DRAFT ENVIRONMENTAL ASSESSMENT
HALE PIULA HAINA NATIVE FOREST AND BIRD HABITAT RESTORATION ACTIVITIES AND RESEARCH FACILITY

TMK (3rd): 7-1-001:003, and 7-1-001:006 and 007 (road easement)
Puʻu Waʻawaʻa, North Kona District, County of Hawaiʻi, State of Hawaiʻi

May 2009

Prepared for:

State of Hawaiʻi
Department of Land and Natural Resources
Office of Conservation and Coastal Lands
1151 Punchbowl Street, Room 131
Honolulu, Hawaiʻi 96813

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Puʻu Waʻawaʻa, North Kona District, County of Hawaiʻi, State of Hawaiʻi

APPLICANT:

Henk and Akemi Rogers
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Honolulu, HI 96814

APPROVING AGENCY:

State of Hawaiʻi
Department of Land and Natural Resources
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1151 Punchbowl Street, Room 131
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CONSULTANT:

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CLASS OF ACTION:

Use of State Lands
Action in the Conservation District

This document is prepared pursuant to:
The Hawaiʻi Environmental Policy Act,
Chapter 343, Hawaiʻi Revised Statutes (HRS), and
Title 11, Chapter 200, Hawaiʻi Department of Health Administrative Rules (HAR).

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SUMMARY

Henk and Akemi Rogers are planning a program of native forest and bird habitat restoration and scientific research for their 2.755-acre parcel of land in the *ahupua‘a* (Hawaiian land division) of Pu‘u Wa‘awa‘a. The property is located at about 4,650 feet in elevation in the State Land Use Conservation District and is surrounded by land under the control of the State Division of Forestry and Wildlife. Known as Hale Piula Haina, it was developed beginning in the mid-1930s and early 1940s to provide catchment water for leased land surrounding it. In order to restore a diverse native forest to provide optimum habitat and food supply for native birds of Pu‘u Wa‘awa‘a, the proposed action includes demolition of the remnants of the catchment system; removal of alien plants; planting of native trees, shrubs and herbs; and advanced predator excluder fencing. Another key aspect of the project is to build a rudimentary 576-square foot facility for the long-term scientific study of the management of the flora and fauna for optimum bird habitat restoration. The project also involves a request for formalization of an easement route and permission for minor repairs along an existing four-wheel-drive road from the Rogers Ranch headquarters to Hale Piula Haina.

The project will have highly beneficial impacts to native flora and fauna, and potential adverse impacts will be avoided through careful survey of the property and timing of alien species removal and construction. A fire plan is being developed to prevent wildfires and assist the State in fire suppression. Historic sites in the form of catchment system remnants are present; they are proposed for documentation prior to removal. No traditional cultural resources or practices are present on the property, and the restoration and research aspects of the project will have direct and indirect benefit to regional forest resources that are of cultural value.

The proposed action meets the needs expressed in the *Management Plan for the Ahupua‘a of Pu‘u Wa‘awa‘a and the Makai Lands of Pu‘u Anahulu* to seek additional resources through such means as grants and partnerships in order to realize the full potential of this plan in a timely manner, and fulfills a number of objectives of the plan.

PART 1: PROJECT DESCRIPTION AND ENVIRONMENTAL ASSESSMENT PROCESS

1.1 Project Description

Henk and Akemi Rogers are planning to restore and scientifically study native forest and bird habitat on a 2.755-acre parcel of land (TMK 7-1-001:003) located about four miles southwest of the Pu‘u Wa‘awa‘a[1] Ranch headquarters, where they own a home and various other facilities (Figures 1-5). The property is at about 4,650 feet in elevation in the State Land Use Conservation District and is surrounded by land under the control of the State Division of Forestry and Wildlife (DOFAW). Called Hale Piula Haina (after the corrugated iron – piula – and the familiar Hawaiian name for the Hind family), it was developed beginning in the mid-1930s or early 1940s to provide catchment water for leased land surrounding it.

In order to restore a diverse native forest to provide optimum habitat and food supply for native birds of Pu‘u Wa‘awa‘a, the proposed action includes demolition of the remnants of the catchment system; removal of alien plants; planting of native trees, shrubs and herbs; and advanced predator excluder fencing. Among the focal bird species are *‘Akepa* (*Loxops coccineus*), *‘I‘iwi* (*Vestiaria coccinea*), Hawai‘i Creeper (*Oreomystis mana*), *‘Akiapola‘au* (*Hemignathus munroi*), *‘Oma‘o* (*Myadestes obscurus*) and *Nene* (*Branta sandvicensis*), as well as native invertebrates such as moths and flies that are food items vital to their nestlings. Another key aspect of the project is to build a rudimentary facility for the long-term scientific study of the management of the flora and fauna for optimum bird habitat restoration. The project also involves a request for formalization of an easement route and permission for minor repairs along an existing four-wheel-drive road from the Rogers Ranch headquarters to Hale Piula Haina located on TMKs 7-1-001:006 and 007 (see Figure 1b). Any repairs to the easement road will need to be approved by DOFAW as part of its management responsibilities of the Pu‘u Wa‘awa‘a Forest Bird Sanctuary.

The project is being developed because of the Rogers’ interest in conservation biology and their appreciation for the unique and diverse ecosystem of Pu‘u Wa‘awa‘a. Hawai‘i is the most isolated archipelago in the world, and flora and fauna found there exhibit some of the world’s most remarkable examples of the evolutionary process known as adaptive radiation, where different life forms evolve from a single species. No other place in the world, including the famous Galapagos Islands, has such a high level of endemism. However, habitat degradation and invasive species have taken a toll on Hawai‘i’s unique life forms, and the State has the greatest number of threatened and endangered plant species in the United States. Of the more than 140 species of birds once found in Hawai‘i only about half remain, and 30 of those are endangered. Scientists also believe that more than half of the native plant communities in Hawai‘i are now rare, and most will be severely degraded or lost in the next several decades if they are not protected (Giffin 2003).

[1] The place name Pu‘u Wa‘awa‘a has at least five different spellings. This documents uses one of the most common, and except where providing direct quotes with other spellings, has attempted to be consistent.

It should be noted that the Rogers are also planning various activities at the ranch headquarters, four miles away in the Agricultural District. Those actions are unrelated to the proposal at Hale Piula Haina, and neither set of actions is dependent on the other in any way.

Context of Hale Piula Haina

The remnants of the catchment facilities currently present on the property were components of a larger system that spread onto State property in a time when the owners of Hale Piula Haina were also the lessees of the surrounding lands. Although a portion of the catchment system on adjacent State land still delivers water to unused water tanks, the catchment system within the Rogers' property is no longer operational. The property has regrown with young native *koa* (*Acacia koa*) in the years since the catchment area was actively used.

Although privately owned, Hale Piula Haina is located within the boundaries of the Pu‘u Wa‘awa‘a Forest Bird Sanctuary, which was established by the State Board of Land and Natural Resources on October 12, 1984. The Forest Bird Sanctuary was specifically created to preserve habitat for endangered forest birds and extends in elevation from 4,000 to 6,500 feet, encompassing 3,806 acres of forest bird habitat. About 800 acres in the northern part of the Forest Bird Sanctuary are within the State Land Use Agricultural District, but most of the Forest Bird Sanctuary, including Hale Piula Haina, lies within the Conservation District. Given this context, a Conservation District Use Permit (CDUP) and EA are necessary for the proposed actions.

Detailed Project Elements

One of the first activities will be demolition of the existing Hale Piula Haina catchment system and selective hand-clearing of the underlying land of undesirable plants and debris. The demolition is expected to provide some material for re-use in other components of the project. The next activity will be construction of a mammalian pest and predator excluder fence to allow native plants an opportunity to grow unhindered by these alien predators. Conservation biologists will then replant the area using the appropriate native species mix and spacing for the trees, shrubs and understory plants. A small outdoor nursery with shade cloth and storage will be built in order to acclimatize native plants grown from locally acquired seeds for outplanting on the property. Establishing plants will require irrigation water. Accordingly, adequate catchment structures and a water tank, currently envisioned at about 10,000 gallons, will be built. Environmentally sound alien plant, mammal and insect control will be applied. Monitoring and maintenance activities will be continuous by both direct observation and remote telemetry.

The project includes replanting of plant species historically found in the Pu‘u Wa‘awa‘a area, and is designed to help perpetuate their existence and increase habitat and food sources for endemic birds. Montane forests, such as those in which Hale Piula Haina is located, support the bulk of Hawai‘i's endemic bird life today (Giffin 2003).

A key component of the restoration effort is research. Therefore the project includes the Hale Piula Haina Native Biota Research Station. Anchored by a pre-fabricated, self-contained shelter (see Figure 5 for example), the station will be "off-the-grid" and powered by safe and clean solar and wind power.

