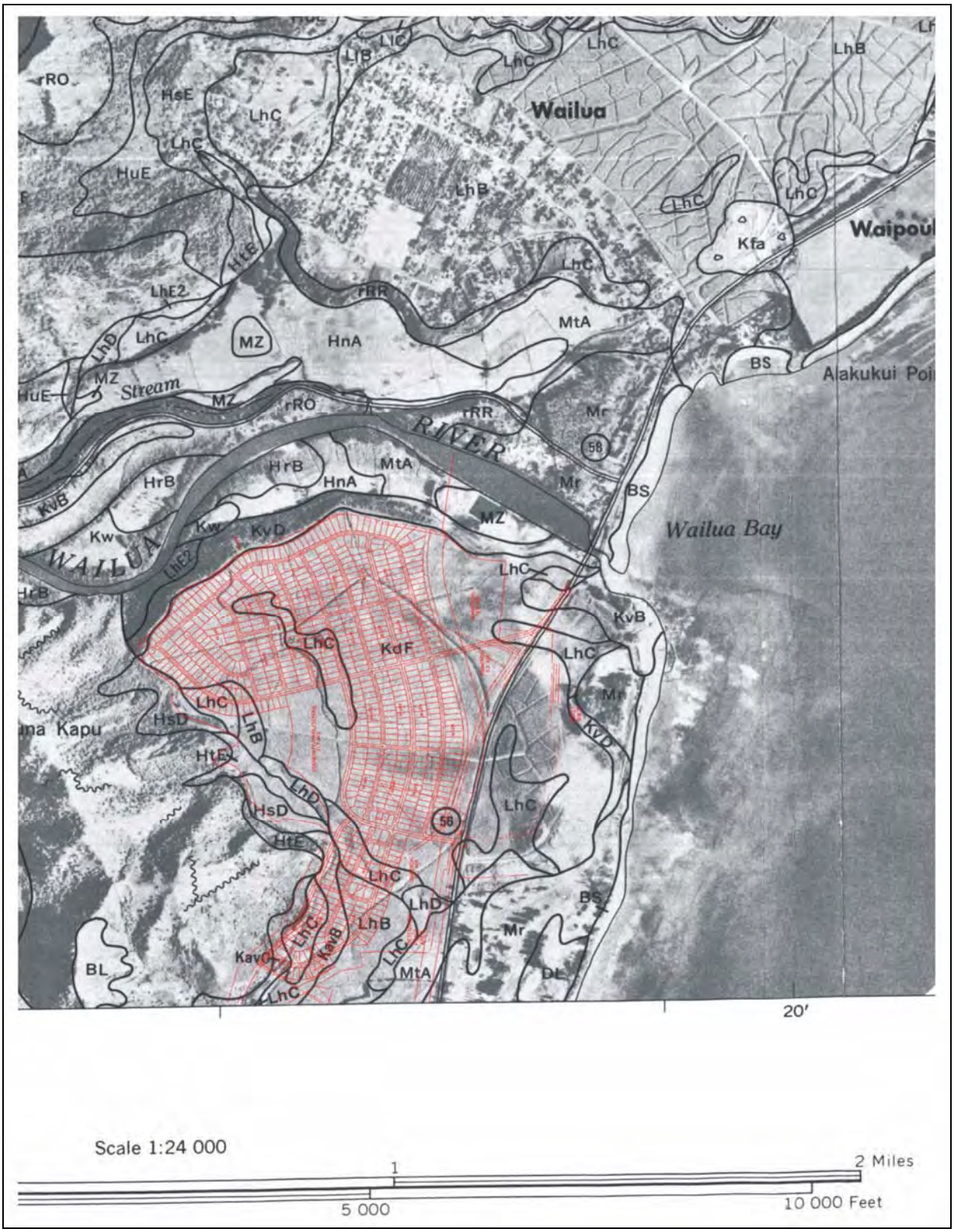


Figure 7: USDA Soil Survey Map Showing Soils in Project Area.

The surface layer of Hanamaulu stony silty clay (HtE) is brown and very dark grayish-brown silty clay about 11 inches thick. The subsoil is 60 inches thick is dark brown and dark reddish brown subangular blocky silty clay that is stony. Runoff is medium to rapid, the slope is between 10 and 35 percent, and the erosion hazard is moderate to severe. This soil is used for pasture, woodland, wildlife habitat, and water supply (*ibid*).

The Kaena Series consists of a very deep, poorly drained soils on alluvial fans and talus slopes on the islands of O`ahu and Kaua`i. These soils developed in alluvium and colluvium from basic igneous material. They are gently sloping to steep and commonly are stony. Elevations range from 50 to 150 feet (*ibid*: 49–50).

Kaena clay (KavB), a brown variant with 1 to 6 percent slopes, occurs on alluvial fans on Kaua`i. It is geographically associated with Kalapa soils. This variant is somewhat poorly drained; it occurs at elevations up to 500 feet. Permeability is slow to moderately slow; runoff is slow and erosion hazard is slight. This soil is used for sugarcane and pasture *(ibid*).

The Kalapa Series consists of well-drained soils at the base of slopes on the island of Kaua`i. These soils developed in material weathered from basic igneous rock and in colluvium. They are moderately sloping to very steep and occur at elevations ranging from 200 to 1,200 feet *(ibid:* 55—56).

Kalapa silty clay (KdF), which is commonly found in upland areas, has a representative profile with a dark brown silty clay surface layer that is 10 inches thick. The subsoil (40 inches thick) ranges from dark red to dark reddish brown silty clay; it has a subangular blocky structure. The substratum is dark brown dusky red and dark red silty clay with soft highly weathered rock; the soil is strongly acidic throughout. Permeability is moderately rapid and runoff is very rapid, the erosion hazard is severe, and the soil has a 40 to 70 percent slope. This soil is used for water supply, pasture and woodland (*ibid*).

CULTURAL AND HISTORIC BACKGROUND

A large body of oral history, including legends and myths, historical documents, like Land Commission Awards, and archaeological studies dealing with Wailuā Ahupua`a makes it one of the best known and most important traditional land divisions on the island of Kaua`i. Wailuā Ahupua`a was clearly an important social, political, religious, and economic center in pre-Contact times.

LEGENDS AND MYTHOLOGY

Numerous accounts deal with the legends and myths of Wailuā Ahupua`a, including Kalakaua (1972), Dickey (1917), Fornander (1916-1919), Rice (1923), and Flores (1995).

Dickey, a longtime resident of Wailuā, recorded numerous legends associated with specific sites throughout Wailuā Ahupua`a. Primary figures associated with the rich mythological history of Wailuā Ahupua`a include Pele, Maui, Kapo/Laka, Kawelo, Pikoiakaala, Laieikawai, Mo`ikeha, La`amaikahiki, and Kaililauokeoa, among others (including the *menehune*). These legends recant such famous events, like when Pele and her sisters surfed outside the mouth of the Wailuā River, and when Maui rode that same surf in his great canoe as he pulled the islands together. Other legends associated with this *ahupua`a* recount the benevolent actions of the famous *mo`o*, goddesses of the waterfalls.

These authors and more recount a variety of other legends associated with the upland regions of Wailuā Ahupua`a. Almost all of the legends are associated with the principal figures of both the pan-Polynesian and Hawai`i-specific cosmologies, in particular, the *akua* (god) Maui and the volcano goddess Pele. Additional notoriety is ascribed to the prominence of Mount Wai`ale`ale as a sacred site. Many legends refer to spiritual and religious pilgrimages by various *ali`i* (chief) to the summit of Mount Wai`ale`ale and to the Ka`awakō Heiau on the trail known as Kaluawehe. This trail, also known as the King's Highway, originated at the mouth of the Wailuā River. Today, the trail has been replaced by Kuamoo Road.

PRE-CONTACT ERA

The Wailuā River is the largest river in the Hawaiian archipelago. It is navigable by large canoes for quite a distance upstream. The river valley cuts between two mountains just before the river enters the sea. During the pre-Contact period, the lower portion of this *ahupua`a*, where Wailuā Stream meets the ocean, was considered to be one of the most attractive places to live in the Islands. The area, once called Wailuā Nui Hoano (Great Sacred Wailuā), was one of the two most sacred areas in the Hawaiian archipelago and was *kapu* (taboo) to commoners. It was crucial that all the Kaua`i *ali`i* were birthed at the Birthstones which were located in an area of Wailuā called Holoholokū. During periods "[w]hen the chiefly class became diminished for some reason, the King selected women of common birth to deliver children at the Birthstones. Legend says such a child would be a chief" (Joesting 1987:5–9). The important role the Birthstones of Holoholukū played during ancient times is exemplified in an ancient chant:

> The child of a chief born at Holoholo-ku is a high chief;
> The child of a commoner born at Holuholu-ku becomes a chief also;
> The child of a high chief born outside of Holoholo-ku is no chief, a commoner he! (*ibid*)

In pre-Contact times, Wailuā and Waimea were known as the alternate seasonal ruling centers of the Kingdom of Kaua`i. Island-wide unification was finally achieved with the acquisition of Kaua`i by Kamehameha in 1810, through a strategically arranged marriage, rather than by outright or direct warfare. The association of Wailuā with the *ali`i nui* (high chief) Wailuānuiahō`ano and Mo`ikeha suggest the area was a recognized social and political center of the kingdom of Kaua`i as early as A.D. 1300–1350.

The naming of Wailuā is likely attributed to its association with the Ali`i Wailuānuiahō`ano. Kamakau (1976), while discussing land divisions, provides insight into understanding the nature of the naming of the *ahupua`a*. He suggests that some localities may have been named for a particularly famous chief. Referring specifically to Wailuā Ahupua`a, Kamakau writes:

> Wailuānui-a Hoa`ano was born at `Ewa, Oahu, and his descendants went to Kaua`i and to Maui, and wherever they settled they called the land after the name of their ancestor. Wailuā was a son of La`akona, ancestor of the `Ewa family by Ka-ho`ano-o-kalani. His name, Wailuānui-a-Ho`ano, came from adding the name of his mother. Thus, some names were derived from those of ancestors. (*ibid:* 7)

The large number of heiau located along the Wailuā River demonstrates the prominence of Wailuā as a religious and political center. Seven *heiau* were recorded in coastal portions of Wailuā Ahupua`a (Ching 1968). In addition, a significant amount of archaeological sites representing a broad spectrum of habitation related activities centered on the cultivation of *taro* (*Colocasia esculenta*), has been gleaned. Most of these sites are concentrated along the main forks of the river and extend up to at least three miles inland of the river mouth (Carpenter and Yent 1997).

HISTORIC TIMES

Wailuā is often described as an area reserved for *ali`i nui*. However, research on Land Commission Awards (LCAs) by Stauffer (1993) for the Division of State Parks suggests that only portions of Wailuā Ahupua`a were reserved for *ali`i,* and that portions were used by

maka`āinana* (commoners). At the time of the Māhele (*i.e.,* middle-19th century), portions of Wailuā were used by *maka`āinana for *pāhale* (houselots), *ala nui* (access routes, trails, throughways), *lo`i* (irrigated terraces), and *kula* (agricultural lands). Of the overall 29 original LCA claims in Wailuā, 28 were from the *maka`āinana* and only one was from a high *ali`i* agent. The latter came from Deborah Kapule's son, Iosia Kaumuali`i, who included in his claim the *pō`alima* of Wailuā. The *pō`alima* were *lo`i* worked by the *maka`āinana* for the *ali`i* of the area; literally, the 'royal taro patch.'

The LCAs awarded to the former *ali`i*, Deborah Kapule, included house lots and agricultural parcels for herself, her son, and her *hānai* (foster, adopted) daughter, Juliana Nahinu. The land claimed by Kapule, much of which had been received from Ka`ahumanu, included fishponds near the coast and land in the vicinity of Kalaeokamanu Heiau, at Holoholokū, indicating that these may have been part of the areas formerly reserved for *ali`i* or personages of high status, such as *kahuna* (priest, sorcerer, master of an art) and advisors. In 1835, Kapule after having moved from her home in Waimea to Wailuā, since converting to Christianity, is said to have made Malae Heiau into a cattle pen and Kalaeokamanu Heiau into a pig pen [Bennett (1931: 125); Dickey (1917: 25-26); Stauffer (1994: 86)].

It is interesting to note that an additional claim came from King Kamehameha III (Kauikeaouli), who claimed everything else in the *ahupua`a,* including water rights and the fishing grounds offshore. This claim was later turned over to the new government. Additionally, later surveys and the testimonies of officials of the land commission indicate as many as 35 additional potential claimant documents were never filed, likely due to the inadequacies of the system of land registration and ownership introduced in the nineteenth century. These claims show a similar pattern of land use compared with awarded claims, and consisted of *pāhale*, *lo`i* (irrigated taro), *kula* (dryland agriculture), and *mo`o`āina* (land parcel) (Stauffer 1993). Most of these awards were located on the north side of the Wailuā River extending from the back beach areas in coastal portions of the *ahupua`a* along the river and along `Ōpaeka`a Stream, and were passed to *kuleana* by Debora Kapule and her son Iosia (Yent 1997: 7, Fig. 4; Yent 2001: 8, Fig. 4).

In traditional times, a system of *`auwainui* (great, big ditch) and *`auwai* (ditch), part of the communal land stewardship system within the *ahupua`a*, would have functioned to divert and deliver water to *lo`i* throughout the *ahupua`a*. This system of wetland taro cultivation was converted largely to rice during the historic period. Additional *loko i`a* (fishponds) were located in the back beach area on the north side of the river mouth.

The Wailuā Complex of Heiau was declared a National Historic Landmark in 1962 (Table 2). In addition to the four heiau, Malae, Kalaeokamanu, Poli`ahu, and Hikinaakalā Heiau, the Complex includes Holoholokū Heiau, Pōhaku Ho`ohānau (Birthstones), the Bell Stone Site, and *pu`uhonua* and petroglyph stones.

The northern half of Wailuā State Park contains Poli`ahu Heiau, Holoholokū Heiau, Pōhaku Ho`ohānau (Birthstones), and the Bell Stone Site. Holoholokū and the Pōhaku Ho`ohānau are recorded as the birthplace of *ali`i*, similar to the Kūkaniloko Site in Wahiawā (O`ahu). This was also a *pu`uhonua*, where *kapu* breakers could obtain immunity and refuge seekers could find safety during war (`Ī`ī 1959). In addition, Holoholokū is reported to be the place associated with Mo`ikeha's arrival from Kahiki (Fornander 1916). Holoholokū is believed to be an area that was set aside exclusively for *ali`i nui*, their priests, family, and attendants. Malae Heiau is reported to have been the oldest *heiau* on the island and the first one built by the Menehune. Thrum reported the Heiau as a walled and paved structure 273 feet by 324 feet with walls 13 feet thick (at base), a traditional form of Menehune construction.

THE SUGAR PLANTATION ERA IN KAUA`I

The second oldest sugar plantation on Kaua`i, after Kōloa, was the Lihue Plantation Company, founded in 1849 (Wilcox 1996) (Figure 8). Sugar was actively planted by the Wailuā Plantation in 1879 and 1880 (Dorrance 2000: 25). The Plantation continued to expand and in 1974, leased some of Grove Farm's cane lands operating strictly on gravity flow. By 1931, 79 percent of 6,712 acres of plantation land were irrigated by gravity flow. Of the reservoirs, Wailuā produced the largest flow at 242 million gallons (*ibid*: 73). Finally, in 1994, in an effort to reduce costs, the Lihue Plantation announced the consolidation of many operations; six years later, it officially closed business.

PREVIOUS ARCHAEOLOGY

Wailuā Ahupua`a is one of the most archaeologically rich areas in the Hawaiian Islands. This section of the report presents a sampling of previous archaeological studies in and around the project area. In general, coastal portions of the *ahupua`a* have been more studied as compared to upland areas, which have received less study. Results of these studies have been used to predict the types of sites and features expected in the project area (see EXPECTED FINDINGS).

Table 2: Heiau Located in the Vicinity of Wailua Ahupua`a (Adapted from Yent 2001: 23, Table 4).