Figure 1a. Project Location Map – Island of Hawai‘i

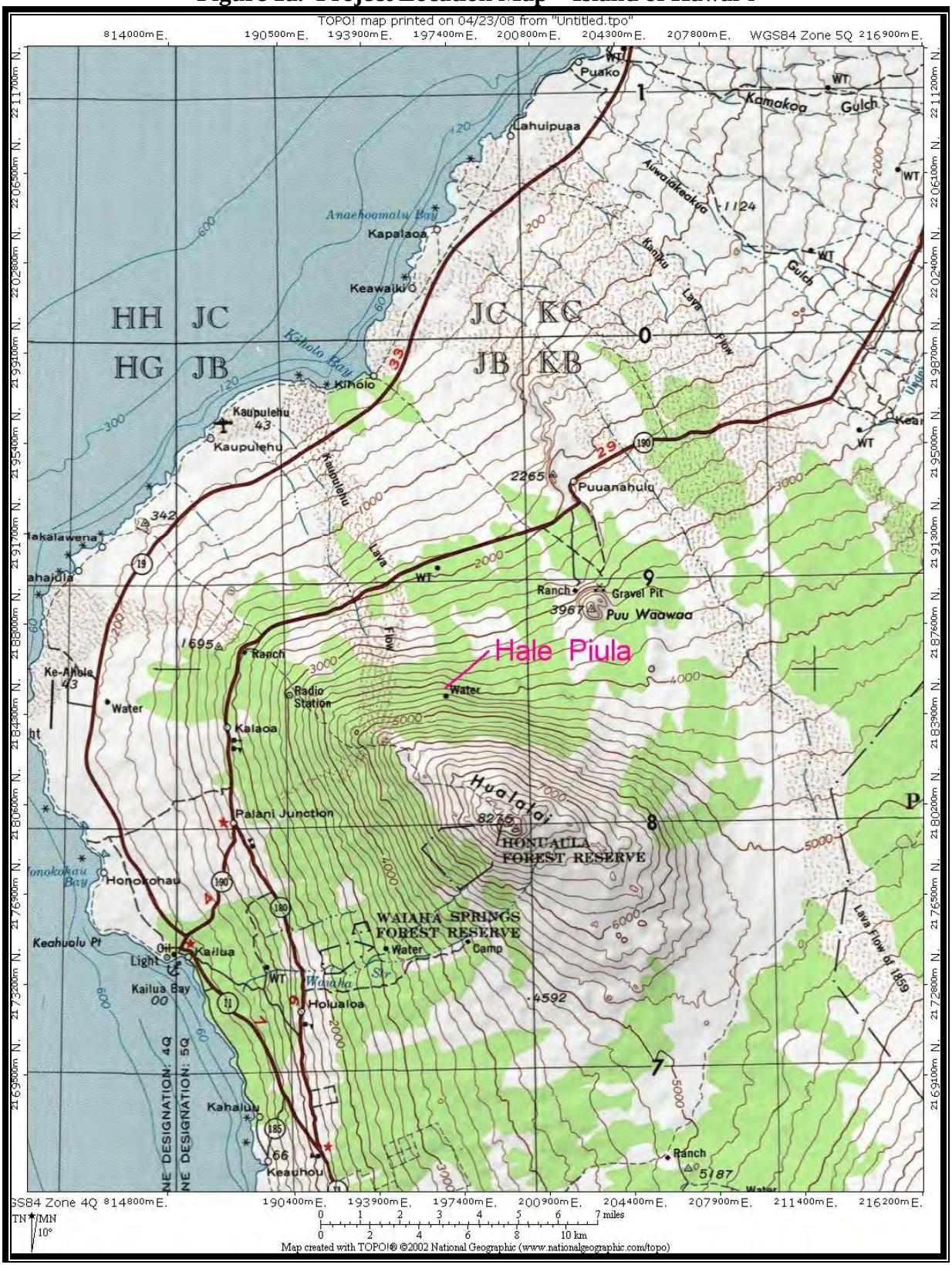


Figure 1b. Project Location USGS Map – Pu‘u Wa‘awa‘a

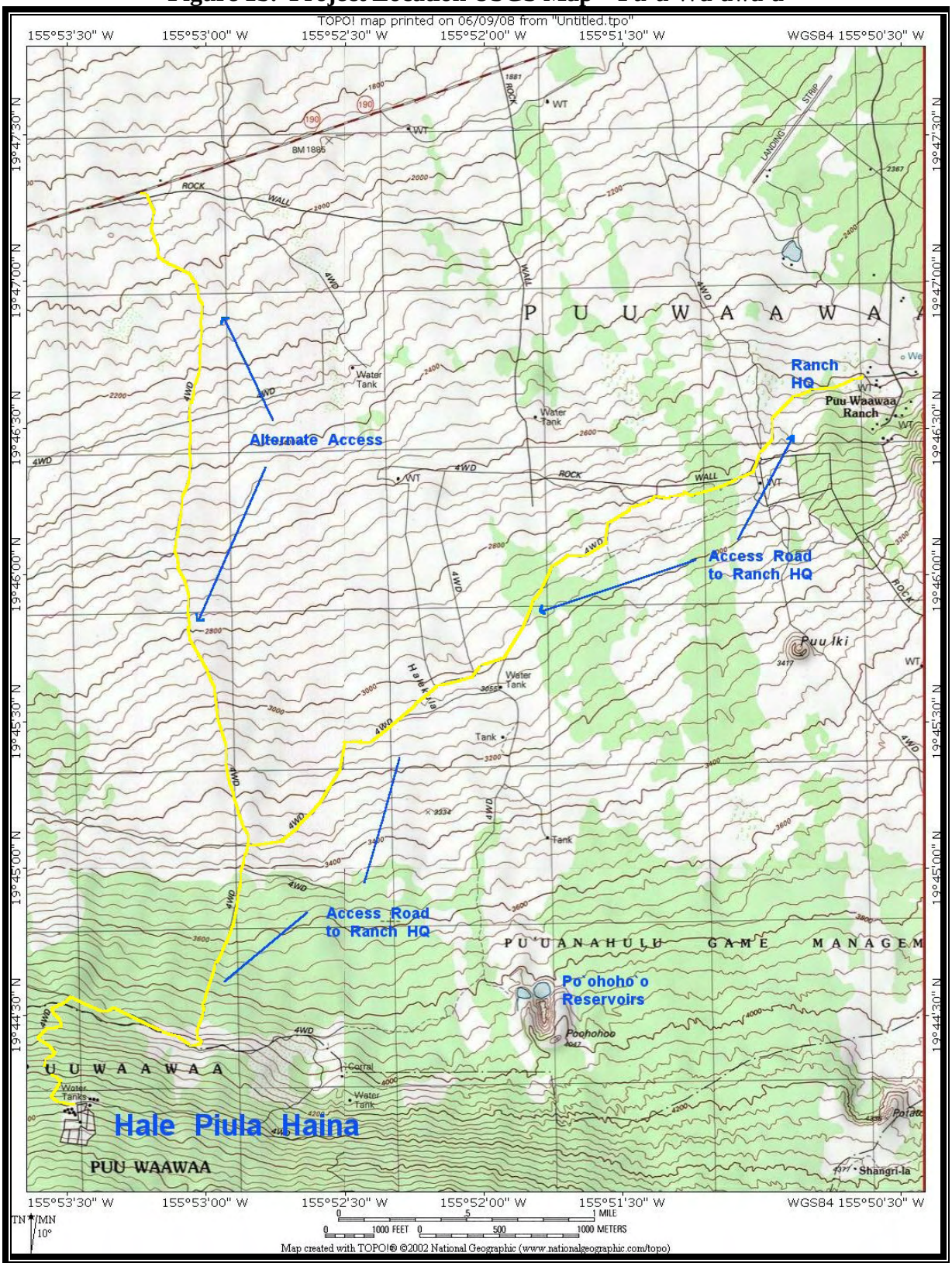
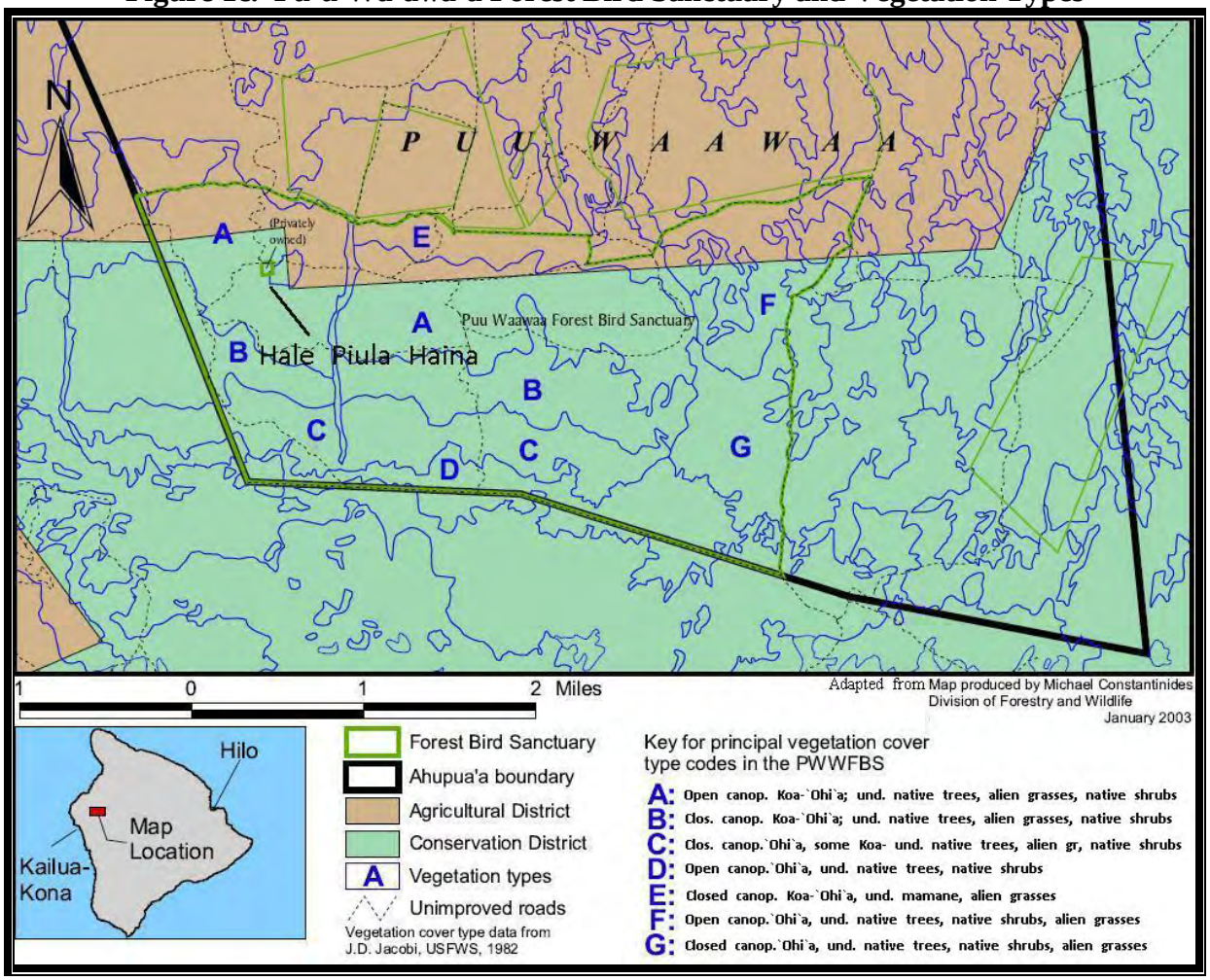


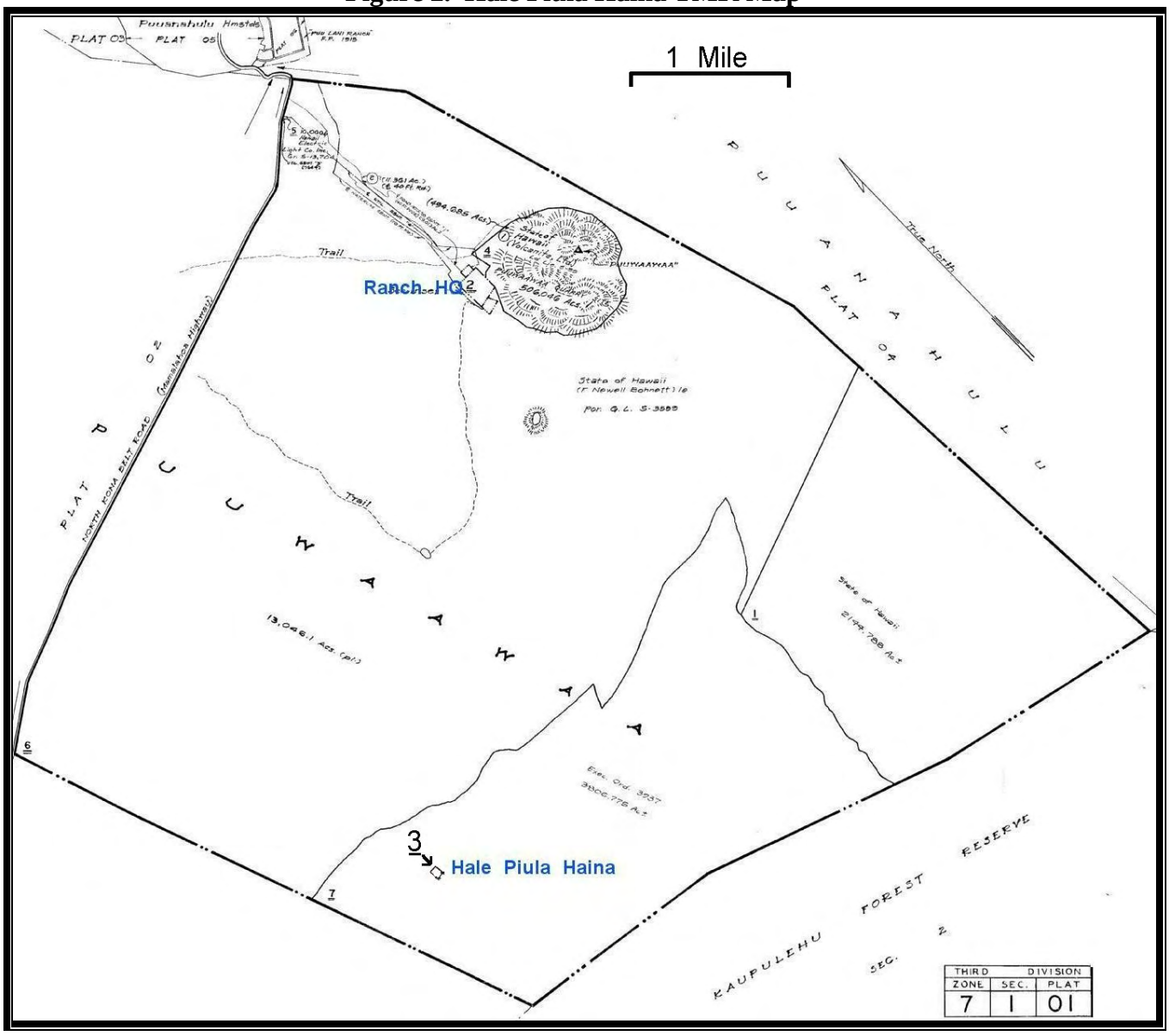
Figure 1c. Pu‘u Wa‘awa‘a Forest Bird Sanctuary and Vegetation Types



The panels will be mounted on a roof covering the entry of the single-story facility, and will be well below the forest canopy. Sealed gel cell batteries will provide storage of electricity for use between solar cycles, mitigating any risk of fire. The 576-square foot facility will have storage areas for equipment storage areas for equipment and supplies, lab space, a simple kitchen and dining area, and quarters for sleeping. There will be no need for any type of infrastructure hookups such as water and sewer, as these items are part of the pre-fabricated structure. A bathroom with a composting toilet along with solar heated water from a catchment system will provide the necessary sanitation system. The structure is self-contained and portable. Once the native forest is successfully restored, and if research activities are no longer necessary, the facility could be removed from Hale Piula Haina to another location, if desired. Plans for addressing wildfires will also be developed as part of the project (see Section 3.1.3 for details)

The research program will involve solicitations and approval of research proposals from qualified scientists with proposals to utilize the facility for research that meets the needs of restoring forest bird habitat. Ideally, the Rogers envision creating a volunteer research board chaired by a biology faculty at the University of Hawai‘i at Hilo, with membership from the Pu‘u Wa‘awa‘a Advisory Group and

Figure 2. Hale Piula Haina TMK Map



Source: Portion of Hawai‘i County Tax Maps

agencies such as DLNR, USFWS, the U.S. Forest Service, as appropriate, to evaluate proposals and supervise research. Initially, researchers will be selected by the Rogers with advice from those Pu‘u Wa‘awa‘a Advisory Group members who choose to participate. Typical expected research proposals will deal with characterizing and evaluating native insect repopulation on rare plants under various cover and density conditions, native bird response to varying flowering and insect conditions availability on rare plants, microclimatic changes within a restored canopy, and differences in nutrient cycling with various cover types.

The project will also involve a request for formalization of the easement route utilizing former ranch roads that has commonly been used to access Hale Piula Haina from the ranch headquarters (see Figure

1b for location). Minor repairs to the road may also be undertaken at the beginning of the project and the right to maintain the road and implement fire mitigation measures are also sought as part of the CDUP.

The project is being done in recognition of the context of the *Management Plan for the Ahupua'a of Pu'u Wa'awa'a and the Makai Lands of Pu'u Anahulu,* which is an effort by DOFAW to implement traditional Hawaiian land planning and management in a contemporary context to promote sustainable resource management and community access to natural resources. Details concerning the plan and the project's consistency with it plan are discussed in Section 3.6.4.

Figure 3a. Hale Piula Haina Photo – Iron Catchment

Figure 3b. Hale Piula Haina Photo – State Water Tank

Figure 3c. Hale Piula Haina Photo – Regenerating *Koa* Forest

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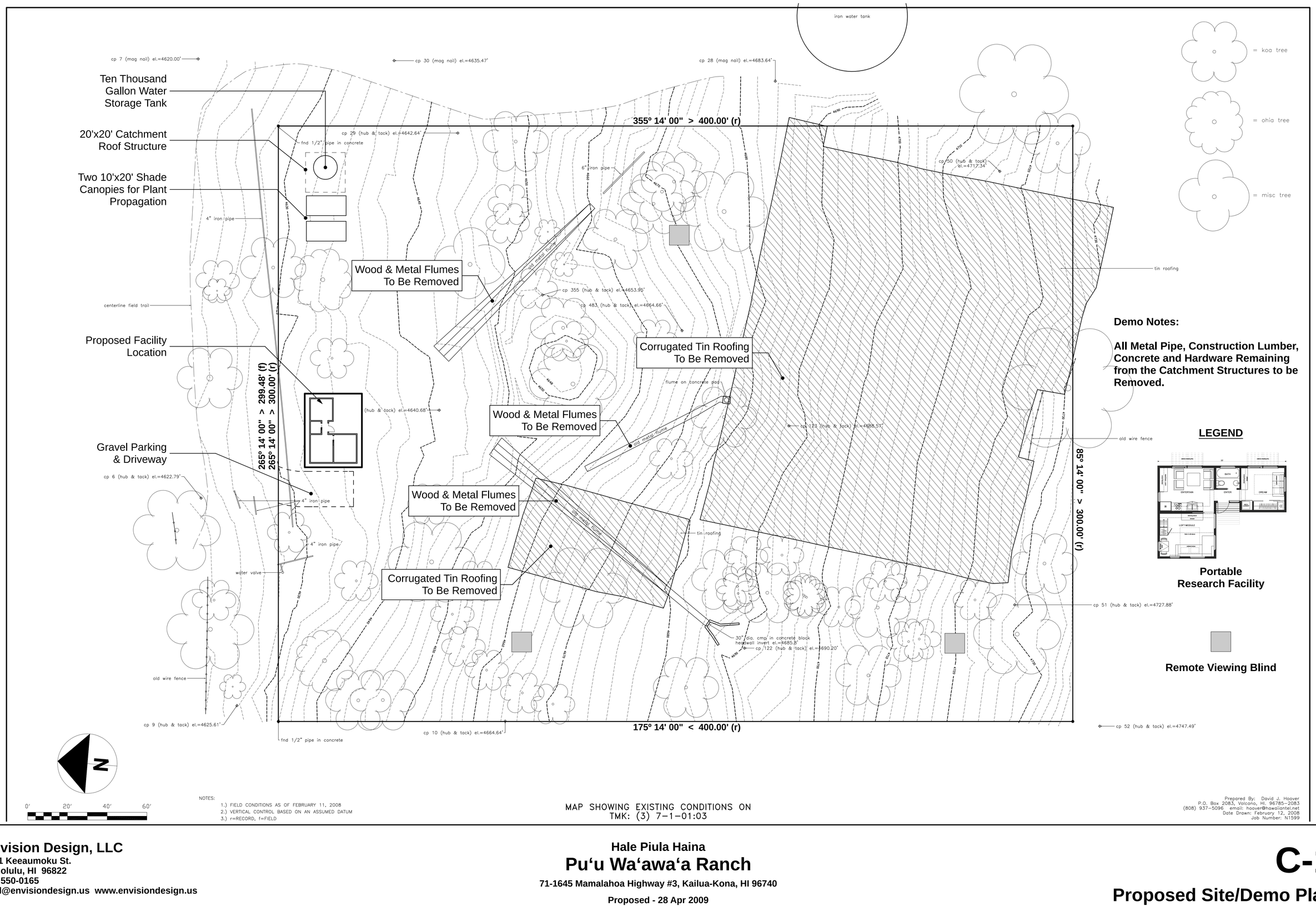

Demo Notes:

All Metal Pipe, Construction Lumber, Concrete and Hardware Remaining from the Catchment Structures to be Removed.