Heiau	State Site Number 50-30-08	Location	Form/ Size	Function	References (Age/association)	Comments
Malae* (*Malaeha'akoa*) (*Makaukiu*)	-104	(In current project area, northeast corner); south side of Wailua River bank;west of Kuhio Highway	Large, square walled enclosure (273 by 324 feet)	Multi-functional: (Luakini, assembly area, habitation)	Menehume Mo'ikeha Flores (1995: II-3) (ca 1300)	Lithic concentration (SCS Site TS-2, Loci A-D)
Hikinaakalā*	-105	South side of Wailua River bank; east of Kuhio Highway at shoreline	Large, rectangular Walled enclosure (395 by 80 feet)	Pu'uhonua Astronomy	Wailuanuiaho'āno Bennett (1931) (ca 1320—1350)	Munch of the stone removed
Kalaeokamanu* (*Ka Lae o Ka Manu*)	-106	North side of River; inland at Pu'ukī and Holoholokū	Small, rectangular Walled enclosure (115 by 65 feet)	Multi-functional: (Luakini, Pu'uhonua, animal pen)	Mo'ikeha and His Son, La'anaikahiki Formander (1916) Ii (1959) Kikuchi (1976) (ca 1300—1340)	Adjacent to Birthsite
Poli'ahu*	-107	Bluff between Wailua River and 'Ōpaeka'a Stream	Large, square Walled enclosure With notch (242 by 165 feet)	Luakini	Menehume Bennett (1931)	
Kukui (*Kaikīhaunakā*) (*Kūhua*)	-108	Boundary Olohena and Wailua at Lae Alakukui	Walled enclosure Terraced on makai side	Luakini Navigational	Kāwelo Thrum (1906) Davis and Bordner (1977)	Much of the stone removed; Cultural material: stone lamps
Kapu'ukoa	-109	North bluff of Wailua River; 1.0 m *mauka* of shore in cane field	Walled enclosure (165 by 66 feet)	Unknown	Bennett (1931) Damon (1931)	Not relocated
Pōhaku'ele'ele	Ching Site 47	Bluff between Wailua River and 'Ōpaeka'a Stream; same ridge as Poli'ahu Heiau	Not recorded	Unknown	Dickey (1917: 29)	Not relocated
Unknown Name	-345 (Ching Site 58)	Bluff at convergence of Wailua River North and South Fork	Square, walled enclosure with notch (87 by 70 feet)	Unknown	Metcalf's map (1846)	Relocated in 1992, State Parks
Meleaha'anounou	??	Makai of Malae Heiau	Not recorded	Unknown	Wailuanuiaho'āno n.a. 1885 (ca 1320—1350)	Destroyed
*The Wailua Complex of Heiau (State Site No. 50-30-08-502) a National Historic Landmark						

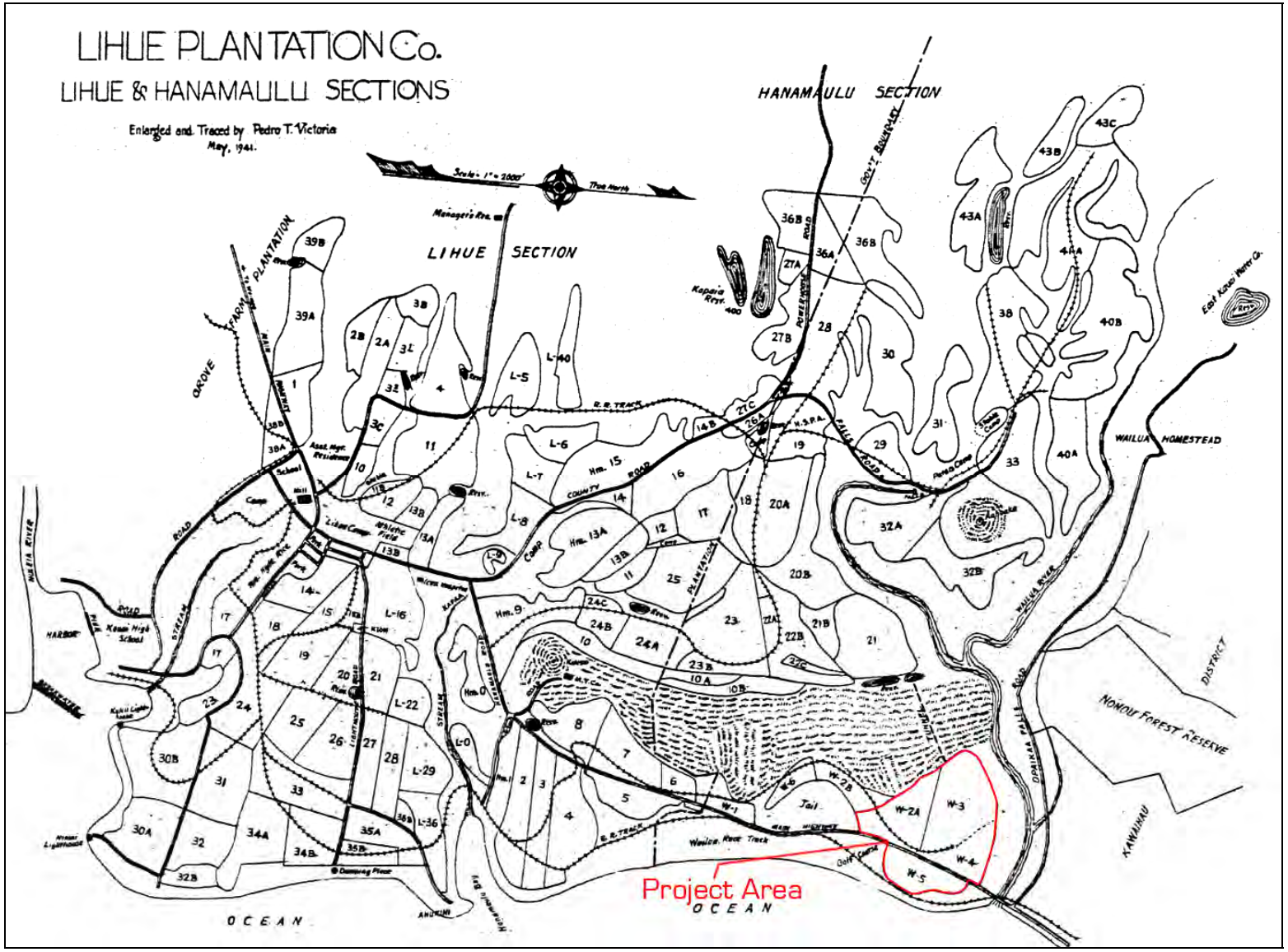


Figure 8: Ca. 1941 Lihue Sugar Plantation Field Map.

Cultural Surveys Hawai`i, Inc. (CSH) conducted an Archaeological Inventory Survey for a proposed bikeway within the Wailuā River State Park. Fieldwork was undertaken in September 2000 and involved the coastal boundary the length of the current DHHL project (*makai*). While the survey's findings were negative for new archaeological sites, the study synthesized previous archaeological work for the immediate project area and vicinity providing a traditional Hawaiian and historic land-use settlement model (Creed, Shideler, and Hammett 2001).

Dega (2001) encountered negative results in a study of bridge footings at the Kamalani Kai Community Built Bridge. During trenching activities, Dega and Powell (2003) identified intact sand layers along Kuhio Highway. These sand layers, excavated to more than 1.60 meters below the graded surface, were sterile.

Several important sites are located on the south bank of the mouth of the Wailuā River, in the coastal portion of the Wailuā River State Park, directly east of the project area. Thrum (1907) recorded Hikinaakala Heiau in his statewide inventory of *heiau*. This *heiau* is now considered to be part of the Wailuā Heiau Complex (SIHP No. 50-30-08-502), which also includes Malae (bordering the immediate project area) and Kalaeokamanu Heiau, and an unnamed *heiau* in the area of Kālepa and Nounou Ridges, and another unnamed shrine at the confluence of the North and South Forks of the river. This site complex is listed on the National Register of Historic Places (see Table 2). In addition to the various *heiau*, Site 502 includes a *pu`uhonua* named Hauola, and petroglyphs named Ka pae ki`i māhū o Wailuā, or PaemahuoWailuā, located on the boulder-strewn beach adjacent to Hikinaakala Heiau (Kikuchi 1973). The origins of this petroglyph site, which incorporate legendary figures into the landscape of coastal Wailuā, are referenced in many epic Hawaiian legends.

An Archaeological Survey of the north fork of the Wailuā River was conducted by the State Parks in 1997. Carpenter and Yent (1997) recorded 15 sites previously identified by Soehren (1967) and Ching (1968); several sites could not be relocated. A variety of features consistent with permanent habitation was re-identified during the 1997 work. Other archaeological sites documented during the 1997 survey include: multiple *`auwai* of varying sizes; extensive agricultural terrace complexes (one with 100 discrete components); sunken or depressed pond fields; several stone platforms interpreted by Ching as house platforms or shrines (a few have upright stones within the construction); irrigated and non-irrigated terraces; and, several enclosures. Pilgrimages to Mount Wai`ale`ale by *ali`i* originated in Wailuā on the trail known as Kaluawehe, often referred to as the King's Highway. This trail starts at the mouth of

the Wailuā River, and goes up the ridge between the North Fork and `Ōpaeka`a Steams to an area named Ka`awakō, where a small shrine (SIHP No. 50-30-08-216) is located. Historic sites include a *poi* mill that was in operation until 1930, and the remains of a wooden flume used to transport water across the river (Carpenter and Yent 1997).

Rechtman and Clark (2001) conducted an Archaeological Inventory Survey of a parcel located just west of the confluence of Opaeka`a Stream and the Wailuā River [TMK: (4) 4-2-003: 002, LCA 3551:2]. No archaeological sites were recorded during this survey. Surface topography and two backhoe trenches indicated extensive disturbance from previous construction in the modern era.

Various restoration work and vegetation removal have been completed for Hikinaakalā Heiau (Yent 1997a; Yent 2000) and Malae Heiau (Yent 1997b), as well as Kalaeokamanu Heiau and Pōhaku Ho`ohānau (Birthstones) at Holoholokū (Yent 2000; Yent 2001).

Kikuchi (1973) recorded SIHP No. 50-30-07-4000, an adze workshop located at the site of the Keahua Arboretum, in Kauakahi. Site 4000 is one of only three known adze workshops in Kaua`i. The site consists of a lithic scatter on a level terrace area, located on the northeast side of Uhau `Iole Stream (Yent 1988). Kikuchi recorded basalt flakes and debitage, worked flakes and cobbles, cores, hammerstones, and adze blanks and performs. The absence of finished adzes at the site suggests that finishing occurred elsewhere. The source of the basalt at Site 4000 has yet to be identified. Likely source areas, including *mauka* sections of Wailuā, have not yet been systematically surveyed.

MALAE HEIAU

Malae, an abbreviated version of the name Malaeha`akoa, is adjacent to the current project area (northeast corner), which covers an area consisting of approximately 9.5 acres. On February 1994 (Exec. Order No. 3608), Malae became the fourth *heiau* included in the Wailuā River State Park system. It is hypothesized that Malae Heiau has functioned in various capacities from pre-Contact to the Historic Period. Tradition says, Malae Heiau was built by the Menehune and initially may have functioned as a *luakini* (temple, shrine, place of sacrifice) (Thrum 1917; Bennett 1931). Historical records indicate that Malae no longer functioned as a *heiau* and was utilized for animal husbandry (Bennett 1931:125; Dickey 1917: 25-26; Stauffer 1993: 86).

Following the earliest surveys and reports on Malae Heiau conducted by Thrum (1907), Dickey (1917) and Bennett (1931), Francis Ching, Jr. completed an Archaeological Survey in 1968 for State Parks. A compendium of these sources and other historical references to the Heiau may be found in Flores (1995).

Kikuchi surveyed the Malae Heiau area after a 1973 sugarcane harvest and located an adze scatter (Kikuchi 1973). Of notable interest were the findings from the surface survey conducted as part of the Environmental Assessment by State Parks to include Malae Heiau into the Wailuā River State Park system. The survey located lithic scatter that included stone tools, primarily adze performs and worked flakes that were found on the exterior of the *heiau* near the northeast corner of the walled enclosure; the site was designated Site -104A (State Parks 1991).

Flores (1999: III-4) noted that very few reports and surveys exist which detail the design and construction of Malae. In an effort to seek assistance regarding preservation, stabilization and interpretation matters concerning Malae Heiau, the Division of State Parks (DLNR) formed the Malae Heiau Advisory Committee in 1994. The Committee noted the Heiau has functioned in various capacities over time and space (2000: 4); and suggested that its large size and strategic location within Wailuā offered a certain vantage point from which to conduct governance activities.

State Parks (1991) conducted archaeological investigations which compared the existing heiau structure to what was recorded previously by Thrum, ca 1906 and Bennett ca. 1931; reported findings revealed a number of structural changes (Yent 2005: 29, Table 3).

Between August 1996 and February 1997, the State Parks conducted archaeological test excavations. Seven test units were excavated throughout the *heiau* interior in order to address research questions concerning age, function and construction sequence (Yent 2005: 43–44, Fig. 12, Table 5).

Three samples of concentrated charcoal deposits taken from test units TP2 and TP7 were radiocarbon dated (*ibid*: 70, Table 20); three distinct cultural deposits and periods of construction and site usage were revealed. The upper deposit was associated with the *`ili`ili* (pebble, small stone) paving evident at the ground surface of the wall architecture throughout the *heiau* interior and corresponds with a late pre-Contact to early historic date A.D. 1720 to 1840 (*ibid*). The middle cultural deposit corresponded to the foundation of the *heiau* enclosure walls which pre-date the construction of the interior walls and *`ili`ili* paving; the radiocarbon date closely

associated with this deposit indicated a late pre-Contact age of A.D. 1700 to 1800 (*ibid*). The lower cultural deposit was obtained from a charcoal lens and postholes 30 cm below the base of the *heiau* enclosure wall. The radiocarbon date obtained from this deposit suggested that the *heiau*'s construction date postdated A.D. 1500. Further testing was recommended to procure additional radiocarbon dates, which would clarify the discrepancies between the cultural history associated construction dates of Malae Heiau[1].

Midden analysis revealed that lithics were the predominate type of artifact; a limited amount of faunal material (dog and pig teeth and mammalian bone fragments) and small quantities of shell were found. The general lack of midden suggested the *heiau* function was not related to habitation.

Basalt artifacts were found throughout the interior of the *heiau* and at the northeast corner enclosure exterior, which was suggestive of basalt tool manufacture. Testing revealed human remains in the southeastern interior corner of Male Heiau (TP-5), which appeared to pre-date the construction of the interior features of the *heiau*. (*ibid*: 72). Radiocarbon dates obtained from lower cultural deposits were obtained from fire pits (TP2 and TP7), as well as from postholes or small pit features (TP4 and TP7). The stratigraphic location of these features was suggested to predate the *heiau* wall.

Various impacts were affected due to sugarcane production (early 1900s to 1991), as well as disturbances by vegetation overgrowth on the interior and exterior walls of the *heiau*. Vegetation clearing projects were undertaken in Years 1997 and 2000 to prevent further damage to walls of the *heiau* (Yent 1997; Na Kahu Hikinaakalā).

An Archaeological Inventory Survey conducted at Malae Heiau has established its significance in close alignment with the Wailuā Complex of Heiau; Malae Heiau is deemed significant under Criterion B through E. Further data recovery has been recommended by State Parks in order to supplement research concerning site function, age, construction sequence, role of adze manufacture and future land use impacts (*ibid*).

DOCUMENTATION OF BURIALS NEAR THE PROJECT AREA

Ongoing studies conducted south of the Wailuā River, in and around the Wailuā Golf Course, have documented many pre- and post-Contact burials. Bennett (1931:125), for example, recorded Site 103, about which he stated: "In the sand dunes that run along the shore half way

[1] Mo`ikeha suggested Male Heiau was initially constructed around A.D. 1300–1350.

between Hanama`ulu and Wailuā River are many burials." Cox (1977) documented 13 burials and scattered human remains at the Wailuā Golf Course. Erkelens and Welch (1993) conducted interviews and documented historical knowledge from long-time local residents of the Wailuā area who stated that "hundreds" of *iwi* (bones) were uncovered when the central driving range was constructed in the mid-1960s. Studies conducted by Folk *et al*. (1991), Folk and Hammett (1991, 1995), and Beardsley (1994) led to the identification of nine more burials within and near the Wailuā Golf Course. Fager and Spear (2000) documented 44 burials and 42 isolated finds of human remains during renovation of the golf course irrigation system. They also documented a subsurface cultural layer (with traditional artifacts) and three fire pit features. Charcoal from one of the fire pit features yielded a calibrated date range (2 Sigma) of A.D. 1440 to 1670, firmly within pre-Contact times.

Ida and Hammatt (1998) documented SIHP No. 50-30-08-761, a burial site located in an easement between Wailuā River and a fence line [TMK: (4) 4-1-004: 019]. This fence line creates an easement providing access to residential properties fronting the river. The burial was discovered (i.e., disturbed) during the removal of a coconut palm tree during clearing and brush-removal operations within the easement. The burial site was eventually assessed as having been previously disturbed. Two LCAs (3557 and 3405) awarded on the property indicate that the area was being used for habitation and for *kalo* cultivation; fourteen *lo`i* were awarded to Kaniwi (Kaniui) at this location.

Morawski and Dega (2004) recorded several, previously disturbed burials in addition to a subsurface cultural layer. The cultural layer, designated SIHP No. 50-30-08-356, demonstrates a lengthy occupation of the area now known as Lydgate Park. The radiocarbon sample submitted from excavations conducted at Site 356 yielded a calibrated date range (2 Sigma) of A.D. 1440 to 1660, firmly within pre-Contact times.

An Archaeological Inventory Survey was conducted at the Old Smith's Landing and Kaumuali`i for the new Comfort Stations for Wailuā River State Park by SCS, Inc. (Morawski and Monahan 2007, *in preparation*). The APE was located south of the existing comfort station building, and north and east of the paved entry road and parking area. To the west of the APE is a low rock wall bordering residential areas on the west side of Kuamoo Road from the parks parking and comfort station facilities. Surface topography and natural stratigraphy within this area were likely disturbed during the construction of the existing building and grading for the parking lot. Soils in this area consisted of surface layers of claylike fill soils overlying disturbed river sands and alluvial soils.

Subsurface testing by SCS amounted to nine shovel probes excavated at two locations in the project area. One incomplete burial along with several subsurface pit features and several artifacts were recorded at Smiths Landing and several lithic artifacts were recorded within excavations at Kaumuali`i Park. The incomplete burial was temporarily preserved in place and is awaiting final determination for preservation or data recovery burial treatment.

EXPECTED FINDINGS

Given all available oral, historical and archaeological evidence regarding Wailuā Ahupua`a, and the project area in particular, there was a relatively high probability of encountering subsurface cultural deposits around Malae Heiau, along the confluence of the Wailuā River, and on the lower slopes of Kālepa Ridge (southwestern boundary). In addition, there was also high expectation of encountering traditional Hawaiian burials along the eastern boundary of the project area directly adjacent to the Wailuā Golf Course. With regard to the majority of the project area that was once cultivated in sugar, it was expected that historic artifacts and archaeological features relating to agriculture dating from the Sugar Plantation period to Historic times would be found.

METHODOLOGY

The work described in this Inventory Survey consisted of archival research, fieldwork, and laboratory analysis. Specifics on all of these research activities are described in detail below.

GPS/SITE POSITIONING FIELD SURVEY METHODS AND POSTPROCESSING

The archaeological field survey was primarily accomplished utilizing a Trimble Pathfinder Pro-XR Global Positioning System (GPS) Rover Unit apparatus. The GPS equipment was configured to operate in the Carrier Mode, with minimum threshold settings of four satellite vehicles connected/operating, 6.0 PDOP. The NAD 83 system was used to provide coordinate datum control. The appropriate GPS base station data was later obtained during post-processing of the field data at the SCS office in Honolulu, in order to accomplish the differential correction of our GPS and site position field data files.

Archaeological sites were flagged and recorded; drawings, maps and photographs were produced. As part of the site recordation process, a GPS reading was taken and logged. With regard to the recordation of TS-2, four main locations (Loci) were established. GPS position

numbers were given for each find spot (N=78). Up to three artifacts were counted for each given find spot located within 1.0 m². The GPS position number, the site and feature designations, and other pertinent data were entered into the GPS data log/field data file, while each GPS reading was being recorded. All GPS coordinates were manually entered onto the site survey field recording form as well. When conducting the trench excavations, one GPS reading was taken located at the north or the west end of the trench. Once the fieldwork and testing were finished, the digital GPS field data files were delivered to the SCS, Inc. Honolulu office.

The specific purpose of this GPS/site survey fieldwork was to register at least one accurate GPS position reading for each newly recorded site, or multiple readings in the case of find spots for lithics, or linear features such as historic roads, railroad paths, and ditches, and to plot the acquired information onto a USGS topographic map. The archaeological field survey and GPS recording efforts were not carried out during the wettest part of the year; therefore 100 percent of the recorded site locations were recorded utilizing GPS. A certain degree of vegetation clearing and trimming was performed to photograph and record Site TS-3's features, as well as to facilitate the GPS reception. The locations of specific topographic features or landmarks (e.g., distinctive trees, rock outcrops, or vegetation types) were also useful when referenced in the individual site descriptions.

Field GPS data was electronically downloaded from the Trimble Recon data logger for post-processing at the SCS Archaeology GIS lab. In GPS Pathfinder Office 3.0 computer program, the data was differentially corrected using CORS, Honolulu Tide Gauge HI as the base data provider, and then exported into Arc View 8.0 with the coordinate system set to UTM, Zone 4 North, NAD 1983 (Hawaii) Mean Sea Level. A GIS layered map was produced with the GPS data layered onto a MrSid Raster Dataset Map of Kaua`i's East side together with Kaua`i County's TMK parcels. GPS site positions were later added to a software-mapping program TOPO, version 3.2.0, which was helpful in delineating survey boundaries, elevations, and distances between sites and trench excavations.

CONSULTATION

SCS consulted with archaeologists from State Parks (Yent; McEldowney), who provided updated research conducted by Parks relative to the project area and Malae Heiau. After the completion of fieldwork, Project Director Jim Powell (SCS) conducted a field inspection with Randy Wickman of the Kaua`i Historical Society, who provided SCS with Kaua`i Historical Society historic maps of the project area (see Figures 4 and 5).

State Parks (Yent) concurred with a recommendation for Data Recovery utilizing GIS. As of yet, no GIS have been performed in order to study the relationship between the *heiau* and Mauna Kapu and *kapu* lands.

ARCHIVAL RESEARCH

Background research was conducted by Trisha Drennan, primarily using previous research authored by Chris Monahan and Lauren Morawski (2007) in their work with Wailuā River State Parks, but also using resources available through Randy Wickman of the Kaua`i Historical Society, Yent and McEldowney (State Parks), State Parks Library, the SHPD library in Kapolei, and the SCS database

Fieldwork consisted of a systematic field inspection and mechanical excavation in two locations of the project area (see Figure 6). The test units were excavated in areas most likely to present cultural remains related to either prehistoric Hawaiian cultural remains (Test Area 2), and to determine the presence of a beach dune sand matrix in which traditional Hawaiian burials might be found (Test Area 1). The primary objective of the subsurface testing was to target areas of proposed excavation, based on construction plans provided to SCS by Environet, Inc. Test units were excavated mechanically by backhoe, and selected soils were screened with standard, ¼-inch metal mesh. All subsurface features and soil anomalies were recorded on standard plan view maps and stratigraphic profiles. Each test unit was photographed and described in standard sedimentological terms (*e.g.*, sediment size, consistency, color, and inclusions) using Munsell *Soil Color Charts*.

Subsurface testing occurred at the Project in two general locations (Test Area 1 [TA-1]; Test Area 2 [TA-2]) (see Figure 6). Twenty-eight Stratigraphic Trench Units (ST-1 through ST-28) were excavated at these two locations (TA-1: ST-1 through ST-23; TA-2: ST-24 through ST-28). Stratigraphic trenches varied in size (area) up to 18.5 m long by 0.80 m wide to 1.36 m deep.

LABORATORY ANALYSIS

All significant finds (i.e., portable artifacts over 50 years in age) were transported to the SCS laboratory in Honolulu. These artifacts and other materials (e.g., midden) were catalogued, analyzed, and interpreted in the SCS laboratory. Laboratory work also consisted of digital drafting of stratigraphic profiles, maps and feature drawings. The traditional artifacts were analyzed by SCS Archaeology lab personnel. All field notes, maps, photographs, and artifacts pertaining to this project are being curated at the SCS laboratory in Honolulu until further notice. No charcoal samples were submitted for radiocarbon dating.

RESULTS

OVERVIEW

Three significant sites were identified during the Inventory Survey at Wailuā-DHHL (see Table 1) (Figure 9). Site TS-1 is an historic site (agricultural water diversion and irrigation features) associated with the Plantation Era on Kaua`i. Site TS-2 consists of a prehistoric surface lithic (stone tool) scatter. TS-3 is composed of two rock terrace remnants (TS-3, Features 2 and 3), one rock wall (TS-3, Feature 1), with traditional construction, and one multi-tiered enclosure (Feature 4). An historic map (ca. 1933) provided by Randy Wickman of the Kaua`i Historical Society, revealed an historic rock wall existed along the eastern border of the project area (see Figure 4). Following the field portion of the inventory survey, a SCS archaeologist revisited the location as exemplified by the historic map and located an earthen berm extensively covered with vegetation. Further investigation and testing will be required to ascertain the berm's form, function and temporal association.

Figure 9: TS-1, Overview of DHHL Lands. View to West.

SITE DESCRIPTIONS

SCS SITE TS-1

TS-1 was an historic agricultural water transportation system that consisted of five features and three subfeatures. One GPS coordinate was recorded (datum) located at the southwest corner of Feature 1A (Reservoir). Site TS-1 was assessed as having over one hundred features throughout the project area that was constructed as part of the water transportation system (Figure 10). Due to time constraints, a representative sample of these features was recorded. An historic map provided by Randy Wickman of the Kaua`i Historical Society, shows the layout of the water transportation system, which includes the reservoir, a tunnel, and many pipe features (see Figure 10).

The water transportation features recorded during the present survey appeared in fair condition, but alteration was noted from weathering and the recent fire. Since Site TS-1 contained historic construction typifying water transportation features, no test units were placed at this site.

Feature 1 was located along the upper northwest boundary of DHHL property and consisted of a reservoir complex (Figure 11). The topography consisted of flat to rolling cane fields; the vegetation has been cleared by the recent burn. Features 1A and 1B were two discrete features consisting of earthen reservoirs.

Feature 1A was a cane field earthen reservoir with concrete watergate (Feature 1C) (see Figure 11). A dozer push pile created a small basin to hold the irrigation water; the feature was contained by an earthen berm. Two pipes enter the reservoir from the eastern (*mauka*) side. No outlet was observed. The interior dimensions of the feature were 24.0 m long by 16.5 m wide and 3.0 m high. The wall thickness of the earthen berm measured from 4.0 to 6.0 m in width. The long axis of the feature is oriented northwest-southeast (360°/20° TN). Small amounts of coral were noted on the features surface. The feature's function was for water storage.

Feature 1B was a second earthen reservoir located 6.0 m east of Feature 1A (see Figure 11). The terrain contained small trees and grass. The reservoir was an irregular bean shape, which was contained by an earthen berm. No outlet exists for this feature. The interior dimensions of the feature were 18.0 m long by 8.0 m wide; the feature's exterior height was from 3.0 m to 0.9 m high with an interior height from 0.8 to 1.5 m high. The wall thickness of the earthen berm measured 4.0 m wide. The long axis of the feature was oriented northwest-

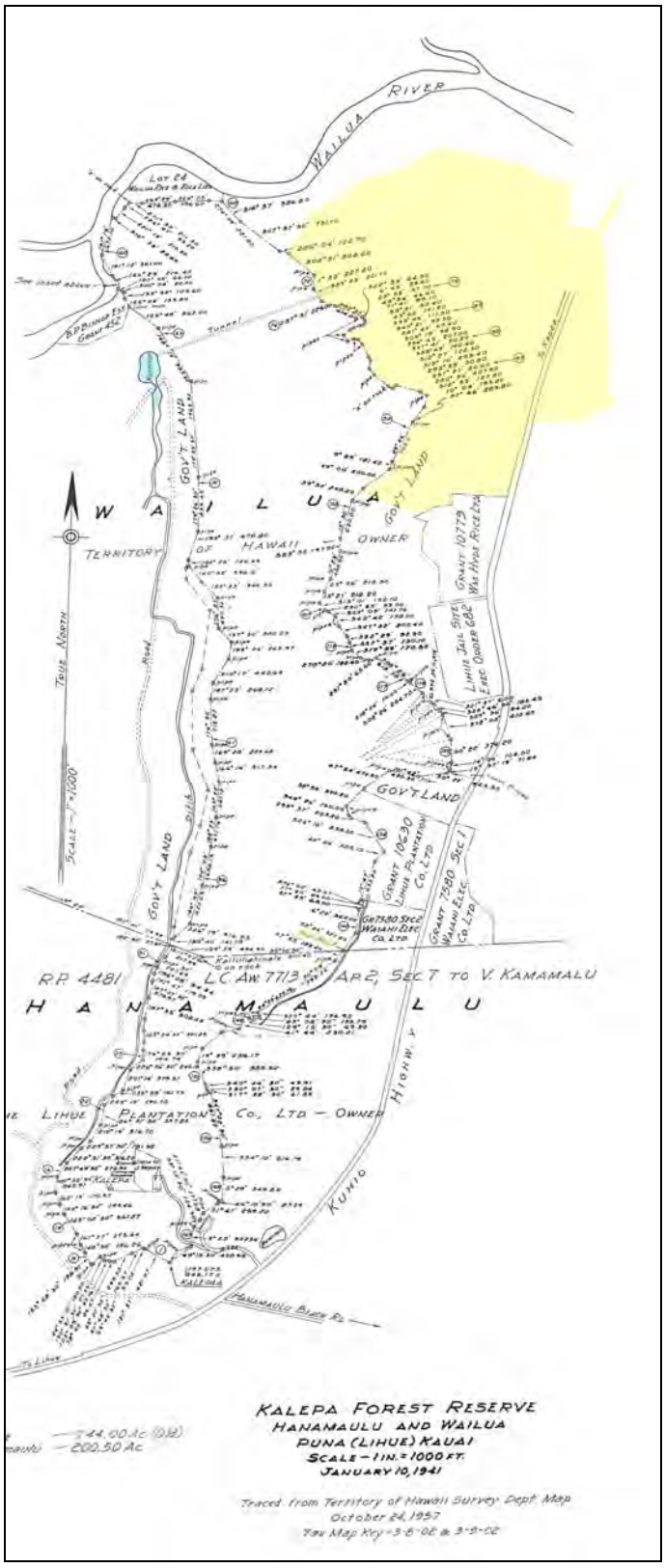


Figure 10: Territory of Hawaii Survey Map, January 10, 1941, Kalepa Forest Reserve (TMK: 3-8-02 & 3-3-02).

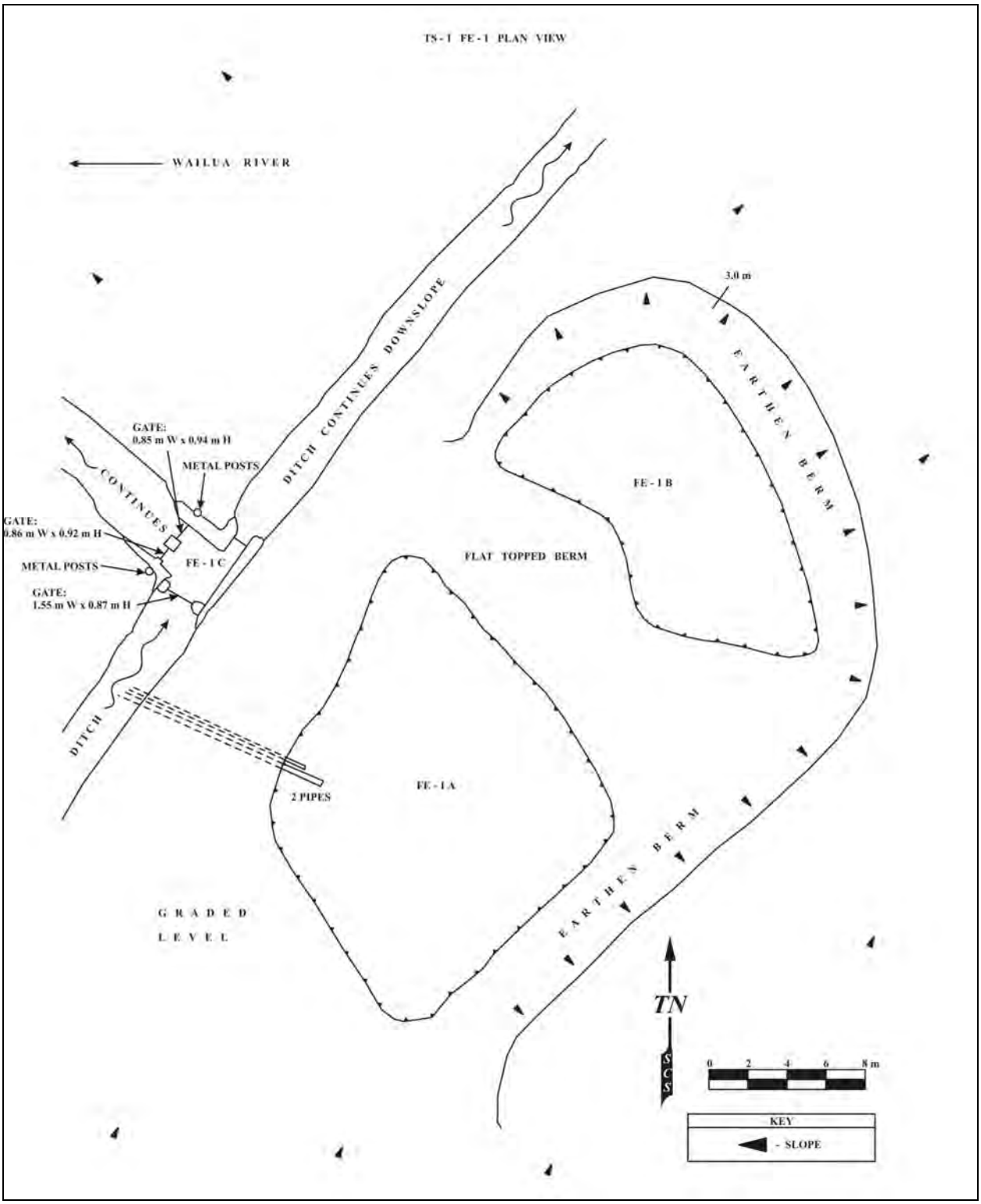


Figure 11: Site TS-1, Feature 1. Plan View.

southeast (20°/360° TN). Feature 1B functioned for water storage; however, no connecting water pipes to the ditch feature were observed as with Feature 1A.

Feature 1C is a three-way watergate, which possibly functioned for water diversion located approximately 7.0 m northeast of FE-1A (reservoir). Three subfeatures composed the concrete structure: one inlet (FE-1C-1), two gate outlets to Wailuā River (FE-1C-2), and one outlet to irrigation ditch (FE-1C-3). Java plum (*Eugenia jambolana* Lam.), grasses and shrubs were observed around the features. Feature 1C-2 directed water down the slope to the Wailuā River; each contained a cylindrical metal lock box, which functioned to regulate the flow of water to the river. The exterior dimensions of the feature were 5.6 m long by 5.6 m wide; the interior dimensions of the feature were 2.6 m long by 2.8 m wide. The feature's interior height was from 0.87 to 0.94 m high. The wall thickness measured 4.0 to 0.6 m wide. The long axis of the feature was oriented southwest-northeast (40°/220° TN).

Feature 2 was a watergate that was burned in the recent fire; it was in poor condition as the wooden components to the feature have burned (Figure 12). The feature was located on the western side of a cane field approximately 100 m above Feature 1A & B (Reservoirs) situated on a small bluff on the south side of the Wailuā River tree line. The feature was constructed of cement, metal wood and basalt; wood and metal forms were filled with earth to make a dam. The slots on the gate are of wood, and the wood posts are enclosed by metal. There s a date in concrete of "7/6/61"; however the feature construction appears to have been exclusive of concrete, but added later for reinforcement.

The exterior dimensions of the feature were 2.4 m long by 4.1 m wide; its height was 0.96 m. The gate portion measured 0.96 m high by 0.71 m wide. The dam's thickness was 0.90 m; the interior dimensions of the feature were 2.6 m long by 2.8 m wide. The feature's interior height ranged from 0.87 to 0.94 m high. The wall thickness measured 4.0 to 0.6 m wide. The long axis of the feature was oriented west-east (84°/204° TN).

Feature 3 was a watergate and culvert situated on a gentle east-facing slope in a cane field. The field was vegetated with *koa haole* (*Leucaena glauca*), grasses and small trees (Figure 13). The feature was constructed of mostly small boulders (20–30 cm diameter), with cement, mortar and stone, supplemented by cinder blocks and metal frame for the wood gate. The boulders were stacked five to seven courses high. The feature contained stacking first, with cinder blocks two to three courses, then with two to four courses of small boulders.