LEGEND

Portable Research Facility

Remote Viewing Blind

NOTES:
1.) FIELD CONDITIONS AS OF FEBRUARY 11, 2008
2.) VERTICAL CONTROL BASED ON AN ASSUMED DATUM
3.) r=RECORD, f=FIELD

MAP SHOWING EXISTING CONDITIONS ON
TMK: (3) 7-1-01:03

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Hale Piula Haina

Pu‘u Wa‘awa‘a Ranch

71-1645 Mamalahoa Highway #3, Kailua-Kona, HI 96740

Proposed - 28 Apr 2009

C-1

Proposed Site/Demo Plan

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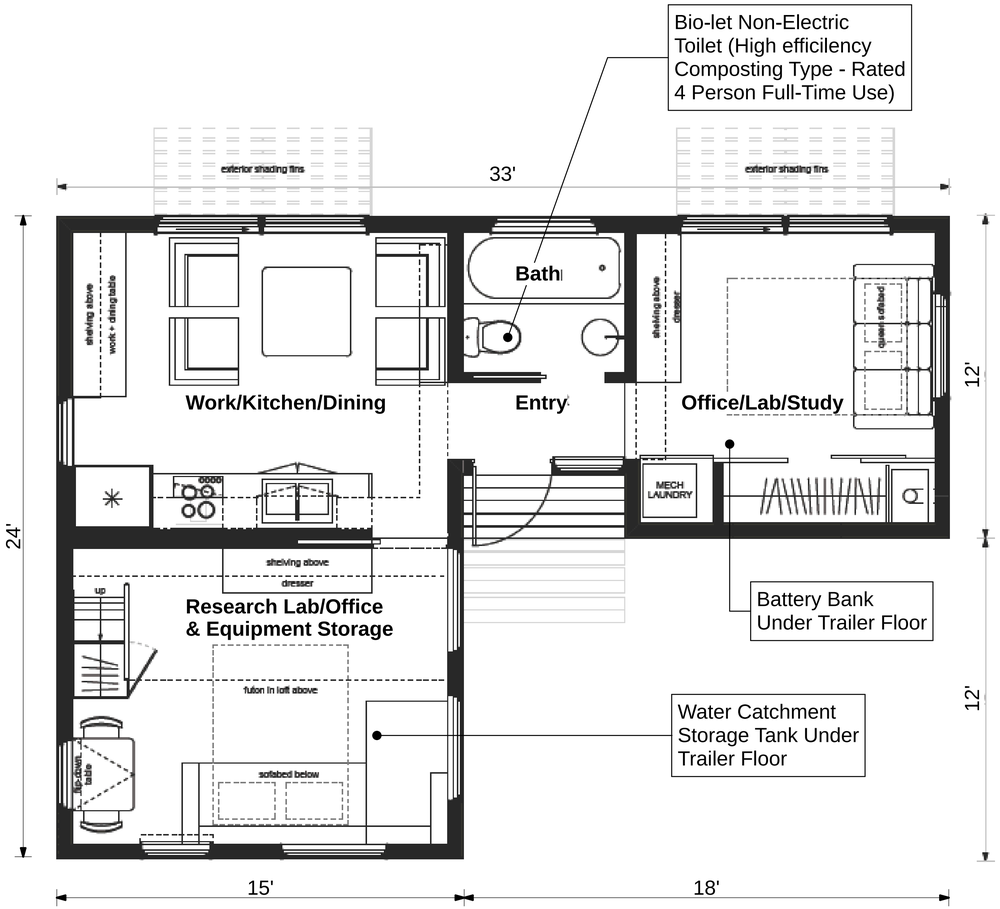
Note: Water Catchment Storage Tank to be Stainless Steel or Food Grade Polyethylene Approved for Potable Water.

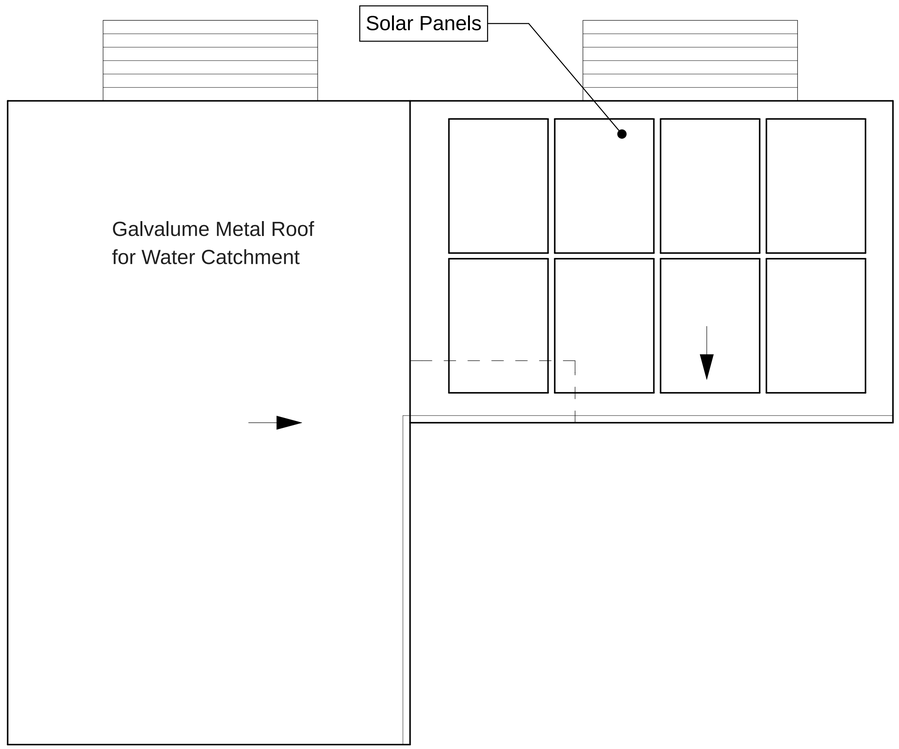
Sinks and Shower will be plumbed to a gray water holding tank under the trailer.



Floor Plan 3/8" = 1'-0"

Note: Solar Panels to provide 100% of electrical load, with a back-up generator for extended periods of cloud cover. Generator will be a whisper quiet biodiesel model used on sailboats.

Batteries to be Sealed Gel Cell type and housed under the trailer in a battery tray to prevent accidental spills.



Roof Plan 3/8" = 1'-0"

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Hale Piula Haina

Pu‘u Wa‘awa‘a Ranch

71-1645 Mamalahoa Highway #3, Kailua-Kona, HI 96740

Proposed - 28 Apr 2009

A-1

Proposed Facility Plans

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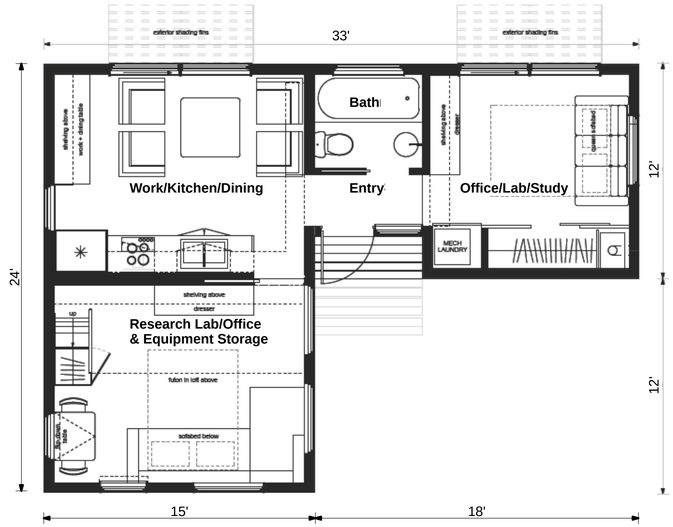
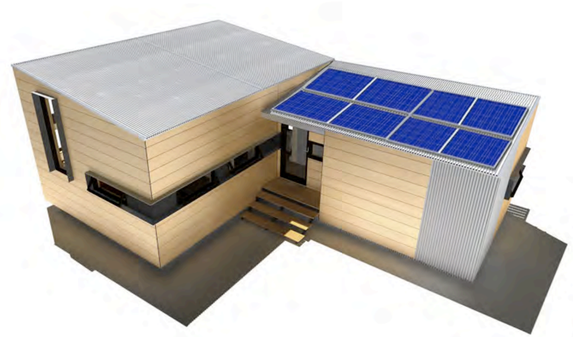
Rear Elevation

Left Elevation



1. Floor Plan Key 1/4" = 1'-0"

Right Elevation



Aerial View

Front Elevation

Aerial View

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Hale Piula Haina

Pu‘u Wa‘awa‘a Ranch

71-1645 Mamalahoa Highway #3, Kailua-Kona, HI 96740

Proposed - 28 Apr 2009

A-2

Proposed Facility Elevations

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1.2 Environmental Assessment Process

This Environmental Assessment (EA) process is being conducted in accordance with Chapter 343 of the Hawai‘i Revised Statutes (HRS). This law, along with its implementing regulations, Title 11, Chapter 200, of the Hawai‘i Administrative Rules (HAR), is the basis for the environmental impact assessment process in the State of Hawai‘i. According to Chapter 343, an EA is prepared to determine impacts associated with an action, to develop mitigation measures for adverse impacts, and to determine whether any of the impacts are significant according to thirteen specific criteria. Part 4 of this document states the anticipated finding that no significant impacts are expected to occur; Part 5 lists each criterion and presents the anticipated preliminary findings by the approving agency, the State of Hawai‘i Department of Natural Resources. If, after considering comments to the Draft EA, the approving agency concludes that, as anticipated, no significant impacts would be expected to occur, then it will issue a Finding of No Significant Impact (FONSI), and the action will be permitted to occur. If the agency concludes that significant impacts are expected to occur, then an Environmental Impact Statement (EIS) will be prepared.

1.3 Public Involvement and Agency Coordination

The following agencies and organizations were consulted in development of the Environmental Assessment.

State:

Department of Health, Environmental Health Administration
Department of Land and Natural Resources, Director
Department of Land and Natural Resources, State Historic Preservation Division
Office of Hawaiian Affairs, Administrator
Office of Hawaiian Affairs, West Hawai‘i Office
Pu‘u Wa‘awa‘a Advisory Group Staff/Members

Mike Donoho	Sally Rice	Miles Nakahara	Bob Masuda
Roger Imoto	Donna Ball	Jon Giffin	Lisa Hadway
Susan Cordell	Robbie Hind	Frank Sayre	Mike Tomich
Hannah Springer			

County:

County Council — Hawai‘i Fire Department — Planning Department

Private:

Kona Hawaiian Civic Club — Pu‘u Anahulu Community Association
Sierra Club, Moku Loa Group and State Chapter
Kona Outdoor Circle — Jim Juvik

Letters in response to early consultation are included in Appendix 1a.

1.4 Cost and Schedule

The action is being privately funded by Henk and Akemi Rogers. Estimated costs for the entire project, including planning, demolition and remediation, building and furnishing the research station, fencing, forest restoration structures and equipment, irrigation lines, water tank, road improvements, plant rearing and planting, and related labor for the first two to three years is $800,000. The Rogers plan to contribute an additional $200,000 for a research budget for the first two to three years, after which research with funding from other sources is expected to be undertaken. In terms of schedule, the project will begin demolition, construction, and remediation as soon as permits are obtained. Restoration and research are expected to be ongoing operations, with no planned terminus.

PART 2: ALTERNATIVES

2.1 Alternative Actions

Although Henk and Akemi Rogers have no intention at this time of engaging in any other action on their property at Hale Piula Haina, for the sake of environmental analysis, several alternatives can be envisioned. The first is a "No Action" alternative, in which the property is essentially left as-is. The remnants of an abandoned water catchment system, which some consider an eyesore in the upper forests of Hualālai, would remain within the boundaries of the Pu‘u Wa‘awa‘a Forest Bird Sanctuary. A slight variation on the No Action alternative (but one which would also require a CDUP) would be to clean up and remove the rusty iron roofing, timber and catchment footings but do nothing else. Even adding such actions, the reforestation project would not occur and the environment of the area would not benefit from increased habitat and food sources for native birds and invertebrates. Research similar to that proposed at the facility could possibly be conducted within the Forest Bird Sanctuary but would almost certainly require State or federal funds.

The property could also be proposed for use for other identified uses, including a single-family home, grazing, or agriculture. These actions would have no public benefit and as they do not meet the goals of forest restoration, the Rogers do not want to implement them.

Hale Piula Haina is the only inholding in the Forest Bird Sanctuary. Some have suggested that the State of Hawai‘i acquire this inholding and either demolish the catchment and restore the area or rebuild the catchment and use it for potable water for ranching or domestic uses. It has even been suggested that regardless of whether the State would improve the property, it would be prudent to purchase it, because a private inholding may be detrimental to the State's conservation program in this area because of potential conflicts between private and public goals. While State acquisition is a potential alternative, it would need to be initiated by the State of Hawai‘i and is not under consideration by the Rogers. In their view, there would be little benefit in substituting State resources for private funding of forest restoration and research.

A report by Dr. James O. Juvik and Lori K. Tango (2003) evaluated the potential of reestablishing catchment area for Pu‘u Wa‘awa‘a on both the Rogers property and the adjacent State land. Section 3.1.2 provides discussion of their findings, but an important point was that the priority refurbishment actions would be located *outside* of the Rogers property and would not be adversely affected by the reforestation and research efforts. While there is a need for additional water at Pu‘u Wa‘awa‘a, the structures on the Rogers' property are simply too dilapidated for reconstruction. As pointed out in the Juvik and Tango report, it would be more appropriate to refurbish the remnant catchment elements on adjacent State land. The Rogers have expressed an interest in assisting in any such endeavor.

The proposed action is an opportunity for a private entity to conduct activities that would have significant conservation benefit. As discussed in the *Management Plan for the Ahupua‘a of Pu‘u Wa‘awa‘a and the Makai Lands of Pu‘u Anahulu* (DOFAW 2003: 5), "the development of partnerships, cooperative agreements and grant proposals will constitute the primary means for [conducting proactive management]." This project can benefit the biotic environment, specifically native plants and birds, particularly due to its location within the Pu‘u Wa‘awa‘a Forest Bird Sanctuary, at no cost to the government.

As mentioned above, the proposed action is the only alternative for their property currently acceptable to the Rogers, and it, along with the No Action Alternative, will be the only actions systematically considered in this Environmental Assessment.

PART 3: ENVIRONMENTAL SETTING, IMPACTS AND MITIGATION MEASURES

Basic Geographic Setting

The area on which the project would take place, TMK 7-1-001:003, is referred to in this document as Hale Piula Haina, although it is recognized that this place name generally includes the State land immediately surrounding this parcel as well. The term *project area* is used variably to describe the general environs of Puʻu Waʻawaʻa and even the entire North Kona District.