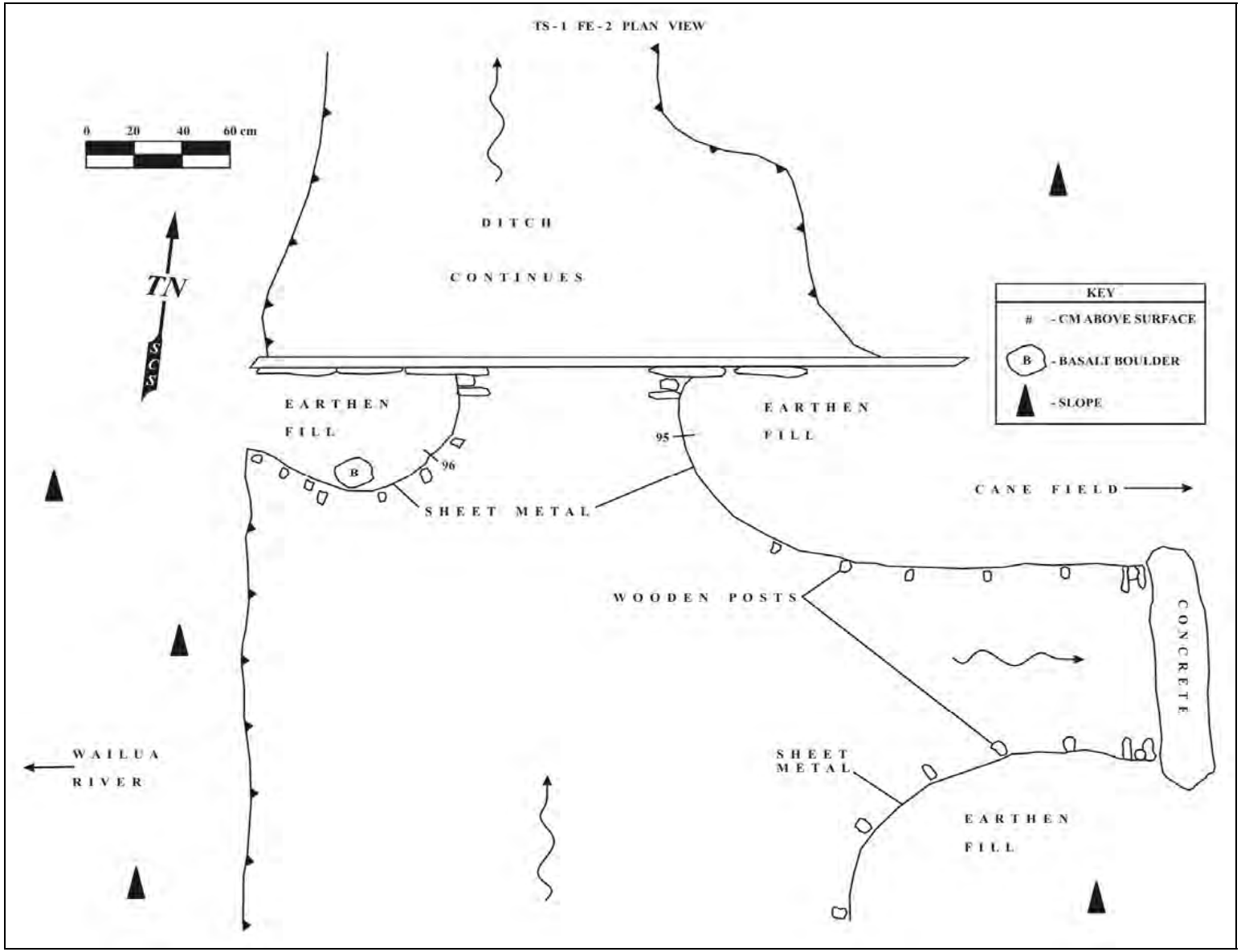


Figure 12: Site TS-1, Feature 2. Plan View.

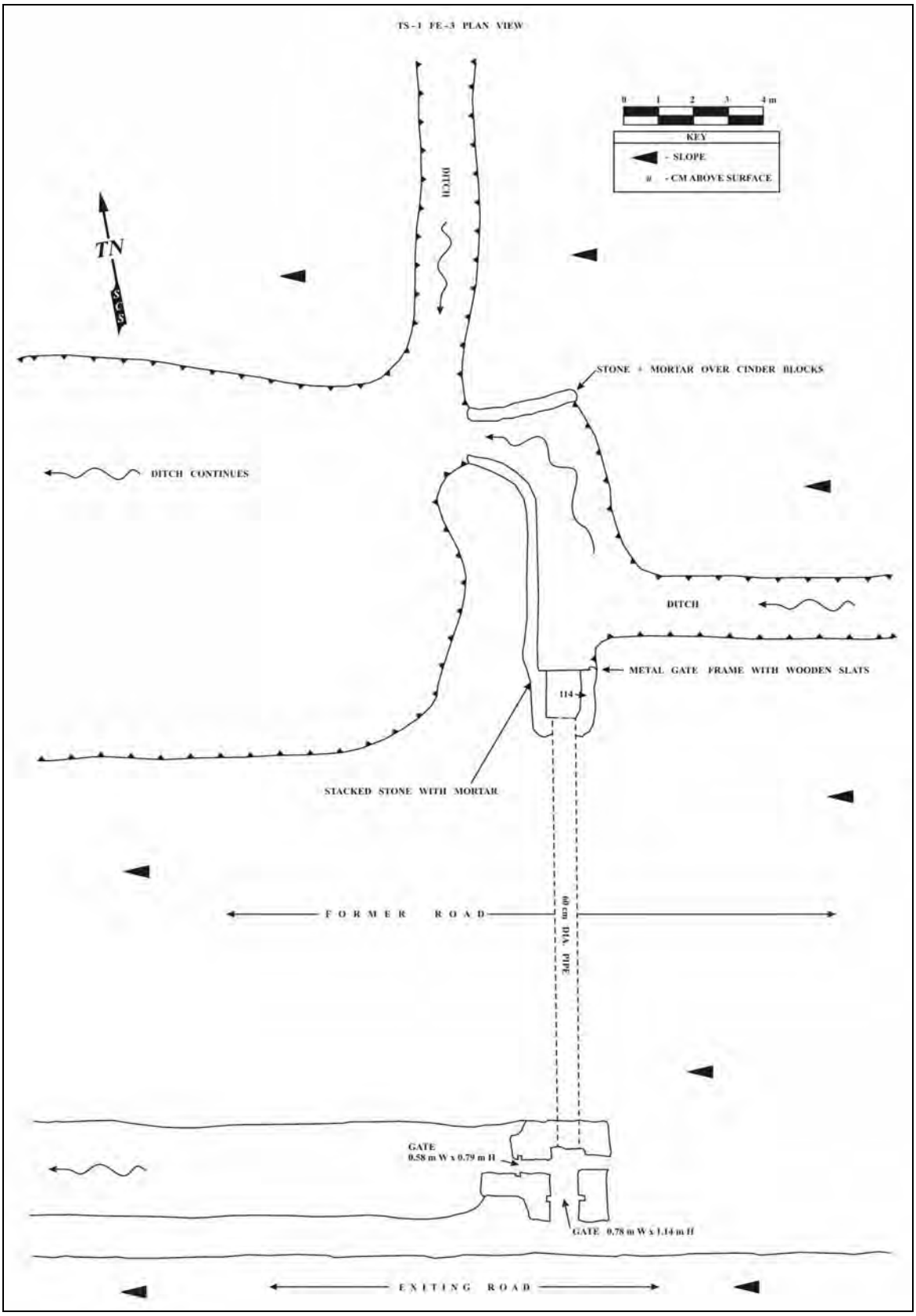


Figure 13: Site TS-1, Feature 3. Plan View.

The exterior dimensions of the feature were 25.0 m long by 3.0 m wide; its height was from 0.79 to 1.14 m. The wall thickness measured 0.4 to 0.5 m wide. The long axis of the feature was oriented north-south (10°/190° TN). The integrity of Feature 3 is poor since it has been damaged by the fire.

Feature 4 contained a bridge with irrigation diversion ditch located mid-slope above a cane field. It was composed of a metal culvert constructed of basalt cobbles (20 cm dia.) which were set in concrete (see Figure 6). A date of "1961" was inscribed in cement on the north side of the bridge. The bridge functioned as transportation corridor for cane haul trucks and plantation equipment since it is situated between cane fields. The feature was in poor condition, its integrity having been affected by erosion and gravity.

Feature 5 was a ditch that descends in elevation from 226 to 81 ft. amsl and is 1280 m in length; it is 3.0 m wide (see Figure 6). The ditch was curvilinear and was oriented northwest-southeast (136°/316°). The feature was U-shaped and was excavated along the base contour of the northeast side of Kālepa Ridge.

Site TS-1 was an historic site associated with the Plantation Era in Kaua`i, which functioned to supply water to cane fields (numbered W-3, W-4, W-5, and W-2A) (see Figure 8).

SCS SITE TS-2

Site TS-2 consisted of a pre-Contact surface lithic (stone tool) scatter (Figure 14). The artifacts occurred within four main locations and one outlier (see Figure 6). Locus A contained the highest concentration of lithics (N=111); the remaining loci consisted of a total 25 artifacts (Appendix A). Locus A was located on level terrain; the closest observable artifact was noted 48.0 m west of Malae Heiau (Site 104); this places the eastern edge of the Locus within the 100-foot buffer zone of the site's western boundary (see Figure 3). Locus A measured 313.0 m long by 242.0 m wide; its longitudinal axis was oriented northwest-southeast. Locus B was situated 249.0 m south of Malae Heiau. The artifact spread was oriented in an east-west direction and measured approximately 200.0 m in length. Loci C and D were situated along the southern banks of Wailuā River. Locus C was located 658.0 m northwest of the Heiau; its artifact spread measured approximately 200.0 m in length. Locus D was situated between Malae Heiau (1.02 km west) and Poli`ahu Heiau (528 m southeast) on the southern banks of Wailuā River; the artifact spread measured 44.0 m in length. The artifacts were associated with pre-Contact times. Five backhoe trenches were placed in Locus A (Test Area 2 [TA-2]), which produced negative results for cultural material (Figure 15) (see STRATIGRAPHIC TEST EXCAVATION).

Figure 14: TS-2, Overview. View to West.

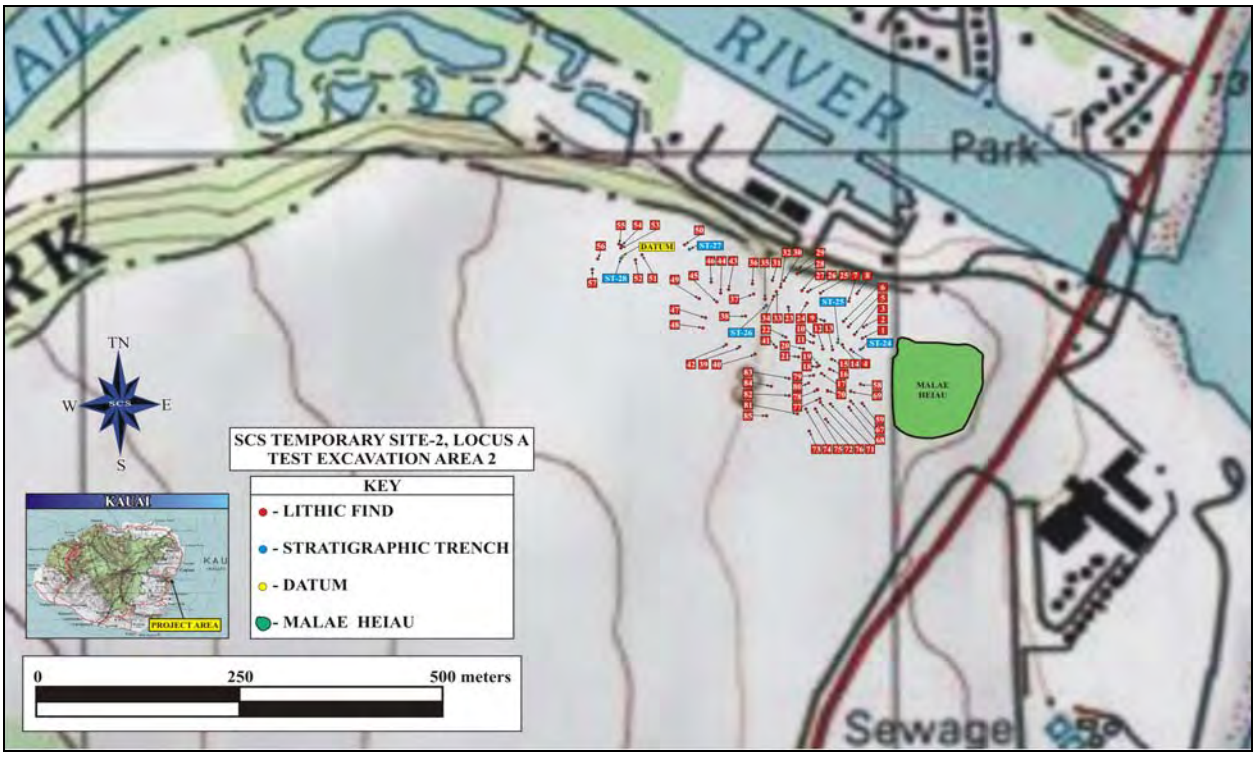


Figure 15: USGS Stratigraphic Trench Locations (TA-2), Site TS-2, Locus A, Plan View Utilizing GPS Points.

SCS SITE TS-3

Site TS-3 contains four features situated along a narrow contour line of a moderately steep northeastern-facing slope of Nailiakauea Ridge between the mountain and the lower plain (Figure 16). Site TS-3, Feature 4 was located just outside the project boundary, but was also recorded due to its significance and possible relation to the other three features. Features 2 and 3 were composed of two rock terrace remnants and one rock wall (TS-3, Feature 1). The site vegetation consisted of umbrella tree (*Brassaia actinophylla*), Christmas berry (*schinus terebinthifolius*), common guava (*Psidium guajava L.)*, Java plum (*Eugenia jambolana* Lam.), and *lantana* (*Lantana camara*). No archaeological test units were placed in Site TS-3.

Figure 16: DHHL Lands. View to West Overlooking TS-3.

Feature 1 was a linear rock wall located at the base of Nailiakauea Ridge, along the southwestern boundary of the project area (Figure 17). The length of the wall (Feature 1) stretched 119.0 m in length, which suggested an historic temporal affiliation; however, the feature was traditionally constructed. The feature was constructed of piled sub-rounded basalt boulders, with intermittently placed cobbles and pebbles. There was some evidence of facing where the boulders were piled two to three courses high (Figure 18). Some large boulders were used in wall segments. The wall measured 119.0 m long and 2.0 to 6.0 m wide with wall

Figure 17: Site TS-3, Feature 1. View to Southwest.

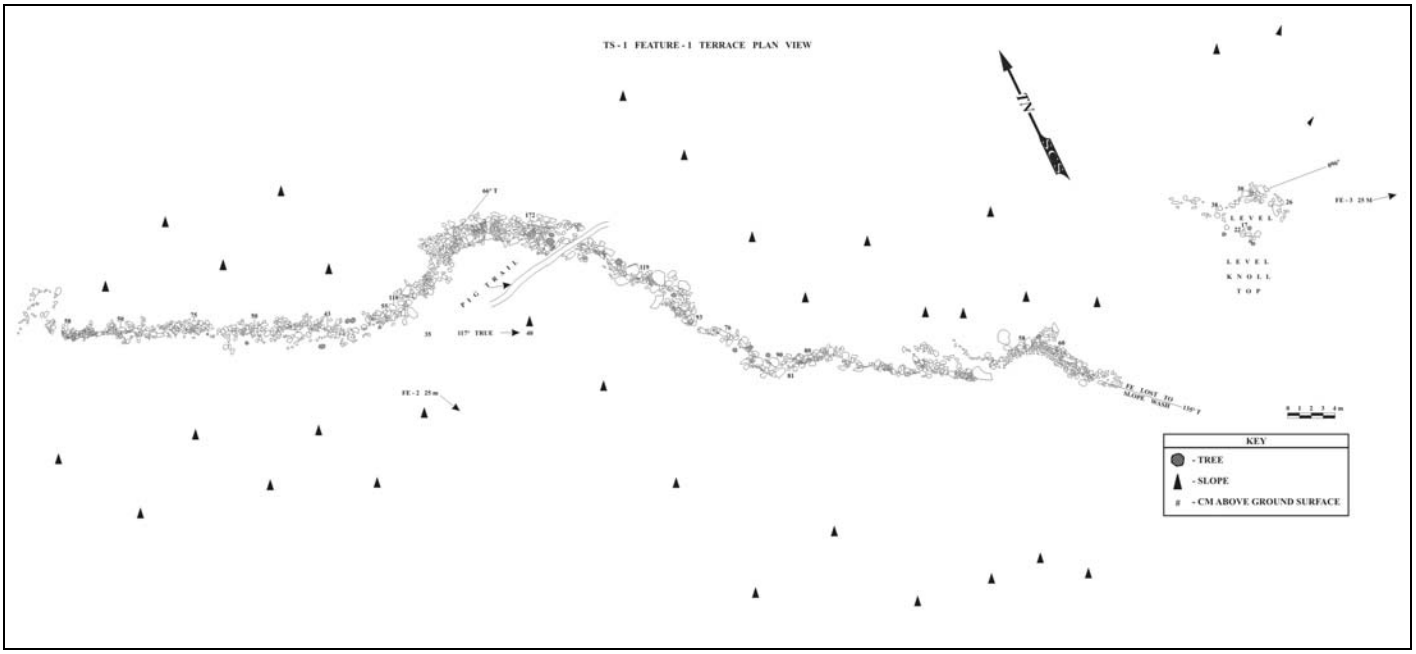


Figure 18: Site TS-3, Feature 1. Plan View.

thickness on average 1.0 m wide, the wall height was from 0.30 m to 1.72 m high. The feature was curvilinear and was oriented northwest-southeast (125°/305° TN). Stacking was still evident along portions of the wall, and its southeastern terminus was suggestive of possible habitation. The feature was in fair condition as it has suffered alteration from erosion, gravity and animal disturbances.

Feature 2 was located 40.0 m upslope from the Feature 1 (rock wall) on a moderate to very steep slope. Feature 2 is divided into two clusters (Figure 19) (Figure 20). Since the slope was steep enough to compromise the stability of the upper portions of the subfeatures, there was evidence of tumbling. The terrace remnants were constructed of piled subrounded boulders, cobbles, and pebbles, which included very large boulders (109.0 by 80.0 by 50.0 cm) that were possible bedrock. There was no evidence of facing throughout the subfeatures. The feature measured 25.0 m long by 8.0 m wide on average, and was oriented northwest-southeast (120°/300° MN). Feature 2 was in fair condition with alteration due to erosion, gravity and animal disturbances.

Feature 3 was a linear terrace situated mid-slope between the cliff face of Nailiakauea Ridge and the Līhu`e plain, and was located at the southwestern boundary of the project area (Figure 21) (Figure 22). The length of the terrace was 4.9 m long with wall thickness of 0.44 m. The features height was from 0.38 m to 0.78 m. The feature was constructed of piled subrounded basalt boulders (0.30 to 0.40 m), three to four courses high, with intermittently placed cobbles and pebbles, and was oriented northwest-southeast (144°/324° TN). Stacking was still evident along portions of the terrace; its southeastern terminus is suggestive of possible habitation. The feature appeared to be in good condition and was relatively unaltered.