The land division or *ahupuaʻa* of Puʻu Waʻawaʻa is located on the western or leeward side of the Island of Hawaiʻi in the North Kona District. Puʻu Waʻawaʻa and Puʻu Anahulu are part of a subdivision of North Kona called Kekaha, which extends from Honokōhau through Puʻu Anahulu. Kekaha means "a dry and barren place," a good description of the land below the hills, or Nāpuʻu, as they were originally called. Puʻu Waʻawaʻa ("furrowed hill" in Hawaiian) takes its name from a large volcanic cinder cone that is a prominent landmark in the area. Puʻu Waʻawaʻa lies on the northern flank of Hualālai volcano, extending from Kīholo at the coast to within a mile of the summit of Hualālai. The area is roughly bounded by the 1859 and Kaʻūpūlehu lava flows. In 1917, Senator Robert Hind began combining lands in Puʻu Anahulu and Puʻuwaʻawaʻa to create Puʻulani Ranch, and ranching has continued to this day in some form or other. The entire region was forested at one time, but wildfires and more than a century of livestock grazing have removed much of the native vegetation. The State owns most land in the almost 40,000 acres of land in Puʻu Waʻawaʻa. Approximately 54 acres within Puʻu Waʻawaʻa are privately owned.

Hale Piula Haina is located at about the 4,650-foot elevation on the northern slope of Hualālai volcano in the *ahupuaʻa* of Puʻu Waʻawaʻa. Hale Piula Haina was developed by former ranch owners to provide catchment water for leased properties in the surrounding area and contains dilapidated structures including rusting, galvanized iron roofing, wooden catchment supports and flumes and cement footings scattered about the property. The property has regrown with native *koa* since the catchment was actively used. A few old plum and apple trees are also present. The surrounding area is a montane forest dominated by native species such as *ʻohiʻa, naio, koa* and *ʻamaʻu*. Non-native species found there include banana *poka*, peach and various vines and grasses.

3.1 Physical Environment

3.1.1 Geology, Soils and Geologic Hazards

Environmental Setting

Geologically, the project corridor is located on 1,500- to 3,000-year-old lava flows from Hualālai volcano (Wolfe and Morris 1996). Soil in this area is described as Manahaa extremely stony silt loam (MND), a well-drained silt loam formed in volcanic ash with 3 to 15 percent of the surface covered in stones (Sato et al. 1973).

The entire Big Island is subject to geologic hazards, especially lava flows and earthquakes. Volcanic hazard in the project area is assessed by the United States Geological Survey as 4 on a scale of ascending risk 9 to 1 (Heliker 1990:23). The hazard risk is based on the fact that Hualālai has steep slopes and is the third most historically active volcano on the island. Volcanic hazard zone 4 areas have had about 5 percent of the area covered with lava since 1800 and less than 15 percent of the area covered in the past 750 years.

In terms of seismic risk, the entire Island of Hawai‘i is rated Zone 4 Seismic Probability Rating (Uniform Building Code, 1997 Edition, Figure 16-2). Zone 4 areas are at risk from major earthquake damage, especially to structures that are poorly designed or built, as the 6.7-magnitude quake of October 15, 2006, demonstrated. Hale Piula Haina does not appear to be subject to subsidence, landslides or other forms of mass wasting.

Impacts and Mitigation Measures

In general, geologic conditions do not appear at this time to impose any overriding constraints on the project, and no mitigation measures are expected to be required. However, it is recognized that much of the surface of Hawai‘i Island is subject to eventual lava inundation and that improvements in places such as Hale Piula Haina face this risk. However, any conservation action within Pu‘u Wa‘awa‘a faces these same risks, and the proposed project is not imprudent to implement.

The No Action Alternative would avoid geologic hazards and risks and potential loss or damage to Hale Piula Haina itself, but this would be of negligible benefit relative to anticipated environmental enhancements to be derived from the project.

3.1.2 Climate, Drainage and Water Resources

Existing Environment: Climate

The importance to ranching at Pu‘u Wa‘awa‘a of weather data, particularly rainfall, has led to a long history of systematic weather records that date from the 1930s (Giffin 2003). In more recent times, Dr. James O. Juvik of the University of Hawai‘i at Hilo has collected a considerable body of data on not only rainfall but also evapotranspiration, wind, fog and solar radiation, as part of studies on fog drip, mountain ecosystem altitudinal distribution, and local wind systems. Data up to 2003 are summarized in Juvik and Tango (2003). Dr. Juvik has established a network of weather/climate monitoring stations within the *ahupua’a* (including one at Hale Piula Haina) to collect environmental data to assist in fire control and general ecological research and natural resource management. These climate data will be available online.

Mean monthly temperatures at Hale Piula Haina range from a low of 41.7 degrees F in February to 71.6 degrees in September (Giffin 2003). Hale Piula Haina is located in the wettest part of the *ahupua‘a* of Pu‘u Wa‘awa‘a, which is relatively dry compared to other upland forests in Kona. During the period from 1938 to 1974 the median annual rainfall at Hale Piula Haina was 46.7

inches, with an annual maximum of 97.4 inches and minimum of 17.6 inches during that 37-year period (Giffin 2003). The long-term (32-year) average annuals rainfall for the period ending in 2003 showed a slight decrease to 44.3 inches (Juvik 2003:19).

Research by Juvik and Tango (2003:3) indicates the presence of a localized, thermal wind system on the slopes of Hualālai, leading to steep climate gradients on the northwestern slopes. The mountain ecological zones and native plant and animal communities are vertically compressed.

Solar radiation in Pu‘u Wa‘awa‘a has also been systematically measured for limited areas over time frames of months (Juvik and Tango 2003:15). Hale Piula Hina has lower values of solar radiation compared to areas both upslope and downslope because of afternoon cloudiness. This finding is significant in terms of both sizing of the solar power facilities for the research station and more importantly because of its implications for forest water balance, as forest transpiration losses will be less than might be expected given temperature and wind. Ground fogs associated with the afternoon cloudiness further improve the water balance at Hale Piula Haina.

Existing Environment: Drainage and Water Resources

The Flood Insurance Rate Maps (FIRM) for the area are not printed, indicating that Hale Piula Haina is in Flood Zone X, outside of the mapped 100-year or 500-year floodplain. No known areas of local (non-stream related) flooding are present.

Low annual rainfall over most of the *ahupua‘a* coupled with the young and porous volcanic substrates has prevented the development of significant natural surface water resources, such as streams, ponds, and springs, at Pu‘u Wa‘awa‘a. The project area has no surface water bodies, other than man-made reservoirs on adjacent pastures that have mostly fallen into disuse and disrepair.

Cattle require significant amounts of water, which led to various efforts to provide a stable water system during the long history of ranching at Pu‘u Wa‘awa‘a. Hale Piula Haina was first developed in mid-1930s as a water source for Pu‘u Wa‘awa‘a Ranch, which began developing surface rainwater catchments and associated water storage and transmission infrastructure to support grazing operations. It was later expanded between 1938 and 1940, and again in the early 1960s. Hale Piula Haina was central to these efforts, as were the reservoirs at Po‘ohoho‘o and near ranch headquarters shown on Figure 1b.

The current management plans for Pu‘u Wa‘awa‘a also will require water for activities that will or might be undertaken, including ranch stock water, fire control, plant nursery and native plant irrigation, and game bird watering. Basal and confined aquifers underlie the area but can only be accessed by deep wells that would have high pumping costs. For most water uses anticipated in the Pu‘u Wa‘awa‘a management plan, using existing groundwater would be cost-prohibitive. However, the catchment, storage and transmission facilities are now largely in disrepair and not currently utilizable. Juvik and Tango’s 2003 report estimated costs for refurbishing these systems, focusing on reestablishing priority catchments at the State and private properties at Hale Piula Haina,

repairing tanks and reservoirs at Hale Piula Haina, and building lines to interconnect Hale Piula Haina and Po‘ohoho‘o. The total cost of such efforts was estimated in 2003 dollars and construction costs at $310,000 to $370,000. The project could yield as much as 8.06 million gallons of water annually at a cost of between $2.00 to $4.00 per thousand gallons. This does not include system operating costs or costs to repair reservoirs at Po‘ohoho‘o (a one-time capital cost of an additional $500,000).

Juvik and Tango determined that the refurbished system could provide a substantial benefit to management efforts and opportunities for collaboration with the other water system in the area:

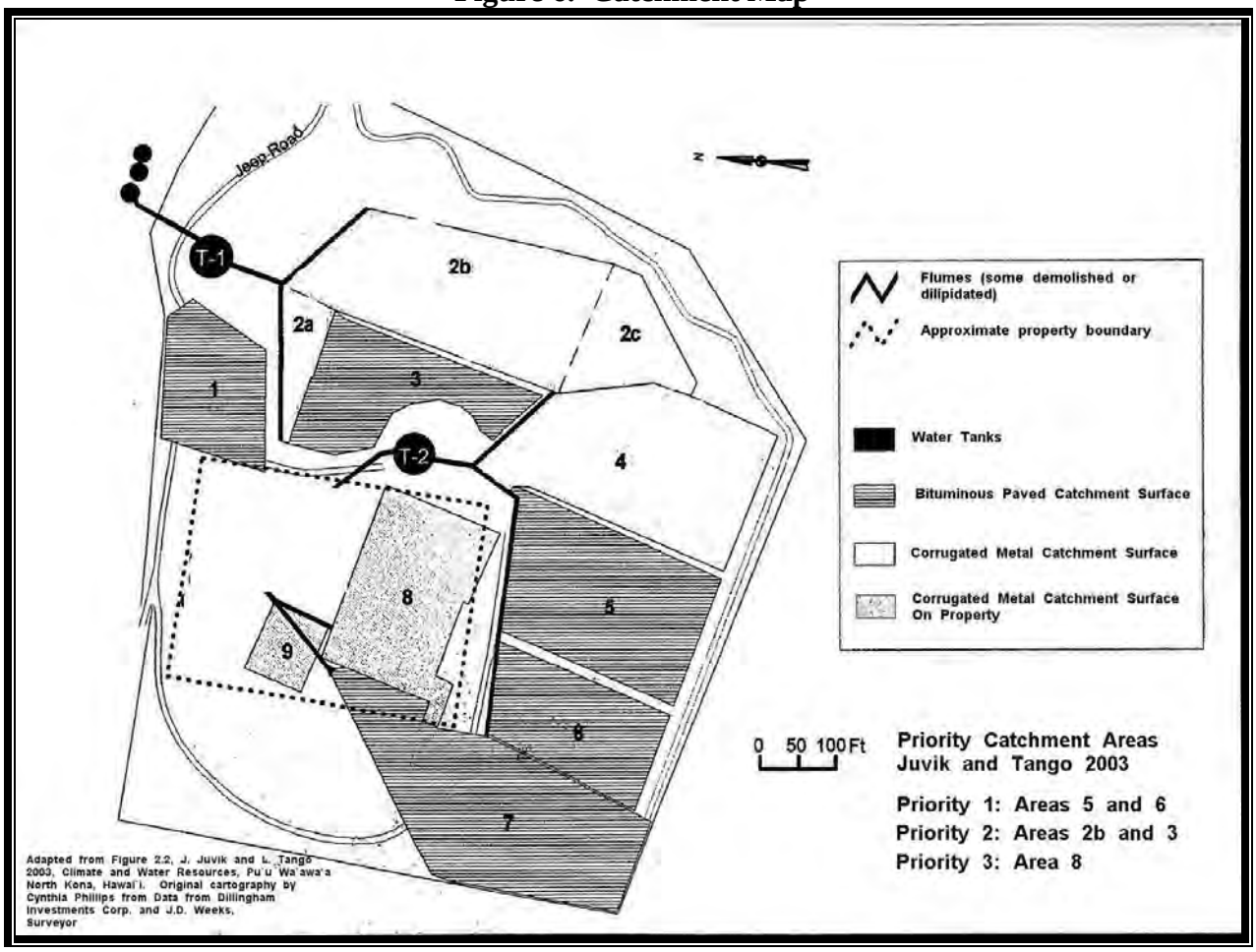
> “Operation and maintenance of a refurbished surface water catchment and storage system at Pu’u Wa’awa’a will present challenges for the DLNR. It may be appropriate to investigate the possibility of linking this system with the current, privately owned (deep well) public water system at Pu’u Wa’awa’a. The two systems exhibit water source complementarity; the well water is expensive (but reliable even during drought), while the surface catchment water is comparatively inexpensive (but the supply is unpredictable). The general water cost estimates prepared in this report do not include estimates of system operating costs or any other costs associated with bringing catchment water quality (treatment/monitoring) up to federal/state drinking water standards” (p. ii).

Figure 6 is an adaptation of a map from the Juvik and Tango report that illustrates existing and former catchment structures at Hale Piula Haina in relation to the Rogers property boundary. Due to a lack of maintenance in recent decades, the catchments operate at only about 18% of the rainfall-collecting capacity they had at their peak of use in the 1960s. Old corrugated iron catchments have been removed, and trees and shrubs have invaded the bituminous paved catchment surfaces at the site.

As Priority 1, Juvik and Tango recommended repairing and resurfacing the overgrown bituminous catchments in Areas 5 and 6 on State land, which are high in elevation and could feed into Tank 2 and the lower down Tank 1. As Priority 2, they recommended resurfacing catchments area 2b and 3 (also on State land), which flow directly into Tank 1. Costs and benefits for these efforts were calculated. Priority 3, restoration of the catchment area illustrated as Number 8 in Figure 6, would not be practical if the Rogers’ proposed reforestation and research facility project was undertaken. This action was so low in priority that costs and benefits were not calculated.

An important point was that priority refurbishment actions would be located outside of the Rogers property and would not be adversely affected by the reforestation and research efforts. While there is a need for additional water at Pu‘u Wa‘awa‘a, the structures on the Rogers property are simply too dilapidated for reconstruction and would be more appropriate on adjacent State land. The Rogers have expressed an interest in assisting in a cooperative endeavor with State or federal agencies on adjacent State land. It is also important to note that the proposed project includes construction of modest catchment and storage facilities to service the needs of the reforestation project and research station.

Figure 6. Catchment Map



Impacts and Mitigation Measures

The action would remove alien vegetation from Hale Piula Haina and replace it with native trees, shrubs and herbs. There would be no long-term adverse impacts to drainage or water quality because the project would maintain a permeable surface.

Work on the project, which would include selective hand-clearing of undesirable plants and debris, would minimize the production of uncontrolled excess sediment from soil erosion that may impact natural watercourses, water quality and flooding. Hand-clearing, as well as the small scale of the project, would eliminate the potential for contaminants associated with heavy equipment and other sources during construction that would have the potential to impact surface water and groundwater if not mitigated effectively. All ground-disturbing work will be performed in conformance with Chapter 10, Erosion and Sediment Control, Hawai‘i County Code. Because most the activities will involve hand clearing or very limited heavy equipment operations on a total area smaller than an acre, no National Pollutant Discharge Elimination System Permit (NPDES) permit is expected to be required. In any case, the contractor will prepare and implement a Storm Water Pollution Prevention Plan (SWPPP). In order to properly manage storm water runoff, the SWPPP will describe the

implementation of a number of best management practices (BMPs) for any aspect of land preparation that has the potential to lead to erosion or sedimentation. These BMPs may include, but will not be limited to, the following:

- Minimization of sediment loss by emplacement of structural controls possibly including silt fences, gravel bags, sediment ponds, check dams, and other barriers in order to retard and prevent the loss of sediment from the site;
- Minimizing disturbance of soil during periods of heavy rain;
- Phasing of the project to disturb the minimum area of soil at a particular time;
- Application of protective covers to soil and material stockpiles;
- Use of drip pans beneath vehicles not in use in order to trap vehicle fluids;
- Routine maintenance of BMPs by adequately trained personnel; and
- Clean-up and disposal at an approved site of significant leaks or spills, if they occur.

3.1.3 Flora, Fauna and Ecosystems

Existing Environment: Flora

The natural vegetation of this part of upland North Kona is typical of Hawaiian montane mesic forest (Gagne and Cuddihy 1990), which in the early 1900s comprised various trees including *koa*, *mamane* (*Sophora chrysophylla*), *naio* (*Myoporum sandwicense*) and *akoko* (*Chamaescyce olowaluana*) , with some *ʻohiʻa* (*Metrosideros polymorpha*) and sandalwood (*Santalum* spp.). The montane mesic forest changes from a predominately *koa-ʻohiʻa* forest at about the 4,200-foot elevation to an open-canopied *ʻohiʻa-mamane* woodland, which extends down to about 3,000 feet in elevation (see Figure 1c for vegetation types in vicinity of Hale Piula Haina).

Following extensive surveys of vegetation in 1909, botanist Joseph Rock in 1913 declared Puʻu Waʻawaʻa "... the richest floral section of any in the whole territory" (Rock 1913). But even then, the effects of ranching were beginning to be felt. A report for the Commissioner of Agriculture and Forestry at the turn of the last century cited concerns over the effects of grazing on large sandalwood and *koa* trees, predicting that dense forests would within two decades give way entirely to open, drier pasture land (Koebele 1900). Although that destruction ensued at a slightly slower pace than Koebele envisioned, the forests of Puʻu Waʻawaʻa have been greatly altered over the past century by ranching, wildfires, illegal *koa* harvesting and the introduction of invasive species. Still, remnants of its biological history remain, including at least 182 native vascular plant species, several of which occur nowhere else in the Hawaiian Islands. Of the roughly 40 rare plant species found in Puʻu Waʻawaʻa, 22 have been officially listed or proposed for listing on the endangered species list. A dozen of those are no longer found at Puʻu Waʻa Waʻa, although some still exist on adjacent lands such as Puʻu Anahulu or Kaʻupulehu (Giffin 2003).

Giffin (Ibid) writes that as late as 1959 the *mamane* canopy in Waihou Forest, which is found between the 3,000- and 3,500-foot elevation in Puʻu Waʻawaʻa, remained essentially intact; it is now an open pasture with the few remaining trees dead or dying. Non-native grasses and weeds have largely replaced native understory plants. More than 60 non-native plant species have been identified in the

Forest Bird Sanctuary alone, many of which disrupt native forest ecosystems. The non-native species posing the greatest threat include fountain grass (*Pennisetum setaria*), banana *poka* (*Passiflora mollissima*), silk oak (*Grevillea robusta*), daisy fleabane (*Erigeron karvinskianus*) and German ivy (*Senecio mikanoides*).

As discussed previously, Hale Piula Haina was cleared in the mid-1930s to early 1940s by former ranch owners for the construction of a rain shed complex to provide catchment water for surrounding lands. Since then, *koa* has been regenerating, although alien plants are also present along with a few old plum and apple trees.

One of the rare plants in the general vicinity of Hale Piula Haina is *Vicia menziesii*, a leguminous vine in the pea family that has the distinction of being Hawai'i's first officially listed endangered species. The plant, which goes by various common names including Hawaiian vetch and Hawaiian broad-bean, was rediscovered in 1993 at a *mauka* paddock at the 5,200 foot elevation (Hale Piula Haina is at 4,650 feet in elevation). Prior to 1985 the plant was thought to exist only on Mauna Kea and Mauna Loa.

During planning efforts for the proposed facility in early 2008, a limited botanical reconnaissance was conducted by Ron Terry and Jill Wagner, and the plant species detected are listed in Table 1. No rare, threatened or endangered species, including *Vicia menziesii*, were detected. Heightened fire danger conditions since the initial reconnaissance have prevented access to the property for a professional botanical survey. Prior to placement of the facility on the site, a professional botanical survey will be conducted to ensure that construction and operation of the facility do not impact any rare, threatened or endangered plant species in or near Hale Piula Haina.

Existing Environment: Vertebrate Fauna

Montane forests, such as that in which Hale Piula Haina is located, support the bulk of Hawai'i's endemic bird life today. Native birds observed in recent years at Pu'u Wa'awa'a include five honeycreepers: *'Amakihi* (*Hemignathus virens*), *'Apapane* (*Himatione sanguinea*), *I'iwi* (*Vestiaria coccinea*), Hawai'i *'Akepa* (*Loxops coccineus*), and Hawai'i creeper (*Oreomystis mana*). Other native birds include the flycatcher *'Elepaio* (*Chasiempis sandwichensis*); two raptors, the *Pueo* or Hawaiian Owl (*Asio flammeus sandwichensis*), and the *I'o* or Hawaiian Hawk (*Buteo solitarius*); and the *Nene* or Hawaiian Goose (*Branta sandvicensis*). Giffin's study said that at least 26 taxa of endemic bird species once existed at Pu'u Wa'awa'a but 17 of those have become extinct or are no longer found in the area.

Although the project area has been habitat for wild populations of the endangered *'Alala* (*Corvus hawaiiensis*), or Hawaiian Crow, there are currently no known *'Alala* surviving in the wild. The *'Alala* nested in the area of Hale Piula Haina as recently as 1981 and was last seen at Pu'u Wa'a Wa'a in 1991, but since has been absent from the area (Giffin 2003). Surviving *'Alala* are protected in captive propagation facilities at the Maui and Keauhou Bird Conservation Centers. Many factors may have contributed to the extirpation of the *'Alala* in the wild, and a summary discussion of threats may be

Table 1
Plant Species Detected at Hale Piula Haina

Scientific Name	Family	Common Name	Life Form	Status*
Acacia koa	Fabaceae	*Koa*	Tree	E
Ageratina riparia	Asteraceae	Hamakua *pamakani*	Herb	A
Buddleia asiatica	Loganiaceae	Buddleia	Shrub	A
Chamaesyce olowaluana	Euphorbiaceae	*Akoko*	Tree	E
Cibotium spp.	Dicksoniaceae	*Hapu'u* tree fern	Fern	E
Conyza bonariensis	Asteraceae	Hairy horseweed	Tree	A
Cyperus spp.	Cyperaceae	Sedge	Sedge	A
Dryopteris dentata	Polypodiaceae	Oak fern	Fern	A
Dryopteris wallicheana	Polypodiaceae	Shuttlecock fern	Fern	N
Geranium homeanum	Geraniaceae	Cranesbill	Herb	A
Grevillea robusta	Proteaceae	Silver oak	Tree	A
Leptecophylla tameiameiae	Epacridaceae	*Pukiawe*	Shrub	I
Malus sylvestris	Rosaceae	Apple	Tree	A
Metrosideros polymorpha	Myrtaceae	*'Ohi'a*	Tree	E
Microlepia strigosa	Dennstaedtiaceae	*Palapalai* fern	Fern	I
Myoporum sandwicense	Myoporaceae	*Naio*	Tree	I
Myrsine lanaiensis	Myrsinaceae	*Kolea*	Tree	E
Passiflora mollissima	Passifloraceae	Banana *poka*	Vine	A
Pennisetum clandestinum	Poaceae	Kikuyu grass	Grass	A
Pennisetum setaceum	Poaceae	Fountain grass	Grass	A
Plantago lanceolata	Plantaginaceae	Narrow-leaved plantain	Herb	A
*Prunus cericefra x P. salicina***	Rosaceae	Plum	Tree	A
Rubus rosifolius	Rosaceae	Thimbleberry	Shrub	A
Sadleria cyatheoides	Blechnaceae	*Ama'u* fern	Fern	E
Senecio mikanioides	Asteraceae	German ivy	Vine	A
Senecio madagascariensis	Asteraceae	Fireweed	Vine	A
Sophora chrysophylla	Fabaceae	*Mamane*	Tree	E
Sphenomeris chinensis	Lindseaceae	*Pala'a* fern	Fern	I
Verbascum sp.	Scrophulariaceae	Mullein	Herb	A
Verbena litoralis	Verbenaceae	*O'iwi*	Herb	A

* A = alien, E = endemic, I = indigenous. ** Methley plum sterile hybrid

found in *The Scientific Basis for the Preservation of the Hawaiian Crow* (Duckworth, *et al.* 1992). Current threats to the crow include: avian diseases; predation on eggs and young birds by mongoose, rats, cats, and Hawaiian Hawks; changes to the native ecosystem due to introduced plants and animals; low reproductive rates; effects of small population size; habitat loss or changes that might reduce important food sources or breeding areas (e.g., wildfires, grazing by ungulates or logging); and other factors (Ellis *et al*. 1992b).

Threats to the other endangered forest birds are similar to those for the *'Alala* and include habitat loss and degradation, avian diseases, genetic problems related to small populations, predation, competition from nonnative species, and wildfires (Ellis *et al*. 1993b).

The Hawai‘i Creeper was once considered abundant in the forests of Kona above 3,000 feet (Perkins 1903). In the late 1970s, the subpopulation of the Hawai’i Creeper in central Kona was estimated at 75 birds above 4,900 feet (Scott *et al*. 1986). Nests of this species have been found from January through August, though the peak breeding period occurs between February and May (USFWS 2006).

The Hawai‘i *‘Akepa* was described as being common in the forests of Kona (Perkins 1903, Munro 1944). During the forest bird surveys of the late 1970s, there was only a single observation of a Hawai‘i *‘Akepa* in the Honaunau Forest Reserve of South Kona (Scott *et al.* 1986). However, several Hawai’i *‘Akepa* have been regularly detected during bird surveys in the Kona Forest Unit since 1999. Unlike some other Hawaiian honeycreepers, the *‘Akepa* has a very defined breeding season, with nest-building from March to May, egg laying from Mid-March to late May and hatching in Late March to early June and fledging from April to the end of June (Lepson and Freed 1997).

The endangered Hawaiian Hawk or *‘Io* is commonly observed foraging and nesting within the forests in many areas of Kona. *‘Io* utilize a wide variety of habitats on the island of Hawai‘i (USFWS 1984). The *‘Io* is the subject of ongoing ecological studies by the USFWS and the Pacific Island Ecosystems Research Center through a cooperative effort with the landowners. Hawaiian Hawks nest between mid-March and late September. DOFAW’s biological assessments in 2003 found no *‘Io* nests near Hale Piula Haina (Giffin 2003)

It should be noted that there is a substantial population of endangered *Nene* at Big Island Country Club golf course, located about six miles northeast of Hale Piula Haina. While the *Nene* was at one time both common and widespread, its numbers dwindled and at one point in the 20th century there were only 30 breeding pairs existing in the Islands. The population on the island of Hawai‘i is presently estimated at several hundred, and one of the largest flocks is found at Pu‘uwa‘awa‘a-Pu‘u Anahulu. Following the development of the golf course, with its fresh water and abundant new grass shoots, *Nene* have found it an attractive site, as they do other golf courses. Although the species is widely distributed on Hawai’i, it is considered vulnerable.

Numerous non-native bird species have also been observed in the project area, including introduced game birds such as California Quail (*Callipepla californica*), Wild Turkey (*Meleagris gallopavo*), Peacock (*Pavo cristatis*) and Ring-necked Pheasant (*Phasianus colchicus*). The most abundant alien bird species in the area of the bird sanctuary include Japanese White-eye (*Zosterops japonicus*), House Finch (*Carpodacus mexicanus frontalis*), Northern Cardinal (*Cardinalis cardinalis*) and Red-billed Leiothrix (*Leiothrix lutea*). A number of songbirds that were being maintained at Pu‘u Wa‘awa‘a Ranch escaped from their cages in the 1960s, and the entire collection was released when the lease for the ranch was transferred to F. Newell Bohnett in 1972. Existing records of the types of songbirds are incomplete (Giffin 2003:41). The most recent additions to the bird population in Pu‘u Wa‘awa‘a have been parakeets and parrots. In 1993 a flock of 31 conures was sighted at the 5,200-foot elevation in the bird sanctuary. The birds are believed to part of a group of nearly three dozen parakeets that escaped 1989 from a private aviary in the Kaloko subdivision located on the western flank of Hualālai. In addition, a flock of up to 13 burrowing parrots has been observed in the area (Giffin 2003).

The only native land mammal in Hawai‘i, the endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*), has also been observed at Pu‘u Wa‘awa‘a, particularly during the month of August. No roosting sites have been observed but the bats are frequently seen emerging from the Forest Bird Sanctuary's forested areas at dusk. They are frequently observed in Kona, although little is known about their foraging or roosting habits there.

Alien mammals are also present. Native plants and animals evolved in the absence of mammalian predators and grazing ungulates and lack many of the usual physical or behavioral defenses against harmful nonnative species. Predators such as small Indian mongooses (*Herpestes auropunctatus*), cats (*Felis catus*) and rats (*Rattus* spp.) may inflict great damage. Feral sheep (*Ovis aries*), goats (*Capra hircus*) and pigs (*Sus scrofa*), are also known to inhabit the Pu‘u Wa‘awa‘a region. Feral sheep are the most abundant in upland forests while feral goats, which were the target of extensive eradication efforts in the 1920s, tend to be more abundant below Highway 190, which is located at about the 2,000-foot elevation in this area. Feral pigs are widely distributed but tend to concentrate in wetter, dense forest areas. No population estimates are available for these feral animals, which are valuable for hunting but detrimental to native forest ecosystems (Giffin 2003).

Of the 10 species of endemic birds still found at Pu‘u Wa‘awa‘a, four are rare and threatened with extinction: the Hawai‘i ‘Akepa, Hawai‘i creeper, Nene and I‘o. Endangered fauna potentially present in the Hale Piula Haina area are listed in Table 2.

Table 2
Endangered Faunal Species Potentially Present at Hale Piula Haina

Species Name	Common Name
Buteo solitarius	Hawaiian Hawk, *‘Io*
Loxops coccineus	Hawai'i *‘Akepa*
Oreomystis mana	Hawai'i Creeper
Hemignathus munroi	*‘Akiapola'au*
Corvus hawaiiensis	Hawaiian Crow, *‘Alala*
Lasiurus cinereus semotus	Hawaiian hoary bat, *ope‘ape‘a*
Drosophila heteroneura	Picture-wing fly

Note: All species are listed as endangered. Sources: Scott *et al*. 1986, Pratt *et al*. 1989, USFWS 1995, unpublished data, USFWS 2006).

Existing Environment: Invertebrates

Invertebrates, although small and often inconspicuous, are, by species and biomass, the predominant native fauna in Hawaii's natural and altered environments. Native Hawaiian plant, vertebrate, and invertebrate populations are interdependent. Certain insects are obligatorily attached to host plants and use only that plant as their food. The health of native Hawaiian invertebrate populations depends on habitat quality and absence or low levels of continental predators. Sufficient food sources, host plant availability, and the absence, or low levels of introduced continental predators and parasites comprise a native ecosystem.