Feature 4 was a large multi-tiered rectangular enclosure situated at the bottom of the ridge of Mauna Kapu (Figure 23) (Figure 24) (Figure 25). It was located 10.0 m upslope (south) of an irrigation ditch (TS-1, Feature 5). A linear rock terrace extended from the enclosure's northwestern wall. Portions of a terrace that may have extended from the enclosure's southwestern side were still evident; however, current usage of a motocross trail has damaged the feature's southwestern corner.

STRATIGRAPHIC TEST EXCAVATION (ST)

Testing at Wailuā-DHHL was conducted on the southeast corner (TA-1) (Figure 26), and the northeastern portion (TA-2) of the Project area (see Figure 15). Twenty-eight Stratigraphic Trench units (ST-1 through ST-28) were excavated, revealing several, discrete stratigraphic layers, with some, relatively-minimal variation from unit to unit (Appendix B). Some of this

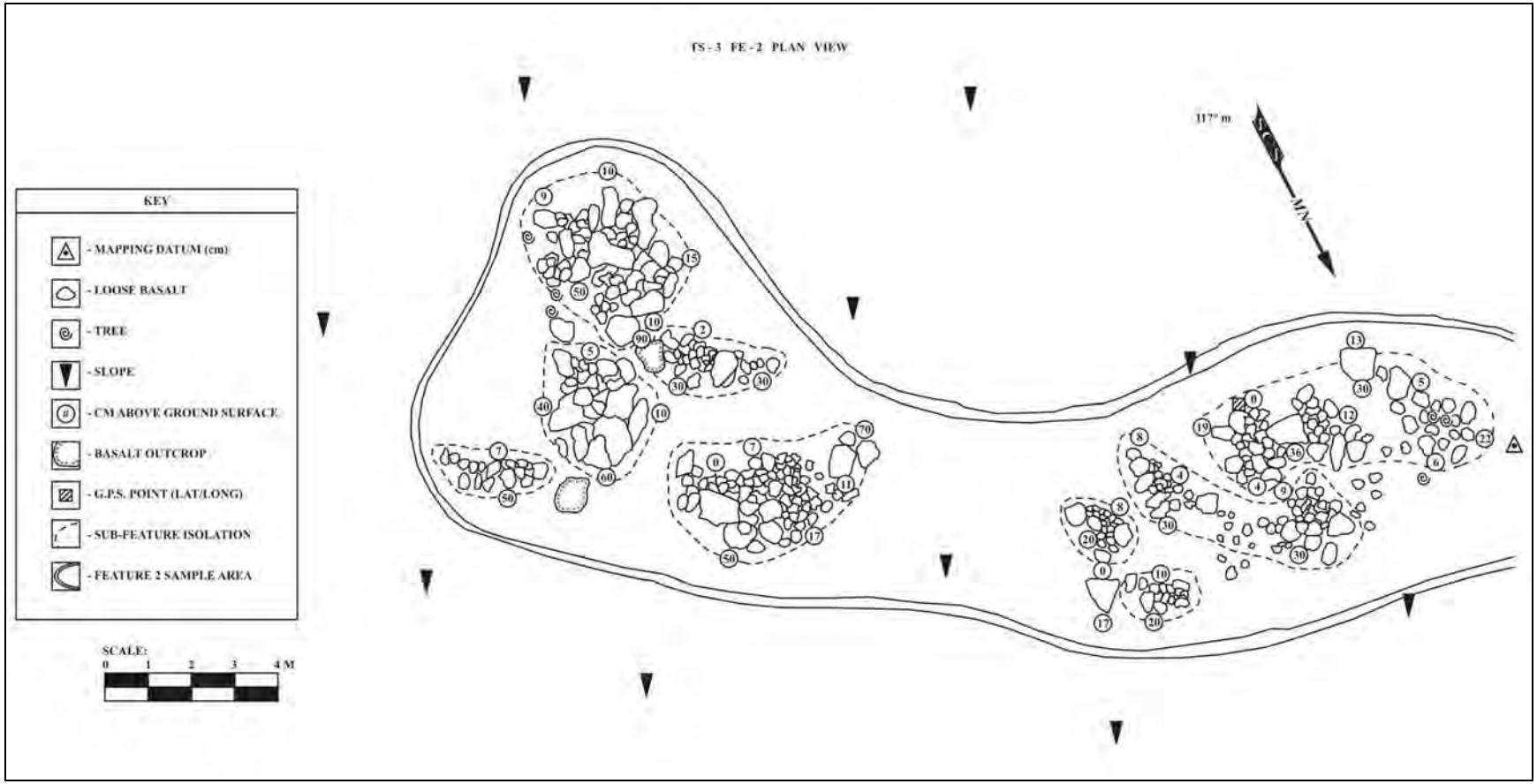


Figure 19: Site TS-3, Feature 2. Plan View.

Figure 20: Site TS-3, Feature 2. View to North.

Figure 21: Site TS-3, Feature 3. View to Northwest.

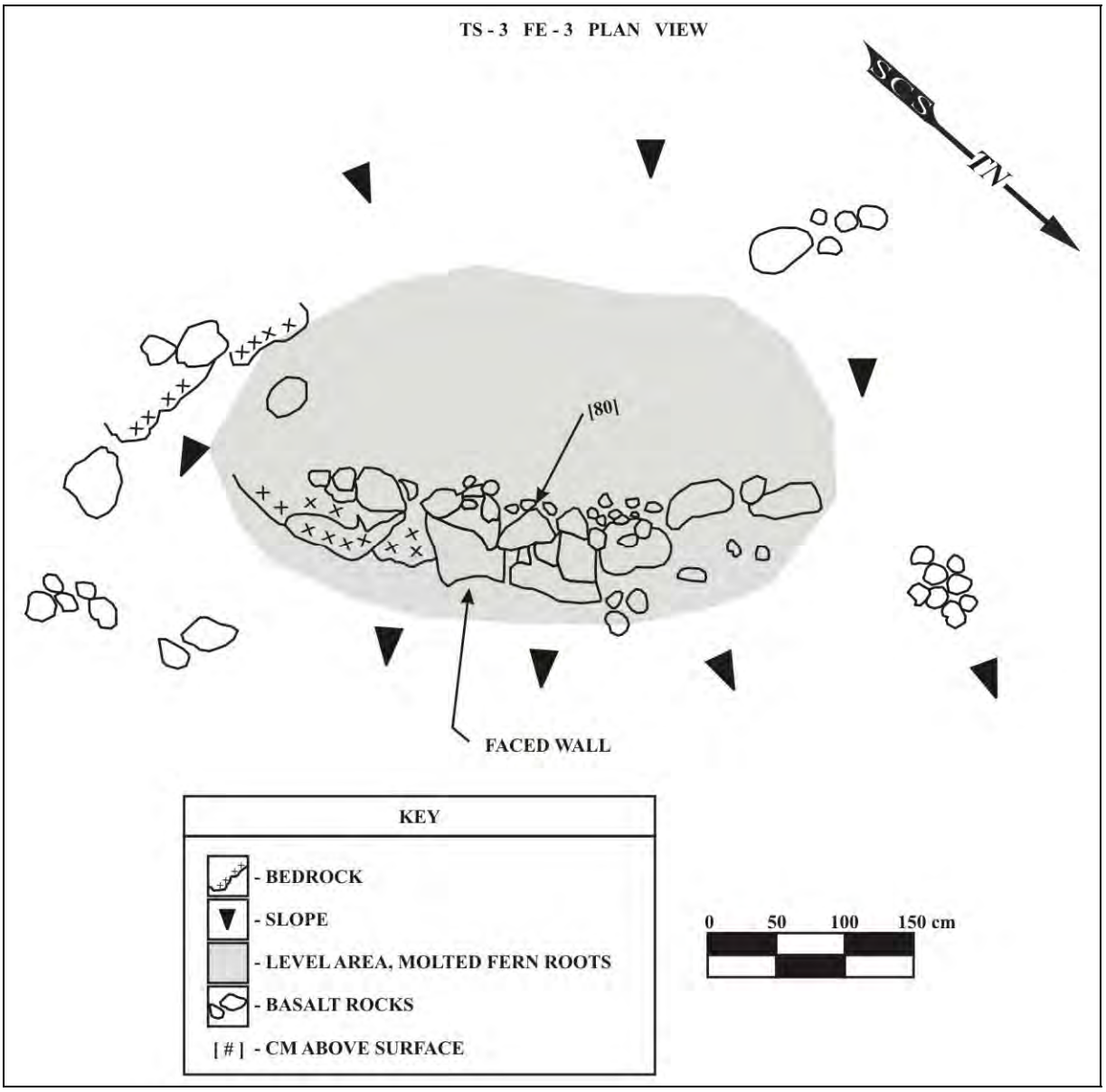


Figure 22: Site TS-3, Feature 3. Plan View.

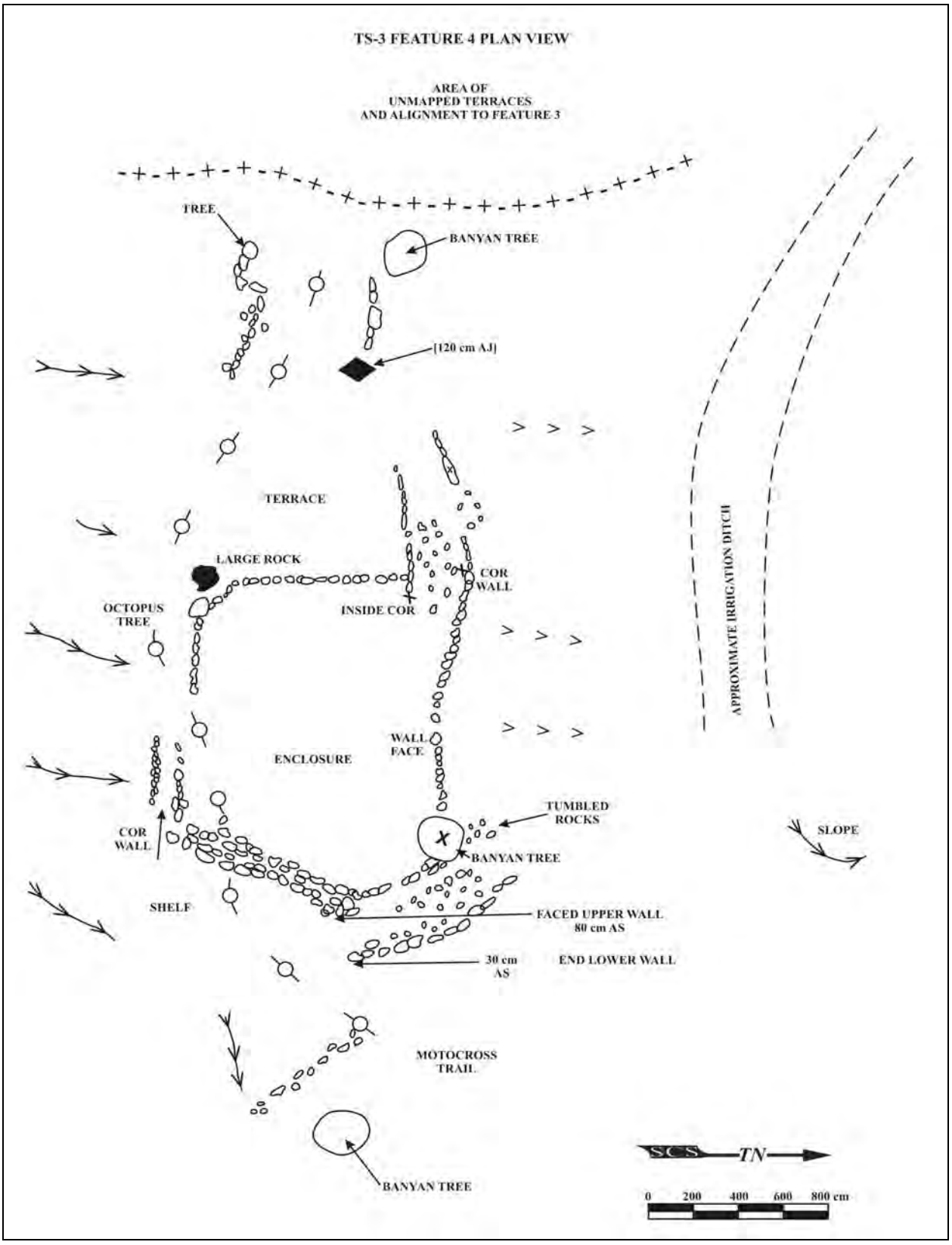


Figure 23: Site TS-3, Feature 4. Plan View.

Figure 24: Site TS-3, Feature 4. View to North.

Figure 25: Site TS-3, Feature 4. View to East.

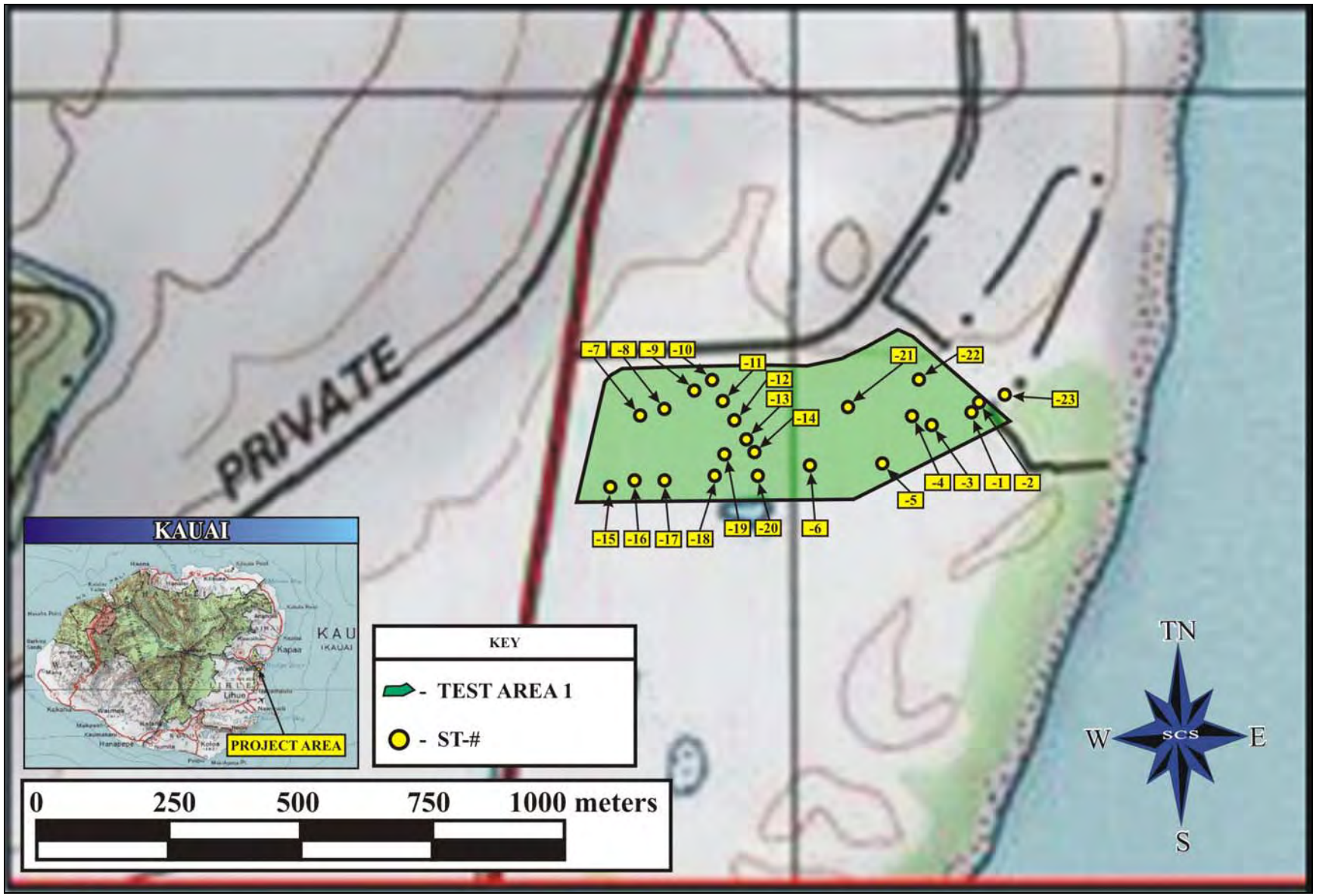


Figure 26: USGS Stratigraphic Trench Locations (TA-1). Plan View Utilizing GPS Points.

variation is likely the result of prior disturbances by agriculture. All trenches were devoid of cultural material, with the results of each listed in Table 3.

SUMMARY AND CONCLUSION

The current Archaeological Inventory Survey led to the identification of three new archaeological sites. Site TS-1 is an historic site that includes agricultural water diversion and irrigation features; it is associated with the Plantation Era on Kaua`i. Site TS-2 consists of a pre-Contact surface lithic (stone tool) scatter associated with Malae Heiau. TS-3 is composed of two rock terrace remnants (TS-3, Features 2 and 3), one rock wall (TS-3, Feature 1) with traditional construction, and one multi-tiered enclosure (TS-3, Feature 4). Subsurface testing at Site TS-2 and selected sections of the project area yielded only negative results. One significant, previously identified site occurs adjacent to the project area, Malae Heiau (State Site -104).

Site TS-3, Feature 4 consisted of a large multi-tiered enclosure, which has been impacted by a trail currently utilized for motocross. Site TS-3, Feature 4 was interpreted as a possible *heiau* or structure that is significant to Malae and Poli`ahu Heiau. This feature borders the project boundary; however, due to its possible affiliation to the other three features, and neighboring Heiau Complex, this site was recorded for Preservation. Although no test excavation was conducted because of the location of the feature at the Project boundary, Data Recovery is recommended for this site in order to answer questions concerning relationship of Mauna Kapu, the Heiau Complex and neighboring *kapu* lands (the immediate Project Area).