An ongoing records survey of invertebrate resources known from the project area is being conducted by Steve Lee Montgomery, Ph.D. Information is being obtained from the following sources: the Bishop Museum Library, University of Hawai'i Hamilton Library, the State's Office of Environmental Quality Control web site (2008), and Google Scholar, as well as online proprietary databases, such as Biological Abstracts, Ingenta Connect, and Zoological Record. The survey also takes advantage of field surveys conducted by Dr. Montgomery and Jon Giffin's 2003 *Pu'u Wa'awa'a Biological Assessment.*

Of critical importance is the presence of threatened or endangered invertebrate species. Only a few such endangered invertebrates are known to exist in the general area. Survey records indicate that no endangered Blackburn's sphinx moth (*Manduca blackburni*) are known from this area of Pu'u Wa'awa'a. Similarly, no endangered *Drosophila* pomace fly species are known in the area, since the necessary lobelia host plants are now absent. Surveys by Dr. Montgomery and others in 1970 noted only the more common *Drosophila* species in the area (Montgomery 1975). Although not endangered, the rare leaf weevil *Rhyncogonus giffardi*, discovered in 1918, has been seen in the greater Pu'u Wa'awa'a area only once since in 1937. Given this infrequency, it is unlikely to be present on the small subject property.

Lava tube caves are often biologically important. The caves provide habitat for invertebrates in their dark zones, and sinkholes and skylights act as natural exclosures to harbor rare and endangered plants from wild and domestic herbivores. According to Giffin (2003), lava tube openings in Pu'u Wa'awa'a are home to five rare varieties of plants either officially listed or proposed for listing as endangered species, as well as to native forest birds which nest on the cave floor or ledges. Fieldwork by Dr. Montgomery, Dr. Giffin and others has not revealed the presence of lava tubes on the Hale Piula Haina property.

Beneficial Impacts

The project is specifically designed to restore the native ecosystem, and substantial benefits should occur.

As discussed in Section 1.1., after demolition and removal (with storage of reusable parts) of the dilapidated catchment system that currently litters the property, the applicant will be guided by recognized experts in the field of Hawaiian biology in efforts to selectively hand-clear non-native plants and establish new plantings of an appropriate species mix and spacing for trees, shrubs and understory to restore native habitat at Hale Piula Haina (Table 2 includes a preliminary list of species to be planted). The project includes establishment of a small, portable, pre-fabricated, self-contained structure to provide living quarters to support long-term scientific study. The main focus of study will be how best to manage the flora and fauna for optimum habitat restoration of native birds as well as the invertebrates such as moths and flies that provide food for bird nestlings. The project also includes construction of excluder fencing to prevent ungulates and other alien predators from interfering with the growth of the native plants, and a small outdoor nursery to acclimatize native plants grown from locally acquired seeds for outplanting on the property. Adequate catchment structures and a water tank, currently envisioned at roughly 10,000 gallons, will be built to provide irrigation water for new

Table 3. Hale Piula Haina Plant Species Restoration List

Scientific Name	Family	Common Name	Status
Acacia koa	Fabaceae	Koa	
Metrosideros polymorpha	Myrtaceae	ʻOʻhia	
Pittosporum hosmeri	Pittosporaceae	Hoʻawa	
Pyschotria hawaiiensis	Rubiaceae	Kopiko	
Myrsine lessertiana	Myrsinaceae	Kolea	
Myrsine sanwicensis	Myrsinaceae	Kolea lau liʻi	
Sophora chrysophylla	Fabaceae	*Mamane*	
Myoporum sandwicense	Myoporaceae	*Naio*	
Coprosma rhynchocarpa	Rubiaceae	*Pilo*	
Hedyotis terminalis	Rubiaceae	*Manono*	
Cheirodendron trigynum	Aquifoliaceae	*Olapa*	Rare
Clermontia sp.	Campanulaceae	*Oha*	Endangered
Delissea undulata	Campanulaceae	None	Endangered
Cyrtrandra hawaiiensis	Gesneriaceae	None	Rare
Pipturus albidus	Piperaceae	*Mamaki*	
Osteomeles lessertiana	Rosaceae	*Ulei*	
Dodonaea viscosa	Sapindaceae	*Aʻaliʻi*	
Urera glabra	Urticaceae	*Opuhe*	Rare
Peperomia sp.	Piperaceae	*Alaʻala wai nui*	
Microlepia strigosa	Dennstaedtiaceae	*Palapalai*	
Rubus hawaiiensis	Rosaceae	*ʻAkala*	
Alyxia olivaformis	Apocynaceae	*Maile*	
Ophioglossum pendulum	Ophioglossaceae	*Puapuamoa*	Rare
Cibotium glaucum	Dicksoniaceae	*Hapuʻu*	
Cibotium medziesii	Dicksoniaceae	*Hapuʻu ʻiʻi*	Rare
Astelia menziesiana	Liliaceae	*Kaluaha*	Rare

plantings. Environmentally sound alien plant, mammal and insect control will be applied. Monitoring and maintenance activities will be continuous by both direct observation and remote telemetry. Plans for addressing wildfires have also been developed (see end of this section for description).

The plants to be reintroduced to the project area include *Delissea undulata,* one of the rarest plants on Hawaiʻi Island. Thought to be extinct in Puʻu Waʻawaʻa after 1971, a single specimen of the rare lobelia was rediscovered there in 1992. Tissue culturing was used to propagate immature seeds, which provided the stock for outplantings, in hope that the rare plant could be saved from extinction. Other lobelioids to be planted as part of the project, various species of *Clermontia,* also known as *oha,* are important nectar sources for long-billed honeycreepers, while their fruits are eaten by other endemic forest birds.

The habitat improvement and management information represented by a) removing alien plants; b) reforesting with native species, including rare and endangered plants that provide unique animal hosts; c) excluding predators ranging in size from cows to rats; and d) fostering scientific study of the specific ecosystem, are expected to have a positive impact on native birds and invertebrates, and perhaps the Hawaiian hoary bat as well. Species that will benefit would include the native honeycreepers *ʻAmakihi, ʻApapane, Iʻiwi, Hawaiʻi ʻAkepa,* and Hawaiʻi creeper. Also benefitted would be other native birds including the flycatcher *ʻElepaio*, the two raptors *Pueo* or Hawaiian owl and *Iʻo* or Hawaiian Hawk; and the *Nene* or Hawaiian Goose.

The U.S. Fish and Wildlife Service is continuing its work with private landowners, conservation organizations and the State to strive for the recovery of the *ʻAlala*. Reintroduction of *ʻAlala* into the Puʻu Waʻawaʻa area remains a possibility.

Habitat improvement will also benefit native insects, which may in turn lead to a cycle of additional resources for native birds. One of the more interesting values of the restoration, as modest in size as it will be, is as a refuge for rare insects that may be present in very small numbers scattered in the wild but may soon be available for study at Hale Piula Haina.

In order to provide for maximum compliance with State and federal endangered species laws, the owners are exploring entering into a "Safe Harbor Agreement". This is a voluntary arrangement between the U.S. Fish and Wildlife Service and a cooperating non-federal landowner under the authority of Section 10(a)(1) of the Endangered Species Act of 1973, 16 U.S.C. 1536(b)(4), 1539(a)(1). Under the Safe Harbor Agreement and an associated enhancement of survival permit, the non-federal property owner implements actions that will result in a net conservation benefit for species listed under the Act without the risk of further restrictions pursuant to section 9 of the Act, which prohibits take of listed species. The property owner also receives assurances related to modifications of the SHA or termination of the permit. Such agreements allow a landowner to promote threatened and endangered species on their property without liability for incidental takes that may occur.

Adverse Impacts and Mitigation Measures

Noise, dust and exhaust associated with dismantling, alien species removal, fence construction and facility emplacement may temporarily disrupt the area. Based on discussions with the U.S. Fish and Wildlife Service's Richard Wass and Tanya Rubenstein, who have observed fence construction in other native forests in the Keauhou area of Kaʻu and the Hakalau Forest Wildlife Refuge units in North Hilo and South Kona, the potential temporary disturbance to individual endangered birds, in general, will not result in deleterious impacts.

However, there is potential for impacts to Hawaiian Hawks if construction activity approaches or destroys a tree in which Hawaiian Hawks are nesting, which occurs between mid-March and late September. Although the large trees preferred by Hawaiian Hawks do not appear to be present, in order to avoid impacts to Hawaiian Hawks, construction activities will be scheduled to the extent practical between October and February, when construction would not seriously disturb the species.

This period coincides with the dry season in Kona and is appropriate for construction activities from other standpoints as well. For any construction scheduled between March and September, a nest search of the area proposed for fencing or access corridor construction and surrounding environs will be conducted by a qualified ornithologist immediately prior to the onset of construction. Audio survey protocols developed by John Klavitter are the normally preferred method of conducting this type of survey (Klavitter 2000). If an active nest is detected during construction, construction activity shall be halted within 500 m (1,600 ft.) of the nest until a consultation with the USFWS, under the terms of the Endangered Species Act of 1973 as amended, can take place and appropriate impact minimization measures can be implemented. The impacts to this species following the completion of construction efforts will be negligible.

Overall threats to the ecology of Pu‘u Wa‘awa‘a are continued introduction of invasive species and fire, which to some extent are inter-related, and also interact with grazing. Ungulates destroy seedlings and young trees, but grasses are more tolerant of grazing and can increase their cover as the native species recede. Fountain grass has been particularly successful in Kona. It has the ability to become established on lava flows that were previously barren and to survive extremely dry conditions. During periods of rainfall, the fountain grass efficiently absorbs the water and produces large quantities of grass. This grass may shade the seedlings of native plants, reducing their growth rate, and then under dry conditions, the fountain grass carries fire through the habitat. The grass is fire-adapted, meaning it readily grows back after fire while most native tree seedlings are killed by grass fires and even adult native trees are poorly to moderately tolerant of fire. With less cover by native species, additional invasive aliens, particularly fire-tolerant ones, can take hold.

The organizations associated with the reforestation effort include Jill Wagner and Leonard Bisel and Associates, individuals and firms with experience in conservation biology and the protocols required to avoid introduction on alien species. Although the potential always exists to introduce invasive species inadvertently, the project will include monitoring of all flora and fauna at Hale Piula Haina and the access roads to not only avoid and/or repair any adverse impacts from the project itself but also to fight unwanted species that may invade for whatever reason.

Wildfire is a significant threat to the ecological patterns and processes at Pu’u Wa’awa’a. Because of the accumulated fuel load in the area, which has increased significantly with the removal of large scale grazing, the potential for a wildfire disaster is high. A wildfire management plan is being developed for the Rogers’ lands by Hawai‘i Wildfire Management Organization, a 501(c)(3) nonprofit organization comprised of all the County, State, and Federal fire fighting agencies on the Island, scientists, and natural resource managers. The plan activities will include:

- Focusing on prevention activities with a public outreach component.
- Reducing fire fuel loads using methods appropriate for the landscape and restoration objectives.
- Maximizing firefighter safety and suppression capabilities through pre-fire suppression planning, staging of auxiliary equipment, and creating any needed access points and defensible space.
- Creating conventional fuel breaks where appropriate. Fuel breaks are areas of reduced vegetation that can slow or stop, assist firefighters in their suppression efforts, and offer safer areas from which to stage suppression efforts.

- Implementing fuels conversion using living fuel breaks tailored to Pu'u Wa'awa'a conditions. Living fuel breaks are created by establishing approved plants that do not easily burn around structures or more vulnerable plants.

3.1.4 Air Quality, Noise, and Scenic Resources

Environmental Setting,

Air quality in the project area, which is far removed from industrial land uses or major highways, is generally good. Air pollution in West Hawai'i is mainly derived from volcanic emissions of sulfur dioxide, which convert into particulate sulfate and produce a volcanic haze (vog) that persistently blankets North and South Kona.

Noise at Hale Piula Haina is generated mainly from wildlife and wind noise and is very low.

The Pu'u Wa'awa'a area is highly scenic, but the project area does not contain any specific sites that are considered significant for their scenic character in the Hawai'i County General Plan. Photographs in Figure 3 illustrate the scenic value of the actual Hale Piula Haina, which is modest.

Impacts and Mitigation Measures

Air quality impacts would be limited to the construction phase, and would include minor exhaust from vehicles used to deliver the pre-fabricated research station and other materials. As selective hand-clearing of non-native plants is planned, there would be a very minor potential for fugitive dust emissions. Impacts due to vehicle exhaust would be negligible due to the small scale of the project and distance of about four miles to sensitive receptors, which are the homes near the base of Pu'u Wa'awa'a. For any significant work on the access road, the contractor will develop dust and implement control plans compliant with provisions of Hawai'i Administrative Rules, Chapter 11-60.1, "Air Pollution Control," Section 11-60.1-33, "Fugitive Dust."

Noise impacts would be limited mostly to the construction phase with minor subsequent noise impacts from the use of the road for access to the research station. Hale Piula Haina is located distant from residential area in Pu'u Wa'awa'a and Pu'u Anahulu, and no highly sensitive noise receptors such as residences, schools, or parks are present. Construction will elevate noise levels during short periods, as it would involve emplacement of the pre-fabricated research station and the addition of new infrastructure (catchment system, solar and wind power generators). These activities are not likely to generate noise exceeding 95 decibels and as such are not expected to exceed the Department of Health's "maximum permissible" property-line noise levels. Noise in relation to native bird species is discussed in the previous section.

While the General Plan does recognize that the steep slopes of Hualālai provide a scenic green backdrop when viewed from the coast, this project will enhance that attribute by removing the rusted and expansive remnants of the catchment system which are currently clearly visible from the highway below. The research station to be installed will be low profile, situated well below the forest canopy and unlikely to be visible from Highway 190, three to four miles distant, or Queen Kaʻahumanu Highway, another three miles away.

3.1.5 Hazardous Substances, Toxic Waste and Hazardous Conditions

Environmental Setting, Impacts and Mitigation Measures

No known hazardous substances are present on Hale Piula Haina, which has fallen into disuse and does not appear to have undergone any active land use in recent times. The history of use of the site and its surroundings does not suggest the presence of hazardous materials. The roofing material will be investigated for the presence of lead paint or asbestos, and if present, a demolition plan will be developed to properly demolish and dispose of material. Additionally, visual surveys of the preferred site and its surroundings did not suggest the use or presence of hazardous materials, including the presence of structures, equipment, or storage containers that might be indicative of hazardous material use. Therefore, based upon prior and present use of Hale Piula Haina, no hazardous substances, toxic wastes, or hazardous conditions are expected to be present at Hale Piula Haina. Access to the site is generally restricted from the general public, which precludes such concerns as dumping of trash or other materials.

3.2 Socioeconomic and Cultural

3.2.1 Socioeconomic Characteristics

Table 4 provides information on the socioeconomic characteristics of the project area (North Kona County Subdivision), along with those of Hawaiʻi County as a whole for comparison, from the United States 2000 census.

The nearest residential community is Puʻu Anahulu, which is not measured by census records but perhaps has several hundred residents. This small community is centered around ranches that leased formerly large tracts of government land in and around Puʻu Waʻawaʻa and homesteads that date from more than a century ago. The homesteaders, many of whom worked on the large cattle ranches, were direct descendants of the native tenants of the Puʻu Anahulu and Puʻu Waʻawaʻa native tenants, and the community has strongly traditional foundations. Subsequent owners and State land lessees have continued to ranch, with more intense grazing on a smaller land base. The late 20th century also saw the development of Big Island Country Club, a private golf course around which there are plans for a residential community, and the Puʻu Lani Ranch subdivision, a gated, upscale residential community.

Table 3. Selected Socioeconomic Characteristics

Characteristic	Hawai'i County	North Kona	Characteristic	Hawai'i County	North Kona
Total Population	148,677	28,543	21 to 65 Years, Disabled (%)	19.2	17.4
Median Age	38.6	39.4	Employed and Disabled, 21 to 65 Years, (%)	51.8	64.1
Older Than 65 Years (%)	13.5	11.8	65 Years or Older, Disabled (%)	40.3	38.1
Race (%)			Employment in:		
White	31.5	47.1	Management	30.2	26.6
Asian	26.7	16.3	Service	22.2	24.3
Hawaiian	9.7	8.9	Sales	25.1	27.8
Other Pacific Islander	1.5	1.8	Office	3.8	2.2
Two or More Races	28.4	23.5	Farming, Fishing and Forestry	9.9	10.4
Hispanic (Any Race)	9.5	7.9	Production, Transportation	8.9	8.8
Family Households (%)	69.6	68.6	Families Below Poverty Line (%)	11.0	5.6
Households with Female Householder, no Husband, With Children (%)	7.7	6.7	Households with Female Householder, no Husband, With Children, Below Poverty Line (%)	28.1	17.5
Householder Lives Alone (%)	23.1	20.1	Individuals Below Poverty Line (%)	15.7	9.7
Average Household Size	2.75	2.70	Over 65 Below Poverty Line	7.2	5.3
Average Family Size	3.24	3.13	Median Household Income ($)	39,805	47,610
Over 25 Years Old With High School Diploma (%)	84.6	87.7	Housing Owner-Occupied (%)	64.5	58.5
Married Now (%)	52.0	53.9	Housing Rented (%)	34.5	41.5
Widowed (%)	6.3	4.9	Housing Vacant (%)	15.5	19.7
Divorced Now (%)	10.7	11.4	Median Home Value, 1999 ($)	153,700	233,900
Veterans (%)	14.5	14.8	Median Rent, 1999 ($)	645	745
Over 16 in Labor Market (%)	61.7	69.2	Rent is Greater Than 25% of Income (%)	46.0	47.2
Residence 5 Years Ago (%)			Poverty by Race:		
Same Home	57.7	49.9	White	14.5	8.8
Different Home, Same County	26.5	28.8	Asian	7.3	6.2
Different County in Hawai`i	4.8	3.5	Native Hawaiian/Pacific Islander	26.4	15.8
Different State/Country	11.0	17.8	Two or More Races	20.4	10.3

Source: U.S. Bureau of the Census, May 2001. *Profiles of General Demographic Characteristics, 2000 Census of Population and Housing, Hawai'i.* (U.S. Census Bureau Web Page).

Impacts

The project is essentially minor in nature, involving the expenditure of private funds that would have a very minor positive economic impact. The project would have no effect on the nearby community of Pu'u Anahulu other than to enhance the existing forest ecosystem.

3.2.2 Cultural and Historic Resources

An archaeological inventory survey and cultural impact assessment were conducted by Rechtman Consulting for Hale Piula Haina. This assessment is contained in Appendix 2 and is summarized below.

Cultural and Historic Background

The *ahupuaʻa* of Puʻu Waʻawaʻa is located in the subdistrict of Nāpuʻu, which is translated as "the hills," which is part of the Kekaha region of the North Kona district. Kekaha is known for its arid areas and is defined as the area from Honokohau through Puʻu Anahulu. Puʻu Waʻawaʻa itself can be literally translated as "furrowed hill," which tradition holds received that name after priestess/chiefess Anahulu moved with her husband Waʻawaʻa and their family to the area.

Puʻu Waʻawaʻa was a favorable place to live in North Kona because of its freshwater springs and brackish ponds along the coast, and productive agricultural land upslope during the rainy season from October to March. In one early historical account, the young chief Kalaniʻōpuʻu challenged the rule of Keaweʻōpala, the son of Alapaʻi-nui, the ruler of Hawaiʻi who had died a few years before in 1754. After killing Keaweʻōpala, Kalaniʻōpuʻu granted "estate lands" in Kekaha to twin chiefs Kameʻeiamoku and Kamanawa as a reward for their valor and counsel. At the time of Kalaniʻōpuʻu's death, Kameʻeiamoku was living at Kaʻūpūlehu and Kamanawa was living at Kīholo. Shortly after Kalaniʻōpuʻu's death, Kamehameha I came into power. Kamehameha I retained the area of Puʻu Waʻawaʻa because, among other reasons, it was a source of kauila and other trees valued for their hard wood used for spears and nails. Mikahela Kekauonohi (a granddaughter of Kamehameha I) claimed Puʻu Waʻawaʻa *Ahupuaʻa* during the Māhele; however, the *ahupuaʻa* was relinquished to the government perhaps in lieu of commutations for other lands awarded. With the 1893 overthrow of the monarchy, the land was ceded along with other Crown and Government lands to the United States and later to the State of Hawaiʻi.

The first formal leases in the area were issued in 1863 and involved the *ahupuaʻa* of Puʻu Anahulu. The lessees, three Oahu residents, sold their interests two years later to Francis Spencer for incorporation into the holdings of the Waimea Grazing and Agricultural Company. During the next several decades, ranching operations spread to more than 120,000 acres of Puʻu Anahulu and Puʻu Waʻawaʻa. In 1893, a new lease for 40,000 acres of Puʻu Waʻawaʻa was granted to an apparent partnership involving Robert Hind and Eben Low, who happened to be the son-in-law of Governor Sanford Dole. The terms of the 25-year lease included the preservation of the forest there and the restriction of further expansion of the lantana plant. Over the next year or so, Hind and Low reported to the commissioners of Crown Lands on the status of their lease enterprise, noting that dry times and a lack of springs were taking a toll on their effort to grow trees and raise cattle. They said it was taking a prodigious effort to control lantana and other invasive species:

> "We have rooted up every lantana visible, this will be our worst enemy on a count of the numerous quails that carry the berries from John Maguire's property [Kaupulehu], adjoining ours which is largely covered with this weed.
>
> "The cactus or the *Papipi* is also spreading fast, and so is the Scotch Thistle; We are trying to keep them from spreading any further."

At the same time the pioneering ranchers acknowledged native plant species were plentiful:

> "Hawaiian trees and shrubs of numerous kinds abound luxuriantly on this land. Viz; the koa, pua, mamane, koko, naio, iliahi, opiko, kolea, kou, kukui, lama & etc. etc."

When the Hawaiian Kingdom began issuing homesteads in the late 1800s, those seeking lands began competing with Pu‘u Wa‘awa‘a Ranch for desirable crop and grazing land. By 1914, Robert Hind began acquiring title to lots in Pu‘u Anahulu from homesteaders who, according to terms of the homesteading application process, needed to prove they had jobs, and the only ones available in the area were those offered by the ranch. Hind's growing sociopolitical influence led to his appointment in 1916 as Hawai‘i Territorial Senator, a position he held for several years. By this time the ranch's primary residence had been built. The home became known as Pihanakalani, which translated as "gathering place [of] high supernatural beings," and was visited by dignitaries from around the world. Over the next two decades the corporation "Robert Hind, Limited" was created to consolidate his interests which by then consisted of 120,000 acres ranging up to 6,000 feet in elevation, with all but 300 acres involving leased government lands. They included 100,000 acres covered with lava flows, with only about 1,500 acres of the remainder considered good grazing land – mostly around the 5,000-foot elevation. Another 100 acres were planted in crops. In 1929 the ranch contained 30 miles of fences, half stone and half wire, and 2,000 head of cattle. It was at this time that efforts were undertaken to reduce the number of goats that were competing with the cattle for forage. In the mid-1930s, changes were made to the leases to exclude private parcels, including many along the coast. The leases for Pu‘u Anahulu and Pu‘u Wa‘awa‘a were again put up for auction in 1937 with Hind retaining them, but at a much higher cost. Robert Hind died in 1938 and his operations continued under a trust overseen by Trustee John K. Clarke until Clarke's death in 1951.

In 1955, the Commissioner of Public Lands removed 500 acres at Pu‘u Wa‘awa‘a from the lease which was granted to Volcanite, Limited, also known as Hawaiian Ornamental Concrete Products, Ltd., for use as a quarry for a period of 21 years. Volcanite, Ltd. voluntarily surrendered the lease in 1967 following complaints of violations but then obtained a series of revocable permits to continue operations until 1988.

In 1958 the officers of Robert Hind Ltd. had decided it could not maintain operations without prohibitively expensive investments in water systems and other range improvements and sold its fee simple holdings to Dillingham Ranch. Two years later, Dillingham was the high bidder on a 40-year lease for the government properties, which it transferred to F. Newell Bohnett in 1972. In 1984, after determining that Bohnett had illegally harvested *koa* from the land, the State Board of Land and Natural Resources removed 84,397 acres from the Pu‘u Wa‘awa‘a Ranch lease.

Bohnett's lease on the remaining property expired in 2000. In 2002 the BLRN transferred all State-managed lands in the *ahupua'a* of Pu'u Wa'awa'a from the Department of Land and Natural Resources' Land Division to the Division of Forestry and Wildlife and State Parks (Giffin 2003). The agencies were directed to develop a management plan to provide for the restoration of native ecosystems and preservation of cultural resources.

In 1993 the fee-simple parcel making up Hale Piula Haina was sold by Bohnett to Pu'u Wa'awa'a Ranch. In 2000 the ranch sold the property to Jerry R. King, who sold it to the applicant, Henk and Akemi Rogers on April 13, 2006.

Archaeological Resources: Existing Environment

A number of previous archaeological studies performed in the Pu'u Wa'awa'a *ahupua'a* have found a wide variety of features from both Precontact and Historic times. However, prior to 2008, only one (McGerty and Spear 2000) encompassed portions of the private land holdings of the former Pu'u Wa'awa'a Ranch near the pu'u itself. That study of 22,000 acres within both Pu'u Anahulu and Pu'u Wa'awa'a found four previously recorded sites and 32 new sites, but none within the private holdings.

The archaeological inventory survey contained in Appendix 2, which is based on work done for all the Rogers' holdings in Pu'u Wa'awa'a (Ketner et al 2008), identified one historic property: State Inventory of Historic Places (SIHP) Site 26171, Hale Piula Haina. It dates from the late nineteenth century and contains mostly architectural elements related to catchment. No Precontact resources were observed.

According to the McGerty and Spear (2000) study, Hale Piula Haina originated through Land Grant No. 10,838 issued on May 31, 1940, but in an oral interview for the current study, William "Billy" Paris Jr., a former Pu'u Wa'a Wa'a Ranch foreman, said that development of the area for water catchment may have begun in the mid-1930s, with additions occurring between 1938 and 1942. Etchings in one of the concrete foundations suggests that portion was constructed in the year 1940. Hale Piula Haina site provided the majority of the water for Pu'u Wa'awa'a ranching activities. After Dillingham took over ranching operations, the site was expanded to include adjacent state-owned land to the northwest, which was entirely paved with asphalt. The site is no longer in use.

The archaeological inventory survey included visual inspection and mapping of the corrugated roofing structures that were built low to the ground to collect rainwater. According to Mr. Paris, the roofing came from former sugar mills in Hawi and Puakō. Rainwater was channeled into wooden gutters that fed a flume that carried the water to wooden tanks built on concrete foundation blocks. A prior landowner removed the tanks but left the blocks.

Archaeological Impacts and Mitigation Measures

SIHP Site 26171, Hale Piula Haina, was considered to be significant under criteria A, B, C and D as established by DLNR-SHPD and contained in Hawai'i Administrative Rules 13§13-284-6. These criteria are: (A) associated with events that have made an important contribution to the broad

patterns of our history; (B) associated with the lives of persons important in our past; (C) embodying the distinctive characteristics of a type, period, or method of construction; representing the work of a master, or possessing high artistic value; and (D) yielding, or being likely to yield, information important for research on prehistory or history. The inventory survey recommends that if the remaining structures at Hale Piula Haina are to be further dismantled, scaled drawings and archive quality photo documentation should be conducted to mitigate impacts to historic properties.

The archaeological inventory survey has been submitted to SHPD for its review as part of the current Draft EA. In response to an earlier archaeological inventory conducted for not only Hale Piula Haina but also the other Rogers holdings (Ketner et al 2008), SHPD concurred with the results of the assessment of the historic properties, and instructed the applicant to provide additional information regarding the nature of the project that might affect SIHP 26171, which is contained in the current inventory. The Final EA is expected to present the results of SHPD review.

Existing Cultural Resources

No specific cultural practices appear to be present within the project site, which is no longer used for its original purpose of water catchment for modern ranching. However, the project site is but a very small portion of Puʻu Waʻawaʻa, which has a long history of cultural activities that need to be considered for context.

Prior to the introduction of ungulates in the nineteenth century, the *ahupuaʻa* contained a significant diversity of plants, including herbs used for medicinal purposes. *Mauka* areas, such Hale Piula Haina, offered a variety of resources including birds, which were hunted for either food or feathers used in ceremonial garments; wood for house and heiau construction and for making canoes and weapons; and ample soil for agriculture. Because of this part of the island is so arid, families living in the upland areas often traveled during dry periods to the coast where water was more plentiful and where offshore fishing, shoreline food sources including fishponds and anchialine ponds, and salt-making areas were available.

Ranching brought significant changes to the landscape and corresponding changes to cultural activities. But cultural resources still remain, including archaeological sites in lower regions and wildlife in upland forest areas. The latter includes plants and birds which are being perpetuated by activities such as the establishment of the sanctuary as well as the project addressed by this EA.

A variety of natural resources still exist in the *mauka* areas, including the many lava tube caves that offer important biological, geological, cultural, aesthetic, recreational and educational opportunities (Giffin 2003). As discussed above, sinkholes and skylights act as natural exclosures to harbor rare and endangered plants from wild and domestic herbivores, and Giffin (2003) reported that lava tube openings in Puʻu Waʻawaʻa are home to five rare varieties of plants and native forest birds which nest on the cave floor or ledges. Midden deposits and man-made structures show that ancient Hawaiians used the caves for a variety of purposes such as shelter, water catchment, food storage and burials and continue to be a source of interest to archaeologists and cultural practitioners. Modern-day research has revealed the caves as a source of subfossils for now-extinct mollusks, arthropods and other invertebrates, as well as those of large, flightless geese and other birds. Such research is

expected to continue as is restoration of native ecosystems and preservation of cultural resources through the establishment of a management plan for the *ahupua‘a* by several State agencies. No caves exist on or near the Hale Piula Haina private parcel and none would be affected by any aspect of the proposed action.

Consultation

As part of their extensive study, Kumu Pono Associates (Maly and Maly 2006) interviewed *kūpuna* of the Nāpu‘u area, which includes Pu‘u Wa‘awa‘a. In addition to rancher Mikio Kato, William Paris and Elizabeth Ruddle-Spielman other interviewees shared information relative to *Hale Piula*, and the general current project area. None of the *kūpuna* interviewed shared knowledge of cultural properties or practices specific to the current study area. All acknowledged the importance of the former catchment in the life of the ranch and the great loss of native forest during the last five decades.