LITHIC ANALYSIS RESULTS

Site TS-2 consists of a pre-Contact surface lithic (stone tool) scatter that is concentrated in four Loci and one outlier. Locus A has been interpreted as a pre-Contact lithic workshop whose function is associated with Malae Heiau. One hundred thirty-six total artifacts were located and collected from the ground surface; the majority found in Locus A situated 48.0 m from the *Heiau* (see Appendix B). The artifact assemblage was composed of flaked stone tools and debitage (debris produced during flaked stone tool manufacture). The stone tool assemblage consisted of basalt adze performs, hammerstones, gravers, biface and uniface fragments, a chisel fragment, basalt cores, polished flakes and edge altered flakes (Figure 27) (Appendix C). As suggested by artifact analysis and flake typology, this was a multi-use site where activities involved food procurement and processing, craft manufacture, and tool manufacture and refinement (Figure 28). Three adze quarries have been identified thus far on Kaua`i, one of which is Site 4000, located in Wailuā. In Kikuchi's 1973 survey of the Malae Heiau, lithic scatter was noted in and around Malae Heiau. The assemblage was relocated in 1991 (Designated as Site-104A) when State Parks revisited Malae Heiau as part of its inclusion into the State Park System.

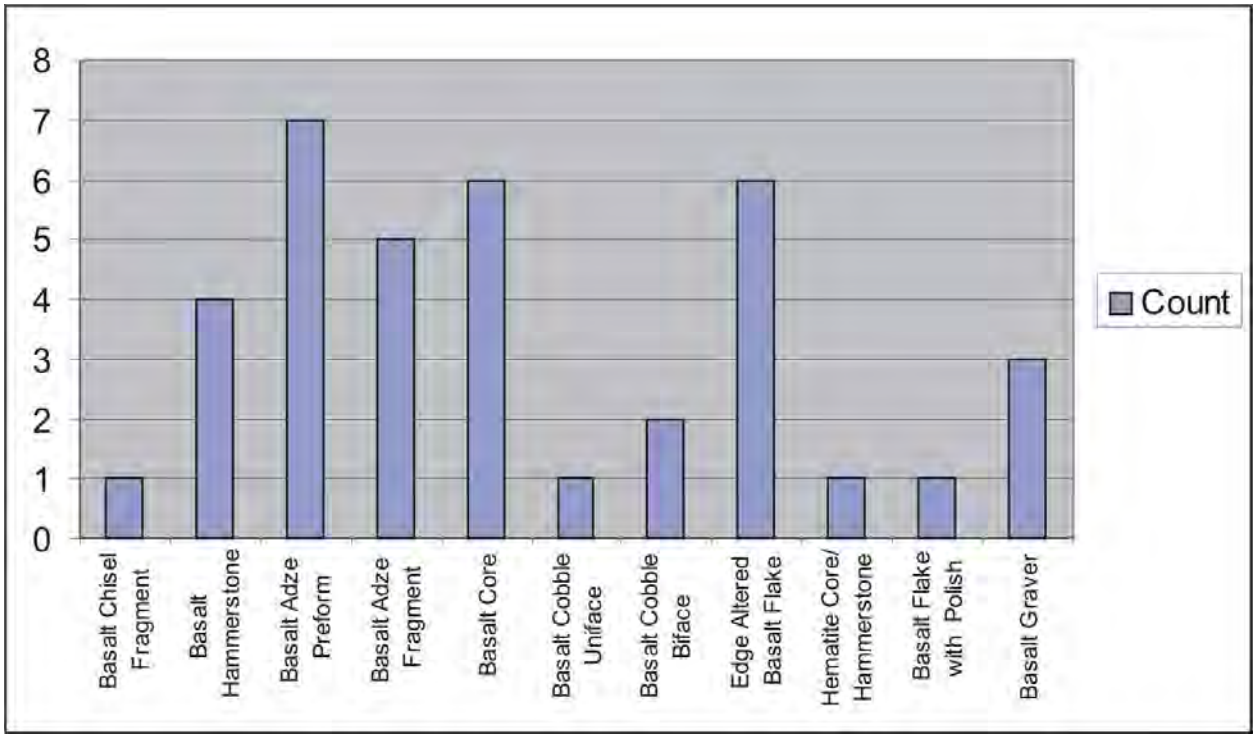
Table 3: ST Units at Wailuā-DHHL.

Test Location Area	ST #	Unit Size LxWxD (m)	Orientation (°)	Profile/ Strata	Munsell/Layers/Soil Description	Culture Material
TA-2	ST-1	7.0 by 0.8 by 0.78	NE-SW 74/254	Southeast 3	Layer I: Dark Brown (7.5 YR 3/2) SILT Loam, Moderate Very Fine Sub-Blocky, Few Micro To Crushed Rootlet, Few Basalt Boulder Limestone And Gravel Rocks, Wavy Clear Boundary, No Cultural Materials. Layer II: Light Gray (7.5 YR 6/4) Sand, Weak Very Fine Single Grain, Few Micro To Fine, Very Few Limestone Gravel, Wavy Abrupt Boundary, No Cultural Remains. Layer III: Limestone	None
	ST-2	4.2 by 0.8 by 1.09	SE-NW 160/340	East 2	Layer I: Dark Brown (7.5 YR 3/2) Silt Loam, Moderate Very Fine Sub-Blocky, Few Micro To Crushed Rootlet, Few Basalt Boulder And Pebble Rocks, Smooth Abrupt Boundary, No Cultural Materials. Layer II: Light Yellowish Brown (10 YR 6/4) Sand, Weak Very Fine Single Grain, Very Few Micro To Medium, No Cultural Remains.	None
	ST-3	8.2 by 0.8 by 1.25	NE-SW 58/238	Southeast 3	Layer I: Dark Brown (7.5 YR 3/2) Silt Loam, Moderate Very Fine Sub-Blocky, Common Micro To Crushed Rootlet, Very Few Basalt Boulder Rocks, Wavy Clear Boundary, No Cultural Materials. Layer II: Light Gray (2.5 Y 7/2) Clay Loam, Structure Less Very Fine Massive, Very Few Micro To Medium, Smooth Clear Boundary, No Cultural Remains. Layer III: Dark Greenish Gray (10 Y 4/1) Sandy Clay, Structure Less Very Fine Massive, No Cultural Remains.	None
	ST-4	18.5 by 0.8 by 1.36	N-S 5/185	West 2	Layer I: Dark Brown (7.5 YR 3/2) Silt Loam, Moderate Very Fine Sub-Blocky, Few Micro To Crushed Rootlet, Very Few Basalt Pebble Rocks, Wavy Clear Boundary, No Cultural Materials. Layer II: Light Yellowish Brown (10 Yr 6/4) Sand, Weak Very Fine Single Grain, Wavy Abrupt Boundary, No Cultural Remains.	None
	ST-5	8.6 by 0.75 by 0.98	SE-NW 144/324	Northeast 2	Layer I: Very Dark Grayish Brown (7.5 YR 3/3) Sandy Loam, Weak Very Fine Sub-Blocky, Common Micro To Fine Rootlet, Wavy Boundary, No Cultural Remains. Layer Ii: Light Yellowish Brown (2.5 Y 6/6) Sand, Weak Very Fine Single Grain, Few Micro To Medium Rootlet, No Cultural Remains.	None
	ST-6	8.6 by 0.75 by 0.98	SE-NW 142/322	East 2	Layer I: Very Dark Grayish Brown (7.5 YR 3/3) Sandy Loam; Weak Very Fine Sub-Blocky, Common Micro to Fine Rootlet, Wavy Boundary, No Cultural Remains. Layer II: Light Yellowish Brown (2.5 Y 6/6) Sand, Weak very Fine, Single Grain, Few Micro to Medium Rootlet, No Cultural Material.	None
	ST-7	6.3 by 0.8 by 0.68	NE-SW 68/248	Northwest 2	Layer I: Dark Brown (7.5 YR 3/3) Loam, Moderate Very Fine Sub-Blocky, Few Micro To Crushed Rootlet, Very Few Basalt Gravel Rocks, Wavy Clear Boundary, No Cultural Remains. Layer II: Reddish Yellow To Very Pale Brown (7.5 Yr 6/6 - 10 Yr 8/3) Sand, Weak Very Fine Massive, Very Few Micro To Fine Rootlet, Very Few Limestone Gravel, No Cultural Remains.	None

Test Location Area	ST #	Unit Size LxWxD (m)	Orientation (°)	Profile/ Strata	Munsell/Layers/Soil Description	Culture Material
	ST-8	3.1 by 1.0 by 0.58	E-W 70/250	-- 2	Layer I: Dark Brown (7.5 YR 3/3) Loam, Moderate Very Fine, Sub-Blocky, Few Micro To Crushed Rootlet, Very Few Basalt Gravel Rocks, Wavy Clear Boundary, No Cultural Remains. Layer II: Reddish Yellow To Very Pale Brown (7.5 Yr 6/6 - 10 Yr 8/3) Sand, Weak Very Fine Massive, Very Few Micro To Fine Rootlet, Very Few Limestone Gravel, No Cultural Remains.	
	ST-9	3.5 by 0.78 by 0.48	NE-SW 68/248	-- 2	Layer I: Dark Brown (7.5 YR 3/3) Loam, Moderate Very Fine Sub-Blocky, Few Micro To Crushed Rootlet, Very Few Basalt Gravel Rocks, Wavy Clear Boundary, No Cultural Remains. Layer II: Very Pale Brown (10 Yr 8/3) Sand, Weak Very Fine Massive, Very Few Micro To Fine Rootlet, Very Few Limestone Gravel, No Cultural Remains.	
	ST-10	3.8 by 0.75 by 0.45	SE-NW 158/338	-- 2	Layer I: Dark Brown (7.5 YR 3/3) Loam, Moderate Very Fine Sub-Blocky, Few Micro To Crushed Rootlet, Very Few Basalt Gravel Rocks, Wavy Clear Boundary, No Cultural Remains. Layer II: Very Pale Brown (10 Yr 8/3) Sand, Weak Very Fine Massive, Very Few Micro To Fine Rootlet, Very Few Limestone Gravel, No Cultural Remains.	
	ST-11	3.3 by 0.7 by 0.51	S-N 172/352	-- 2	Layer I: Dark Brown (7.5 YR 3/3) Loam, Moderate Very Fine Sub-Blocky, Few Micro To Crushed Rootlet, Very Few Basalt Gravel Rocks, Wavy Clear Boundary, No Cultural Remains. Layer II: Very Pale Brown (10 Yr 8/3) Sand, Weak Very Fine Massive, Very Few Micro To Fine Rootlet, Very Few Limestone Gravel, No Cultural Remains.	None
	ST-12	3.9 by 0.8 by 0.74	SE-NW 142/322	Northeast 2	Layer I: Dark Brown (7.5 YR 3/3) Loam, Moderate Very Fine Sub-Blocky, Few Micro To Crushed Rootlet, Very Few Basalt Gravel Rocks, Wavy Clear Boundary, No Cultural Remains. Layer II: Very Pale Brown (10 Yr 8/3) Sand, Weak Very Fine Massive, Very Few Micro To Fine Rootlet, Very Few Limestone Gravel, No Cultural Remains.	None
	ST-13	4.3 by 0.75 by 0.70	SE-NW 148/328	Southwest 2	Layer I: Dark Brown (7.5 YR 3/3) Loam, Moderate Very Fine Sub-Blocky, Few Micro To Crushed Rootlet, Very Few Basalt Gravel Rocks, Wavy Clear Boundary, No Cultural Remains. Layer II: Very Pale Brown (10 Yr 8/3) Sand, Weak Very Fine Massive, Very Few Micro To Fine Rootlet, Very Few Limestone Gravel, No Cultural Remains.	None
	ST-14	4.0 by 0.8 by 0.84	S-N 166/346	Southwest 3	Layer I: Very Pale Brow (10 YR 7/3) Sand, Weak Very Fine Single Grain, Common Micro To Crushed Rootlet, 80% Crushed Coral Sub Gravel To Gravel Rocks, Smooth Abrupt Artificial Boundary, No Cultural Materials With Crushed Coral Line Rock Mixed With Sand For Old Road Surface. Layer II: Dark Brown (7.5 YR 3/3) Loam, Weak Very Fine Sub-Blocky, Few Micro To Medium Rootlet, Very Few Basalt Pebble Rocks, Wavy Abrupt Boundary, No Cultural Remains. Layer III: Very Pale Brown (10 Yr 7/4) Sand, Moderate Very Fine Single Grain, No Cultural Remains.	None
	ST-15	5.5 by 0.8 by 1.00	E-W 88/268	North 2	Layer I: Dark Brown (7.5 Yr 3/2) Loam, Common Micro To Crushed Rootlet, No Cultural Remains. Layer II: Very Pale Brown (10 Yr 7/3) Sand, Very Few Micro To Medium Rootlet, No Cultural Remains.	None
	ST-16	5.2 by 0.8 by	E-W	South	Layer I: Dark Brown (7.5 YR 3/2) Loam, Common Micro To Crushed Rootlet, No Cultural	None

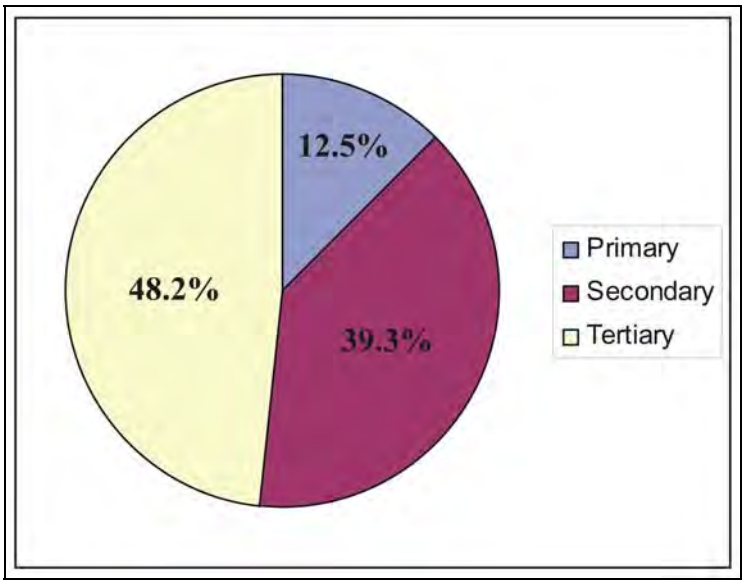
Test Location Area	ST #	Unit Size LxWxD (m)	Orientation (°)	Profile/ Strata	Munsell/Layers/Soil Description	Culture Material
		0.86	92/272	2	Remains. Layer II: Very Pale Brown (10 YR 7/3) Sand, Very Few Micro To Medium Rootlet, No Cultural Remains.	
	ST-17	4.3 by 0.75 by 0.87	E-W 90/270	South 2	Layer I: Dark Brown (7.5 YR 3/2) Loam, Common Micro To Crushed Rootlet, No Cultural Remains. Layer II: Very Pale Brown (10 YR 7/3) Sand, Very Few Micro To Medium Rootlet, No Cultural Remains.	None
	ST-18	4.1 by 0.8 by 0.95	E-W 103/283	North 2	Layer I: Dark Grayish Brown (10 YR 4/2) Loam, Weak Very Fine Sub-Blocky, Few Micro To Fine Rootlet, Very Few Basalt Gravel Rocks, Smooth Abrupt Boundary, No Cultural Remains. Layer II: Light Yellowish Brown (10 YR 6/4) Sand, Weak Very Fine Single Grain, Very Few Micro To Medium Rootlet, No Cultural Remains.	None
	ST-19	5.6 by 0.8 by 1.32	N-S 2/182	East 2	Layer I: Dark Grayish Brown (10 YR 4/2) Loam, Weak Very Fine Sub-Blocky, Common Micro To Crushed Rootlet, Common Coral Gravel Rocks, Wavy Abrupt Boundary, No Cultural Remains. Layer II: Light Yellowish Brown (10 Yr 6/4) Sand, Weak Very Fine Sub-Blocky, Very Few Micro To Medium Rootlet, No Cultural Remains.	None
	ST-20	7.0 by 0.8 by 0.69	E-W 91/271	North 2	Layer I: Dark Grayish Brown (10 YR 4/2) Loam, Moderate Very Fine Sub-Blocky, Common Micro To Medium Rootlet, Very Few Basalt Gravel Rocks, Smooth Abrupt Boundary, No Cultural Remains. Layer II: Pale Yellow (2.5 Y 8/2) Sand, Weak Very Fine Single Grain, Very Few Micro To Fine Rootlet, Very Few Limestone Gravel Rocks, No Cultural Remains.	None
	ST-21	4.0 by 0.75 by 1.4	SE-NW 128/308	Northeast 2	Layer I: Dark Brown (7.5 YR 3/4) Silty Clay Loam, Weak Very Fine Sub-Blocky, Few Micro To Corse Rootlet, Few Basalt Cobble Gravel Pebble Rocks, Smooth Clear Boundary, No Cultural Remains. Layer II: Dark Brown (7.5 YR 3/2) Silty Clay, Weak Very Fine Sub-Blocky, Very Few Micro To Medium Rootlet, Very Few Basalt Cobble Pebble Rocks, No Cultural Remains.	None
	ST-22	5.7 by 0.8 by 1.22	N-S 8/248	Northwest 2	Layer I: Dark Brown (7.5 YR 3/3) Silty Clay Loam, Weak Very Fine Sub-Blocky, Few Micro To Medium Rootlet, Few Basalt Bolder Cobble Pebble Rocks, Smooth Clear Boundary, No Cultural Remains. Layer II: Dark Brown (7.5 YR 3/4) Silty Clay, Weak Very Fine Sub-Blocky, Very Few Micro To Fine Rootlet, No Cultural Remains.	None
	ST-23	6.7 by 0.8 by 0.78	SE-NW 130/310	-- 4	Layer I: Dark Reddish Brown (5 YR 3/3) Loam, Moderate Very Fine Sub-Blocky, Few Micro To Med Rootlet, Very Few Sub Basalt Pebble Rocks, Wavy Abrupt Boundary, Modern Trash Materials. Layer II: Yellowish Brown (10 YR 5/6) Sand, Weak Very Fine Single Grain, Very Few Micro To Fine Rootlet, Smooth Abrupt Boundary, No Cultural Remains. Layer III: Light Yellowish Brown (10 YR 6/4) Sand, Weak Very Fine Single Grain, Very Few Micro To Fine Rootlet, Smooth Abrupt Boundary, No Cultural Remains. Layer IV: Dark Brown (7.5 YR 3/2) Silty Clay, Weak Very Fine Sub-Blocky, Very Few Micro To	None

Test Location Area	ST #	Unit Size LxWxD (m)	Orientation (°)	Profile/ Strata	Munsell/Layers/Soil Description	Culture Material
					Fine Rootlet, No Cultural Remains.	
TA-1	ST-24	2.5 by 0.6 by 0.55	E-W 103/283	-- 2	Layer I: Reddish Brown (2.5 YR 5/4) Plow Zone, Clay/ Roots. No Cultural Material. Layer II: Yellowish Red (5 YR 5/8) Compact Clay/ No Roots. No Cultural Material.	None
	ST-25	2.6 by 0.6 by 0.56	E-W 82/262	-- 2	Layer I: Reddish Brown (2.5 YR 5/4) Plow Zone, Clay/ Roots. No Cultural Material. Layer II: Yellowish Red (5 YR 5/8) Compact Clay/ No Roots. No Cultural Material.	None
	ST-26	2.3 by 0.6 by 0.56	SE-NW 110/290	-- 2	Layer I: Reddish Brown (2.5 YR 5/4) Plow Zone, Clay/ Roots. No Cultural Material. Layer II: Yellowish Red (5 YR 5/8) Compact Clay/ No Roots. No Cultural Material.	None
	ST-27	2.0 by 0.6 by 0.35	SE-NW 125/305	-- 2	Layer I: Reddish Brown (2.5 YR 5/4) Plow Zone, Clay/ Roots. No Cultural Material. Layer II: Yellowish Red (5 YR 5/8) Compact Clay/ No Roots. No Cultural Material.	None
	ST-28	2.3 by 0.6 by 0.53	E-W 90/270	-- 2	Layer I: Reddish Brown (2.5 YR 5/4) Plow Zone, Clay/ Roots. No Cultural Material. Layer II: Yellowish Red (5 YR 5/8) Compact Clay/ No Roots. No Cultural Material.	None



Tool	Count
Basalt Chisel Fragment	1
Basalt Hammerstone	4
Basalt Adze Preform	7
Basalt Adze Fragment	5
Basalt Core	6
Basalt Cobble Uniface	1
Basalt Cobble Biface	2
Edge Altered Basalt Flake	6
Hematite Core/ Hammerstone	1
Basalt Flake with Polish	1
Basalt Graver	3

Figure 27: Basalt Artifact Counts for Site TS-2 Stone Tool Assemblage.



Basalt Debitage	Counts
Primary	7
Secondary	22
Tertiary	27

Figure 28: Site TS-2 Stone Tool Flake Typology Summary.

Loci B, C and D have been interpreted as pre-Contact lithic chipping stations, areas of the "floor" within an archaeological site that yields more stone flakes than any other kind of artifact. Such features are frequently interpreted as places used for the chipping of stone, where tools were sharpened and possibly finished.

Locus B contained four pieces of ground surface debitage and one tool that consisted of an edge altered basalt flake. The other four pieces consisted of two tertiary flakes, one secondary flake and one non-diagnostic flake.

Locus C contained one basalt tool and three pieces of debitage; one was from volcanic glass, collected from the ground surface. The basalt core displayed multiple striking platforms. The debitage consisted of one secondary, one tertiary, and one non-diagnostic flake.

Locus D contained 3 basalt tools and 12 pieces of debitage. The basalt tools consisted of two basalt adze performs and one basalt adze fragment. The debitage contained two secondary flakes, eight tertiary flakes and two non-diagnostic flakes.

The outlier consisted of one non-diagnostic flake.

CONCLUSION

Concerning the immediate project area, Malae Heiau is an integral part of the Complex, one whose function remains poorly understood. It is hypothesized that Malae Heiau has functioned in various capacities from pre-Contact to the Historic Period; it s reported to have been built by the Menehune and may have functioned originally as a *luakini* (Thrum 1917; Bennett 1931). Thrum (1907:41) noted that the other *heiau* on Kauai were “connected in their workings” in the manner of Malae and Poli`ahu. Research questions remain unanswered with regard to the connectedness of the sites in the Complex. The petroglyph boulders located at Hauola (Place of Refuge, Site -105) contain important legendary associations associated with *heiau* functions that took place during festivals. The petroglyphs showed evidence of sharpening and stone tool refinement by the early Hawaiians. Investigation into the various stages of lithic reduction taking place along Wailuā River, including newly discovered site (TS-2, Loci A through D), could address certain research questions. Further work is required that necessitates cultural landscape analysis utilizing GIS to understand Malae’s relationship to the rest of the Complex. As noted in the National Register nomination application form (1989) under significance:

> "The Wailuā Complex of Heiau is one of the most important archeological site complexes in the Hawaiian Islands with components spanning all phases of Hawaiian culture." Relative to modern day concerns: "Most of the heiau and sacred sites in the NHL complex are associated with legends, rulers and events that played an important role in Hawaiian culture and are of traditional significance to contemporary Hawaiians of native descent."

Even after the abolishment of the *kapu* system and ancient religion by 1819, the sites containing *heiau* continue to be regarded as *wahi pana* (legendary places), places imbued with *mana* (supernaturnal power; authority, power), and hold significance to today's Hawaiian people (Kirch 1996: 11).

Where are the sacred sites of the Hawaiians today? Can their boundaries be properly delineated? Further work is required in order to address these questions specifically; can the Wailuā Heiau Complex be construed as a web of culturally significant spiritual locales spread across a larger ancestral landscape whose connection remains significant, both in terms of site and for designated sacred open space? These questions can only be addressed with further investigation and consultation.

Hawai`i State Law, Article XII, Section 76; Act 50, mandates the protection of cultural site integrity, therefore further work is recommended in the way of consultation as proposed in the attendant cultural impact assessment (McGerty and Spear 2007). Since the early 1980s, the federal government has listed traditional cultural places (TCPs) on the National Register of Historic Places, which is managed by the Department of the Interior. Many TCPs are sacred sites. In keeping with the protocol concerning traditional cultural practices of the Hawaiian people and their sacred sites, the proper spiritual atmosphere must be observed.

SIGNIFICANCE ASSESSMENTS

Sites TS-1, TS-2 and TS-3 have been evaluated for significance according to the criteria established for the State and National Register of Historic Places. The five criteria are listed below:

Criterion A: Site is associated with events that have made a significant contribution to the broad patterns of our history;

Criterion B: Site is associated with the lives of persons significant to our past;

Criterion C: Site is an excellent site type; embodies distinctive characteristics of a type, period, or method of construction, or represents the work of a master, or possesses high artistic values, or represents a significant and distinguishable entity whose components may lack individual construction;

Criterion D: Site has yielded or has the potential to yield information important in prehistory or history;

Criterion E: Site has cultural significance; probable religious structures or burials present (State of Hawai`i criteria only).

Site TS-1 and TS-2 are significant under Criteria D; Portions of TS-2 (Locus A) may be affiliated with the Malae Heiau (Site -104/104A), of the State and National Register of Historic Places. Site TS-3 is significant under D. TS-3, Feature 4 falls outside of the project boundaries; however, since the cultural significance of feature is yet undetermined, further work is recommended to investigate the site's function through time.

RECOMMENDATIONS

The proposed project would visually affect the surrounding cultural landscape from certain vantage points, notably the *heiau.* The potential impact on these culturally affiliated resources is of major concern for the proposed project. The Wailuā Complex of Heiau (Site -502) is one of the few remaining places in the Hawaiian Islands where one can enjoy a relatively unaltered view from one *heiau* to another. Concerning the immediate project area, Malae Heiau is an integral part of the Complex, one whose function remains poorly understood. Further work is required that necessitates cultural landscape analysis utilizing GIS to understand Malae's relationship to the rest of the Complex. Investigation into the various stages of lithic reduction taking place along Wailuā River, including newly discovered site (TS-2, Loci A through D), could also address certain research questions. In addition, a historic feature (rock wall) was identified through archival research, and was later relocated as an earthen berm heavily obscured by vegetation.

Sites TS-1 (agricultural water diversion and irrigation features) and TS-2 (Lithic [stone tool] workshop) are significant under Criteria D of the State Register of Historic Places; no further work is recommended for TS-1. However, further attention is needed to address a possible western boundary extension of Site -104 to include TS-2, Locus A (Lithic Workshop), as an extension of Site -104A. Site TS-3 is significant under Criteria D and possibly E, and requires further archaeological study. Data Recovery is recommended for this site in addition to further investigation into possible connections between Site -502 and *kapu* lands, which the attending commercial development would affect.

Archival research identified the existence of an historic rock wall that was not evident through pedestrian survey but its location is shown on an historic map; the approximate location of this historic wall was later verified on the ground as an earthen berm after the conclusion of the field portion of the survey. Data Recovery should include testing at the historic wall site to verify its existence and location.

Further, construction activities immediately outside the current Buffer Zone of Site -104 (Malae Heiau) at Site TS-2, as well as the northern border of the project area which includes areas of lithic concentrations and TS-1 Feature 5, should be monitoring by a qualified Archaeologist during ground penetrating phases of construction.

At this juncture, Data Recovery is strongly recommended, and concurred with by State Parks, in order to further investigate both visual and lineal ties from the Malae Heiau to neighboring *heiau* and relationship to *kapu* lands and Mauna Kapu (including Site TS-3). This Data Recovery will involve study utilizing GIS. In addition, further consideration is recommended on extending the site boundaries of Site -104A, to encompass the cultural activities that were being conducted there. All such boundaries should be properly delineated before the commencement of any construction activities and clearly marked with construction-type fencing.

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APPENDIX A: LOCUS A ARTIFACTS

SCS PROJECT 864 SITE TS-2 LOCUS A SURFACE MIDDEN INVENTORY					
Field Bag	**Find Spot ID**	**Unit**	**Identification**	**Count**	**Remarks**
1	1	-	Basalt Debitage	1	Interior flake
2	2	-	Basalt Debitage	1	Secondary flake
3	3	-	Basalt Debitage	1	Secondary flake
4	4	-	Basalt Debitage	2	1-Secondary flake, 1-interior flake
5	5	-	Basalt Debitage	1	Interior flake
6	6	-	Basalt Debitage	1	Secondary flake
7	7	-	Basalt Debitage	1	Interior flake
7	7	-	Basalt Chisel Fragment	1	Trapezoidal in cross-section, cutting edge beveled on top and bottom
8	8	-	Basalt Hammerstone	1	Waterworn cobble, elongated with opposite ends battered
9	9	-	Basalt Debitage	1	Secondary flake
10	10	-	Fractured Basalt	1	Waterworn, non-artifact
11	11	-	Basalt Debitage	1	Interior flake
12	12	-	Basalt Adze Preform Fragment	1	Fractured, trapezoidal in cross-section

13	13	-	Basalt Debitage	1	Non-diagnostic flake
14	14	-	Basalt Core	1	Single striking platform
14	14	-	Basalt Debitage	1	Secondary flake
15	15	-	Fractured Basalt	1	Waterworn, non-artifact
16	16	-	Basalt Debitage	1	Secondary flake
17	17	-	Basalt Cobble Uniface	1	-
18	18	-	Basalt Debitage	1	Interior flake
19	19	-	Edge Altered Basalt Flake	1	Fractured, thin rectangle in cross-section; possible adze preform
20	20	-	Edge Altered Basalt Flake	1	Artifact based on primary flake; 2 unifacial edges; Edge #1: 3.0 cm length, Edge #2: 4.8 cm length
21	21	-	Basalt Debitage	2	1-Interior flake, 1-non-diagnostic flake
22	22	-	Basalt Adze Preform	1	Artifact based on secondary flake; semi-circular in cross-section

23	23	-	Basalt Adze Blank Fragment	1	Fractured, bevel end present, rectangular in cross-section
24	24	-	Basalt Debitage	2	1-Secondary flake, 1-non-diagnostic flake
25	25	-	Basalt Debitage	1	Secondary flake
26	26	-	Fractured Basalt	1	Possible debitage
27	27	-	Basalt Debitage	2	1-Interior flake, 1-non-diagnostic flake
28	28	-	Basalt Debitage	1	Interior flake
29	29	-	Basalt Debitage	1	Secondary flake
30	30	-	Basalt Adze Preform	1	Fractured, irregular trapezoid in cross-section
31	31	-	Basalt Debitage	1	Interior flake
32	32	-	Hematite Core/ Hammerstone	1	Fragment, multiple striking platforms
33	33	-	Basalt Debitage	2	1-Secondary flake, 1-interior flake
34	34	-	Basalt Debitage	1	Secondary flake

35	35	-	Basalt Adze Fragment	1	Back end only, rectangular in cross-section, possibly preform fragment
36	36		Basalt Hammerstone	1	Slightly elongated, opposite ends battered
37	37	-	Basalt Debitage	1	Interior flake
38	38	-	Basalt Hammerstone	1	Irregular diamond shape, one end battered
39	39	-	Basalt Core	1	Multiple striking platforms
40	40	-	Basalt Debitage	1	Primary flake
41	41	-	Edge Altered Basalt Flake	1	Unifacial, 3.0 cm length (worked edge)
42	42	-	Basalt Cobble Biface	1	Based on waterworn cobble, 2 edges flaked; Edge #1: unifacial, 5.0 cm length, Edge #2: bifacial, 15.0 cm length
43	43	-	Basalt Debitage	1	Interior flake

44	44	-	Basalt Core	1	Artifact based on waterworn cobble, fragmented, multiple striking platforms
45	45	-	Basalt Hammerstone	1	Vesicular, one end battered
46	46	-	Basalt Debitage	1	Secondary flake
47	47	-	Basalt Debitage	1	Secondary flake
47	47	-	Basalt Flake with Polish	1	2-Facets polished
48	48	-	Basalt Debitage	1	Interior flake
49	49	-	Basalt Debitage	1	Non-diagnostic flake
49	49	-	Basalt Adze Preform Fragment	1	Bevel end only, rectangular in cross-section
50	50	-	Basalt Debitage	2	Interior flakes
51	51	-	Basalt Debitage	1	Secondary flake
52	52	-	Basalt Debitage	3	1-Primary flake, 1-secondary flake, 1-interior flake
53	53	-	Basalt Debitage	1	Secondary flake
54	54	-	Basalt Debitage	1	Interior flake
55	55	-	Basalt Debitage	3	1-Primary flake, 1-secondary flake, 1-non-diagnostic flake

56	56	-	Basalt Debitage	1	Primary flake
57	57	-	Basalt Debitage	1	Interior flake
58	58	-	Basalt Debitage	1	Interior flake
59	59	-	Basalt Adze Fragment	1	Back end only, trapezoidal in cross-section, 3-facets polished
67	67	-	Basalt Debitage	3	Interior flakes
68	68	-	Basalt Debitage	1	Interior flake
69	69	-	Basalt Adze Preform	1	Trapezoidal in cross-section
70	70	-	Edge Altered Basalt Flake	1	Artifact based on interior flake; unifacial 2.2 cm curved length
71	71	-	Basalt Debitage	2	1-Secondary flake, 1-interior flake
72	72	-	Basalt Debitage	1	Secondary flake
73	73	-	Basalt Cobble Biface	1	Artifact based on waterworn cobble
73	73	-	Edge Altered Basalt Flake/ Graver	1	-
74	74	-	Basalt Debitage	1	Interior flake
75	75	-	Basalt Debitage	1	Primary flake

76	76	-	Basalt Debitage	2	1-Interior flake, 1-non-diagnostic flake
77	77	-	Basalt Debitage	1	Interior flake
78	78	-	Basalt Debitage	1	Non-diagnostic flake
79	79	-	Basalt Graver	1	2-Worked edges; Edge #1: unifacial, 2.9 cm length, Edge #2: bifacial, 2.0 cm length
80	80	-	Basalt Debitage	1	Interior flake
81	81	-	Basalt Adze Preform Fragment	1	Fragment, bevel end
82	82	-	Basalt Debitage	1	Non-diagnostic flake
83	83	-	Fractured Basalt	1	Waterworn cobble, non-artifact
84	84	-	Basalt Debitage	2	Non-diagnostic flakes
84	84	-	Edge Altered Basalt Flake	1	Artifact based on interior flake, unifacial, 6.5 cm length (altered edge)
84	84	-	Basalt Core Fragment	1	Multiple striking platforms
85	85	-	Basalt Graver	1	Point missing

91	91	-	Basalt Pebble	1	Manuport, naturally worn
91	91	-	Basalt Debitage	6	2-Primary flakes, 2-secondary flakes, 2-interior flakes
92	-	ST-24	Basalt Debitage	1	Secondary flake
93	-	-	Basalt Debitage	3	2-Secondary flakes, 1-interior flake
93	-	-	Basalt Core	1	Multiple striking platforms

SCS PROJECT 864 SITE TS-2 LOCUS B SURFACE MIDDEN INVENTORY					
Field Bag	**Find Spot ID**	**Unit**	**Identification**	**Count**	**Remarks**
86	86	-	Edge Altered Basalt Flake	1	Unifacial, 3.0 cm length (altered edge)
87	87	-	Basalt Debitage	1	Secondary flake
88	88	-	Basalt Debitage	1	Interior flake
89	89	-	Basalt Debitage	1	Interior flake
90	90	-	Basalt Debitage	1	Non-diagnostic flake

SCS PROJECT 864 SITE TS-2 LOCUS C SURFACE MIDDEN INVENTORY					
Field Bag	**Find Spot ID**	**Unit**	**Identification**	**Count**	**Remarks**
60	60	-	Basalt Core Fragment	1	Multiple striking platforms
60	60	-	Basalt Debitage	1	Non-diagnostic flake

61	61	-	Basalt Debitage	1	Interior flake
65	65	-	Volcanic Glass Debitage	1	Secondary flake

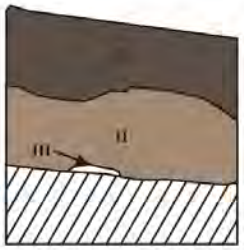
SCS PROJECT 864 SITE TS-2 LOCUS D SURFACE MIDDEN INVENTORY					
Field Bag	**Find Spot ID**	**Unit**	**Identification**	**Count**	**Remarks**
62	62	-	Basalt Adze Preform	1	Trapezoidal in cross-section
63	63	-	Basalt Debitage	1	Non-diagnostic flake
64	64	-	Basalt Debitage	1	Secondary flake
94	-	-	Basalt Adze Fragment	1	Back end only, rectangular in cross-section, 3-facets polished
95	-	-	Basalt Debitage	5	1-Secondary flake, 3-interior flakes, 1-non-diagnostic flake
96	-	-	Basalt Debitage	5	Interior flakes
96	-	-	Basalt Adze Preform	1	Fragment, bevel end only, triangular in cross-section

SCS PROJECT 864 SITE TS-2 OUTLIER SURFACE MIDDEN INVENTORY					
Field Bag	**Find Spot ID**	**Unit**	**Identification**	**Count**	**Remarks**
66	66	-	Basalt Debitage	1	Non-diagnostic flake

APPENDIX B: STRATIGRAPHIC TRENCH EXCAVATION PROFILE DRAWINGS

ST - 1 THROUGH ST - 3 PROFILE

ST - 1 SOUTH EAST PROFILE



I - LAYER I: DARK BROWN (7.5 YR 3/2) SILT LOAM, MODERATE VERY FINE SUB-BLOCKY, FEW MICRO TO CRUSHED ROOTLET, FEW BASALT BOULDER LIMESTONE AND GRAVEL ROCKS, WAVY CLEAR BOUNDARY, NO CULTURAL MATERIALS.

II - LAYER II: LIGHT GRAY (7.5 Y 6/4) SAND, WEAK VERY FINE SINGLE GRAIN, FEW MICRO TO FINE, VERY FEW LIMESTONE GRAVEL, WAVY ABRUPT BOUNDARY, NO CULTURAL REMAINS.

III - LAYER III: LIMESTONE

ST - 2 EAST WALL PROFILE

I - LAYER I: DARK BROWN (7.5 YR 3/2) SILT LOAM, MODERATE VERY FINE SUB-BLOCKY, FEW MICRO TO CRUSHED ROOTLET, FEW BASALT BOULDER AND PEBBLE ROCKS, SMOOTH ABRUPT BOUNDARY, NO CULTURAL MATERIALS.

II - LAYER II: LIGHT YELLOWISH BROWN (10 YR 6/4) SAND, WEAK VERY FINE SINGLE GRAIN, VERY FEW MICRO TO MEDIUM, NO CULTURAL REMAINS.

ST - 3 PROFILE

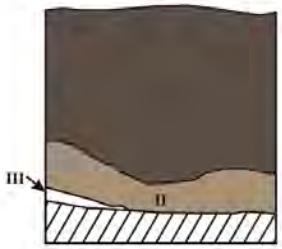
I - LAYER I: DARK BROWN (7.5 YR 3/2) SILT LOAM, MODERATE VERY FINE SUB-BLOCKY, COMMON MICRO TO CRUSHED ROOTLET, VERY FEW BASALT BOULDER ROCKS, WAVY CLEAR BOUNDARY, NO CULTURAL MATERIALS.

II - LAYER II: LIGHT GRAY (2.5 Y 7/2) CLAY LOAM, STRUCTURE LESS VERY FINE MASSIVE, VERY FEW MICRO TO MEDIUM, SMOOTH CLEAR BOUNDARY, NO CULTURAL REMAINS.

III - LAYER III: DARK GREENISH GRAY (10 Y 4/1) SANDY CLAY, STRUCTURE LESS VERY FINE MASSIVE, NO CULTURAL REMAINS.

ST - 4 THROUGH ST - 6 PROFILE

ST - 4 PROFILE

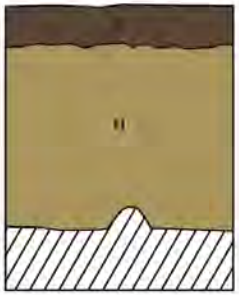


I - LAYER I: DARK BROWN (7.5 YR 3/2) SILT LOAM, MODERATE VERY FINE SUB-BLOCKY, FEW MICRO TO CRUSHED ROOTLET, VERY FEW BASALT PEBBLE ROCKS, WAVY CLEAR BOUNDARY, NO CULTURAL MATERIALS.

II - LAYER II: LIGHT YELLOWISH BROWN (10 YR 6/4) SAND, WEAK VERY FINE SINGLE GRAIN, WAVY ABRUPT BOUNDARY, NO CULTURAL REMAINS.

III - LAYER III: LIMESTONE ROCK

ST - 5 PROFILE



I - LAYER I: VERY DARK GRAYISH BROWN (7.5 YR 3/3) SANDY LOAM, WEAK VERY FINE SUB-BLOCKY, COMMON MICRO TO MEDIUM ROOTLET, VERY FEW BASALT PEBBLE ROCKS, SMOOTH BOUNDARY, NO CULTURAL REMAINS.

II - LAYER II: LIGHT YELLOWISH BROWN (2.5 Y 6/6) SAND, WEAK VERY FINE SINGLE GRAIN, FEW MICRO TO MEDIUM ROOTLET, NO CULTURAL REMAINS.

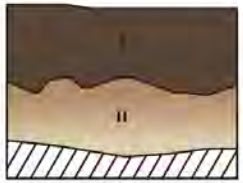
ST - 6 PROFILE

I - LAYER I: VERY DARK GRAYISH BROWN (7.5 YR 3/3) SANDY LOAM, WEAK VERY FINE SUB-BLOCKY, COMMON MICRO TO FINE ROOTLET, WAVY BOUNDARY, NO CULTURAL REMAINS.

II - LAYER II: LIGHT YELLOWISH BROWN (2.5 Y 6/6) SAND, WEAK VERY FINE SINGLE GRAIN, FEW MICRO TO MEDIUM ROOTLET, NO CULTURAL REMAINS.

ST - 7 THROUGH ST - 10 PROFILE

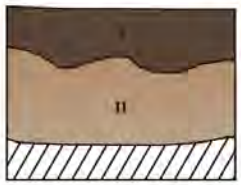
ST - 7 PROFILE



I - LAYER I: DARK BROWN (7.5 YR 3/3) LOAM, MODERATE VERY FINE SUB-BLOCKY, FEW MICRO TO CRUSHED ROOTLET, VERY FEW BASALT GRAVEL ROCKS, WAVY CLEAR BOUNDARY, NO CULTURAL REMAINS.

II - LAYER II: REDDISH YELLOW TO VERY PALE BROWN (7.5 YR 6/6 - 10 YR 8/3) SAND, WEAK VERY FINE MASSIVE, VERY FEW MICRO TO FINE ROOTLET, VERY FEW LIMESTONE GRAVEL, NO CULTURAL REMAINS.

ST - 8 PROFILE



I - LAYER I: DARK BROWN (7.5 YR 3/3) LOAM, MODERATE VERY FINE SUB-BLOCKY, FEW MICRO TO CRUSHED ROOTLET, VERY FEW BASALT GRAVEL ROCKS, WAVY CLEAR BOUNDARY, NO CULTURAL REMAINS.

II - LAYER II: REDDISH YELLOW TO VERY PALE BROWN (7.5 YR 6/6 - 10 YR 8/3) SAND, WEAK VERY FINE MASSIVE, VERY FEW MICRO TO FINE ROOTLET, VERY FEW LIMESTONE GRAVEL, NO CULTURAL REMAINS.

ST - 9 PROFILE

I - LAYER I: DARK BROWN (7.5 YR 3/3) LOAM, MODERATE VERY FINE SUB-BLOCKY, FEW MICRO TO CRUSHED ROOTLET, VERY FEW BASALT GRAVEL ROCKS, WAVY CLEAR BOUNDARY, NO CULTURAL REMAINS.

II - LAYER II: VERY PALE BROWN (10 YR 8/3) SAND, WEAK VERY FINE MASSIVE, VERY FEW MICRO TO FINE ROOTLET, VERY FEW LIMESTONE GRAVEL, NO CULTURAL REMAINS.

ST - 10 PROFILE

I - LAYER I: DARK BROWN (7.5 YR 3/3) LOAM, WEAK VERY FINE SUB-BLOCKY, COMMON MICRO TO MEDIUM ROOTLET, WAVY ABRUPT BOUNDARY, NO CULTURAL REMAINS.

II - LAYER II: VERY PALE BROWN (10 YR 7/3) SAND, WEAK VERY FINE SUB-BLOCKY, FEW FINE TO FINE ROOTLET, NO CULTURAL REMAINS.

ST - 11 THROUGH ST - 14 PROFILE

ST - 11 PROFILE

I - LAYER I: DARK BROWN (7.5 YR 3/3) LOAM, WEAK VERY FINE SUB-BLOCKY, COMMON MICRO TO MEDIUM ROOTLET, SMOOTH ABRUPT BOUNDARY, NO CULTURAL REMAINS.

II - LAYER II: VERY PALE BROWN (10 YR 7/4) SAND, MODERATE VERY FINE SINGLE GRAIN, FEW FINE TO CRUSHED ROOTLET, NO CULTURAL REMAINS.

ST - 12 NORTH EAST WALL PROFILE

I - LAYER I: DARK BROWN (7.5 YR 3/3) LOAM, WEAK VERY FINE SUB-BLOCKY, COMMON MICRO TO MEDIUM ROOTLET, SMOOTH ABRUPT BOUNDARY, NO CULTURAL REMAINS.

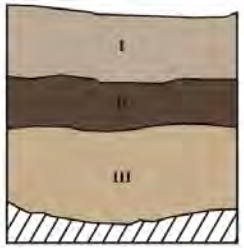
II - LAYER II: VERY PALE BROWN (10 YR 7/4) SAND, MODERATE VERY FINE SINGLE GRAIN, FEW FINE TO CRUSHED ROOTLET, NO CULTURAL REMAINS.

ST - 13 SOUTH WEST WALL PROFILE

I - LAYER I: DARK BROWN (7.5 YR 3/3) LOAM, WEAK VERY FINE SUB-BLOCKY, COMMON MICRO TO MEDIUM ROOTLET, SMOOTH ABRUPT BOUNDARY, NO CULTURAL REMAINS.

II - LAYER II: VERY PALE BROWN (10 YR 7/4) SAND, MODERATE VERY FINE SINGLE GRAIN, FEW FINE TO CRUSHED ROOTLET, NO CULTURAL REMAINS.

ST - 14 SOUTH WEST WALL PROFILE



I - LAYER I: VERY PALE BROW (10 YR 7/3) SAND, WEAK VERY FINE SINGLE GRAIN, COMMON MICRO TO CRUSHED ROOTLET, 80% CRUSHED CORAL SUB GRAVEL TO GRAVEL ROCKS, SMOOTH ABRUPT ARTIFICIAL BOUNDARY, NO CULTURAL MATERIALS WITH CRUSHED CORAL LINE ROCK MIXED WITH SAND FOR OLD ROAD SURFACE.

II - LAYER II: DARK BROWN (7.5 YR 3/3) LOAM, WEAK VERY FINE SUB-BLOCKY, FEW MICRO TO MEDIUM ROOTLET, VERY FEW BASALT PEBBLE ROCKS, WAVY ABRUPT BOUNDARY, NO CULTURAL REMAINS.

III - LAYER III: VERY PALE BROWN (10 YR 7/4) SAND, MODERATE VERY FINE SINGLE GRAIN, NO CULTURAL REMAINS.

ST - 15 THROUGH ST - 17 PROFILE

ST - 15 NORTH WALL PROFILE

I - LAYER I: DARK BROWN (7.5 YR 3/2) LOAM, COMMON MICRO TO CRUSHED ROOTLET, NO CULTURAL REMAINS.

II - LAYER II: VERY PALE BROWN (10 YR 7/3) SAND, VERY FEW MICRO TO MEDIUM ROOTLET, NO CULTURAL REMAINS.

ST - 16 SOUTH WALL PROFILE

I - LAYER I: DARK BROWN (7.5 YR 3/2) LOAM, COMMON MICRO TO CRUSHED ROOTLET, NO CULTURAL REMAINS.

II - LAYER II: VERY PALE BROWN (10 YR 7/3) SAND, VERY FEW MICRO TO MEDIUM ROOTLET, NO CULTURAL REMAINS.

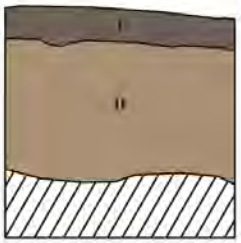
ST - 17 SOUTH WALL PROFILE

I - LAYER I: DARK BROWN (7.5 YR 3/2) LOAM, COMMON MICRO TO CRUSHED ROOTLET, NO CULTURAL REMAINS.

II - LAYER II: VERY PALE BROWN (10 YR 7/3) SAND, VERY FEW MICRO TO MEDIUM ROOTLET, NO CULTURAL REMAINS.

ST - 18 THROUGH ST - 20 PROFILE

ST - 18 NORTH WALL PROFILE



I - LAYER I: DARK GRAYISH BROWN (10 YR 4/2) LOAM, WEAK VERY FINE SUB-BLOCKY, FEW MICRO TO FINE ROOTLET, VERY FEW BASALT GRAVEL ROCKS, SMOOTH ABRUPT BOUNDARY, NO CULTURAL REMAINS.

II - LAYER II: LIGHT YELLOWISH BROWN (10 YR 6/4) SAND, WEAK VERY FINE SINGLE GRAIN, VERY FEW MICRO TO MEDIUM ROOTLET, NO CULTURAL REMAINS.

ST - 19 EAST WALL PROFILE

I - LAYER I: DARK GRAYISH BROWN (10 YR 4/2) LOAM, WEAK VERY FINE SUB-BLOCKY, COMMON MICRO TO CRUSHED ROOTLET, COMMON CORAL GRAVEL ROCKS, WAVY ABRUPT BOUNDARY, NO CULTURAL REMAINS.

II - LAYER II: LIGHT YELLOWISH BROWN (10 YR 6/4) SAND, WEAK VERY FINE SUB-BLOCKY, VERY FEW MICRO TO MEDIUM ROOTLET, NO CULTURAL REMAINS.

ST - 20 NORTH WALL PROFILE

I - LAYER I: DARK GRAYISH BROWN (10 YR 4/2) LOAM, MODERATE VERY FINE SUB-BLOCKY, COMMON MICRO TO MEDIUM ROOTLET, VERY FEW BASALT GRAVEL ROCKS, SMOOTH ABRUPT BOUNDARY, NO CULTURAL REMAINS.

II - LAYER II: PALE YELLOW (2.5 Y 8/2) SAND, WEAK VERY FINE SINGLE GRAIN, VERY FEW MICRO TO FINE ROOTLET, VERY FEW LIMESTONE GRAVEL ROCKS, NO CULTURAL REMAINS.

ST - 21 THROUGH ST - 22 PROFILE

ST - 21 NORTH EAST WALL PROFILE

- LAYER I: DARK BROWN (7.5 YR 3/4) SILTY CLAY LOAM, WEAK VERY FINE SUB-BLOCKY, FEW MICRO TO CORSE ROOTLET, FEW BASALT COBBLE GRAVEL PEBBLE ROCKS, SMOOTH CLEAR BOUNDARY, NO CULTURAL REMAINS.

- LAYER II: DARK BROWN (7.5 YR 3/2) SILTY CLAY, WEAK VERY FINE SUB-BLOCKY, VERY FEW MICRO TO MEDIUM ROOTLET, VERY FEW BASALT COBBLE PEBBLE ROCKS, NO CULTURAL REMAINS.

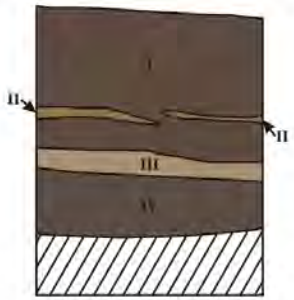
ST - 22 NORTH WEST WALL PROFILE

- LAYER I: DARK BROWN (7.5 YR 3/3) SILTY CLAY LOAM, WEAK VERY FINE SUB-BLOCKY, FEW MICRO TO MEDIUM ROOTLET, FEW BASALT BOLDER COBBLE PEBBLE ROCKS, SMOOTH CLEAR BOUNDARY, NO CULTURAL REMAINS.

- LAYER II: DARK BROWN (7.5 YR 3/4) SILTY CLAY, WEAK VERY FINE SUB-BLOCKY, VERY FEW MICRO TO FINE ROOTLET, NO CULTURAL REMAINS.

ST - 23 THROUGH ST - 27 PROFILE

ST - 23 PROFILE



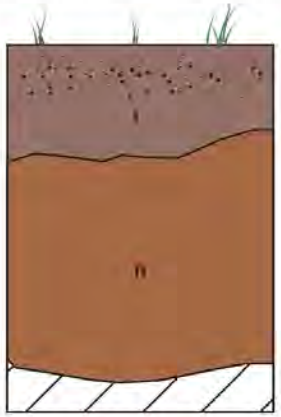
I - LAYER I: DARK REDDISH BROWN (5 YR 3/3) LOAM, MODERATE VERY FINE SUB-BLOCKY, FEW MICRO TO MED ROOTLET, VERY FEW SUB BASALT PEBBLE ROCKS, WAVY ABRUPT BOUNDARY, MODERN TRASH MATERIALS.

II - LAYER II: YELLOWISH BROWN (10 YR 5/6) SAND, WEAK VERY FINE SINGLE GRAIN, VERY FEW MICRO TO FINE ROOTLET, SMOOTH ABRUPT BOUNDARY, NO CULTURAL REMAINS.

III - LAYER III: LIGHT YELLOWISH BROWN (10 YR 6/4) SAND, WEAK VERY FINE SINGLE GRAIN, VERY FEW MICRO TO FINE ROOTLET, SMOOTH ABRUPT BOUNDARY, NO CULTURAL REMAINS.

IV - LAYER IV: DARK BROWN (7.5 YR 3/2) SILTY CLAY, WEAK VERY FINE SUB-BLOCKY, VERY FEW MICRO TO FINE ROOTLET, NO CULTURAL REMAINS.

TYPICAL PROFILE TO ST - 24 THEOUGH ST - 27



I - LAYER I: REDISH BROWN (2.5 YR 5/4) PLOW ZONE, CLAY/ ROOTS. NO CULTURAL MATERIAL.

II - LAYER II: YELLOWISH RED (5 YR 5/8) COMPACT CLAY/ NO ROOTS. NO CULTURAL MATERIAL.

SCALE:

APPENDIX C: SELECTED ARTIFACT PHOTOGRAPHS

DSC03206_REV: Field Bag 96-Basalt Adze Preform (left), Field Bag 7-Basalt Chisel (middle), Field Bag 49-Basalt Adze (right).

DSC03208_REV: Field Bag 73-Basalt Cobble Uniface (upper left), Field Bag 79-Basalt Graver (upper right), Field Bag 70-Edge Altered Basalt Flake (lower left), Field Bag 14-Basalt Core (lower right).