Cultural Resources: Impacts and Mitigation Measures

No cultural practices appear to be present within Hale Piula Haina itself, which is no longer used for its original purpose. It is reasonable to conclude that based upon the apparent lack of resources and uses, the exercise of native Hawaiian rights related to gathering, access, or other customary activities will not be affected, and there will be no adverse effect upon cultural practices or beliefs. Benefits to cultural resources include restoration of natural resources with which cultural practices are interwoven, including native forest and native birds, both at Hale Piula Haina itself and, through the knowledge obtained through research, throughout the *ahupua‘a*. The conclusions concerning cultural resources will be reviewed in light of any comments received on the Draft Environmental Assessment.

3.3 Infrastructure

3.3.1 Utilities and Public Services

Existing Facilities and Services and Impacts

There are no utilities supplied to the site, and none are needed. The action would not have any impact on existing utilities, as the research station to be installed will be provided with catchment water, electricity generated by solar and wind and a composting toilet.

As discussed in Section 3.1.3, A wildfire management plan is being developed for the Rogers’ lands by Hawai‘i Wildfire Management Organization, a 501(c)(3) nonprofit organization comprised of all the County, State, and Federal fire fighting agencies on the Island, scientists, and natural resource managers. The intent is to provide plans and facilities that will not only mitigate any fire activity from the proposed action but to substantially improve fire suppression and fire fighting in the general area.

Because of the nature of the project, no public services such as police service, recreational facilities or schools would be affected by demands or other impacts of the project in any material way.

3.3.2 Roadways

Existing Facilities, Impacts and Mitigation Measures

Hale Piula Haina is accessed by an existing four-wheel-drive road (see Figure 1b) which also services the main properties and other uses within the Forest Bird Sanctuary and other lands within Pu‘u Wa‘awa‘a. The road is owned and maintained by the State of Hawai‘i. A formal easement for the access is a component of the project, and Henk and Akemi Rogers are agreeable to assisting in the maintenance of the roadway.

3.4 Secondary and Cumulative Impacts

The project will not involve any secondary such as population changes or effects on public facilities.

Cumulative impacts result when implementation of several projects that individually have limited impacts combine to produce more severe impacts or conflicts in mitigation measures. The project, being limited to a project involving native forest and bird habitat restoration and scientific research, has very limited adverse impacts. At the current time, according to files at the Planning Department and notices filed in the *OEQC Environmental Notice*, there do not appear to be any roadway, utility or development projects being undertaken in the area. Henk and Akemi Rogers are planning a number of renovations and new projects at the Ranch headquarters. These separate improvements, which are within the Agricultural District and not subject to Chapter 343, HRS, do not have any relation to the proposed project, which is over four miles to the northeast, and would not interact in any adverse way.

The greatest potential for environmental impact interaction is related to activities at Pu‘u Wa‘awa‘a as part of the Management Plan, including hiking, hunting, ranching, development of water catchment, reforestation, scientific research, and traditional cultural uses. As Hale Piula Haina is within the Forest Bird Sanctuary part of Pu‘u Wa‘awa‘a, the intensity of such activities may be less than in other parts of Pu‘u Wa‘awa‘a. The Hale Piula Haina reforestation and research project is relatively small in scale and environmentally benign, and it is also located far away from most proposed activities. But still at issue are the access road, uses in immediately surrounding lands, invasive species, and fire potential. The proposed Hale Piula Haina facility will see relatively light use, at most a few cars per day, which should not cause traffic problems no matter the level of use that occurs nearby as part of the Management Plan. An agreement regarding maintenance of the road will be an important aspect of the approval of the use. Currently, because of the sensitivity of the general area, very few uses are planned in this area of the Forest Bird Sanctuary near Hale Piula Haina. Any such activities would probably involve reforestation and research, which match completely the activities proposed at Hale Piula Haina. There is thus a greater potential for synergy than conflict, but careful coordination will need to be undertaken. For this reason, the Hale Piula Haina reforestation and research project includes institution of a volunteer research board chaired by a biology faculty at the University of Hawai‘i at Hilo, with membership from the Pu‘u Wa‘awa‘a Advisory Group, DLNR, USFWS, US Forest Service, and/or other institutions, as appropriate, to evaluate proposals and supervise research. The potential cumulative impacts of introducing alien species and additional fire potential are serious but can be dealt with through cooperative programs, as discussed in Section 3.1.3.

3.5 Required Permits and Approvals

- Conservation District Use Permit
- Hawai‘i County Planning Department Plan Approval and Building Permit

In addition, as the project would be easier to construct and maintain with a direct road connection between the Pu‘u Wa‘awa‘a Ranch Headquarters, Henk and Akemi Rogers are seeking from the Board of Land and Natural Resources formalization of an easement on an existing road that has long been used to access Hale Piula Haina from headquarters (see Figure 1b for general location).

3.6 Consistency with Government Plans and Policies

3.6.1 Hawai‘i State Plan

Adopted in 1978 and last revised in 1991 (Hawai‘i Revised Statutes, Chapter 226, as amended), the Plan establishes a set of themes, goals, objectives and policies that are meant to guide the State’s long-run growth and development activities. The three themes that express the basic purpose of the *Hawai‘i State Plan* are individual and family self-sufficiency, social and economic mobility and community or social well-being. The proposed project would promote these goals by restoring an area important for community well-being.

3.6.2 Hawai‘i County General Plan and Zoning

The *General Plan* for the County of Hawai‘i is a policy document expressing the broad goals and policies for the long-range development of the Island of Hawai‘i. The plan was adopted by ordinance in 1989 and revised in 2005 (Hawai‘i County Department of Planning). The *General Plan* itself is organized into thirteen elements, with policies, objectives, standards, and principles for each. There are also discussions of the specific applicability of each element to the nine judicial districts comprising the County of Hawai‘i. Most relevant to the proposed project are the following Goal and Policies, and Courses of Action of particular chapters of the General Plan:

Environmental Quality – Goals
(a) Define the most desirable use of land within the County that achieves an ecological balance providing residents and visitors the quality of life and an environment in which the natural resources of the island are viable and sustainable.
(b) Maintain and, if feasible, improve the existing environmental quality of the island.
(c) Control pollution.
Environmental Quality – Policies
(a) Take positive action to further maintain the quality of the environment.

Environmental Quality – Standards
(a) Pollution shall be prevented, abated, and controlled at levels that will protect and preserve the public health and well being, through the enforcement of appropriate Federal, State and County standards.
(b) Incorporate environmental quality controls either as standards in appropriate ordinances or as conditions of approval.
(c) Federal and State environmental regulations shall be adhered to.

Discussion: The action will incorporate pollution controls and has as its goal the restoration of native ecosystems. Therefore the action is consistent with relevant goals, policies, and courses of action of the Environmental Quality section of the County of Hawai‘i General Plan.

Flooding and Other Natural Hazards - Goals
(a) Protect human life.
(d) Prevent damage from inundation.
Flooding and Other Natural Hazards - Policies
(q) Consider natural hazards in all land use planning and permitting.
Flooding And Other Natural Hazards -Standards
(a) "Storm Drainage Standards," County of Hawaii, October, 1970, and as revised.
(b) Applicable standards and regulations of Chapter 27, "Flood Control," of the Hawai‘i County Code.
(d) Applicable standards and regulations of Chapter 10, "Erosion and Sedimentation Control," of the Hawaii County Code.

Discussion: The project is not located within a floodplain or other area of natural hazards, will not cause erosion or sedimentation, and will abide by applicable standards and regulations regarding drainage and erosion and sedimentation control. Therefore the action is consistent with relevant goals, policies, and courses of action of the Flooding and Other Natural Hazards section of the County of Hawai‘i General Plan.

Historic Sites – Goals
(a) Protect, restore, and enhance the sites, buildings, and objects of significant historical and cultural importance to Hawaii.
Historic Sites – Policies
(c) Require both public and private developers of land to provide historical and archaeological surveys and cultural assessments, where appropriate, prior to the clearing or development of land when there are indications that the land under consideration has historical significance.

Neither Hale Piula Haina nor the Pu‘u Wa‘awa‘a Ranch headquarters are listed as Historic Sites in the North and South Kona section of the Historic Sites chapter of the County of Hawai‘i General Plan.

Discussion: An archaeological inventory and a cultural assessment have been performed on Hale Piula Haina. The project will be constructed without impacting any resources, consistent with the goals, standards and policies of the Historic Sites chapter of the County of Hawai‘i General Plan.

Natural Beauty – Goals
(a) Protect, preserve and enhance the quality of areas endowed with natural beauty, including the quality of coastal scenic resources.
(b) Protect scenic vistas and view planes from becoming obstructed.
Natural Beauty - Policies
(h) Protect the views of areas endowed with natural beauty by carefully considering the effects of proposed construction during all land use reviews.
(i) Do not allow incompatible construction in areas of natural beauty.

Discussion: The remnants of an abandoned water catchment system, which some may consider an eyesore in the upper forests of Hualālai, will be removed. The proposed structure will be low-profile and will not adversely impact scenery; the reforestation will be beneficial to scenic values by restoring a native forest. Therefore, the proposed action satisfies relevant goals and policies of the Natural Beauty chapter of the County of Hawai‘i General Plan.

The Hawai‘i County General Plan Land Use Pattern Allocation Guide (LUPAG). The LUPAG map component of the *General Plan* is a graphic representation of the Plan's goals, policies, and standards as well as of the physical relationship between land uses. It also establishes the basic urban and non-urban form for areas within the planned public and cultural facilities, public utilities and safety features, and transportation corridors. Hale Piula Haina is classified as extensive agriculture. The proposed action is consistent with this designation.

Hawai‘i County Zoning. Hale Piula Haina is located in the Conservation District and therefore has no County of Hawai‘i zoning designation.

3.6.3 Hawai‘i State Land Use Law

All land in the State of Hawai‘i is classified into one of four land use categories – Urban, Rural, Agricultural, or Conservation – by the State Land Use Commission, pursuant to Chapter 205, HRS. The property is in the State Land Use Conservation District, resource subzone.

HRS 205-2(e) describes the intended uses for Conservation Districts:

> "Conservation districts shall include areas necessary for protecting watersheds and water sources; preserving scenic and historic areas; providing park lands, wilderness, and beach reserves; conserving indigenous or endemic plants, fish, and wildlife, including those which are threatened or endangered; preventing floods and soil erosion; forestry; open space areas whose existing openness, natural condition, or present state of use, if retained, would enhance the present or potential value of abutting or surrounding communities, or would maintain or

enhance the conservation of natural or scenic resources; areas of value for recreational purposes; other related activities; and other permitted uses not detrimental to a multiple use conservation concept."

Activities with the Conservation District must demonstrate consistency with certain criteria. A separate Conservation District Use Application (CDUA) is being prepared for the project that addresses these criteria in details. The following provides a summary.

1. Consistency with purpose of the Conservation District. The purpose of this chapter is to regulate land use in the Conservation District for the purpose of conserving, protecting, and preserving the important natural resources of the State through appropriate management and use to promote their long-term sustainability and the public health, safety, and welfare.

The proposed land use is consistent with the purpose of the Conservation District. The proposed activities at Hale Piula Haina are designed specifically to conserve, protect and preserve natural habitat with a program of native forest reforestation and scientific study of the native forest and bird habitat. The program will entail removing existing structures that are dilapidated, debris and alien plants; erect a mammalian pest and predator exclusion fence. Conservation biologists will then replant the area using appropriate native species mix and spacing for the trees, shrubs, and understory plants. It is anticipated that with the reforestation will greatly improve bird habitat and help re-establish a native bird population. A key component of the restoration effort is research. The research conducted at Hale Piula Haina will provide information that can be applied to the State's reforestation efforts on the surrounding lands under the control of DOFAW. The efforts at Hale Piula Haina will help conserve, protect and preserve the important natural resources of the State through appropriate management and use to promote their long-term sustainability not only on the project site but also through the research will provide information that can be applied on the surrounding State-owned property.

2. Consistency with objectives of the subzone of the land in which the use will occur. The objective of the Resource subzone "…is to develop, with proper management, areas to ensure sustained use of the natural resources of those areas."

The proposed actions are consistent with the objectives of the Resource subzone. The proposed actions are designed to develop a protocol for the reforestation of an area that has been disturbed by human activities and return it to a natural state that will encourage the re-establishment of a native forest habitat and therefore a native bird population. The proposed actions will establish proper management for this area to ensure sustained use of the natural resources of the area. The protocols developed for the project area could be used for the surrounding state lands which will require the same care in developing sustainable natural resources. All proposed uses are *identified uses* in the Resource subzone:

- The proposed action to remove the existing structures at Hale Piula Haina is an identified use under in the Conservation District Rules, Hawai'i Administrative Rules (HAR) Section 13-5-22 P-9, (C-1) STRUCTURES, EXISTING, which allows: "Demolition, removal, or alteration of existing structures, facilities, and equipment." (C-1, requires a Departmental Permit.)

- The proposed removal of alien species and replanting with native species is an identified use under HAR Section 13-5-24, R-5, (C-1) allows for: "Landscaping, defined as alteration of plant cover, including trees, in an area of more than 10,000 square feet." (C-1, requires a Departmental Permit.)
- The improvements to the access roadway, from the Rogers Ranch to Hale Piula Haina, are an identified use under Section 13-5-22 P-9 (A-1) STRUCTURES, EXISTING, which allows: "Replacement or reconstruction of existing structures and facilities as identified in the exempt classes established in Section 11-200-8, except as provided in Section 13-5-37 where the new structure will be located approximately on the same site and will have substantially the same purpose, capacity, density, height, and dimensions as the structure replaced." (A-1, requires no permit from the Board or Department.) Access roadway repairs and maintenance are also an identified use under HAR Section 13-5-22 P-9 (D-1), STRUCTURES, EXISTING, which allows for: "Demolition, grading, removal or alteration of topographic features." (D-1, requires a Board Permit.)
- The construction of the fencing and the research facility are identified uses under HAR Section 13-5-22 P-1(D-1), DATA COLLECTION, which states: "Basic data collection, research, education, and resource evaluation that involves a land use causing ground disturbance." (D-1, requires a Board Permit.)

It is clear that the Conservation District Rules anticipated these types of activities and permitted them as identified uses in the Resource Subzone with the appropriate permit.

3. Compliance with the provisions and guidelines contained in Chapter 205A, Hawai'i Revised Statutes (HRS), entitled "Coastal Zone Management." The property is not located in the Special Management Area (SMA) and does not require an SMA permit. However, it does comply with the applicable provisions and guidelines, per the following assessment.

- Recreational Resources: The property is located over 9 miles from the ocean, and no coastal recreational resources are involved; there will be no negative impact to existing resources. The land surrounding the subject parcel is part of the Pu'u Wa'awa'a Forest Bird Sanctuary and is controlled by DOFAW. Access to and through this area is carefully controlled by DOFAW.
- Historic Resources: The subject area has been the subject of an Archaeological Inventory Survey, which is being reviewed by the State Historic Preservation Division for concurrence with the finding of no adverse effect to historic properties given the specified mitigation.
- Scenic and Open Space resources: As the property is located over 9 miles from the ocean, it will have no effect on coastal scenic and open space resources. The proposed action involves removing debris from a man-made catchment system. The removal of the dilapidated structures and reforestation with native species will enhance the open space resources and will have no adverse impact on upland scenic resources.
- Coastal Ecosystems: As the property is located over 9 miles from the shoreline. No surface watercourses are present that could potentially transmit pollutants and valuable coastal ecosystems are protected from disruption. There will be no impact on coastal ecosystems.
- Economic Uses: The location of Hale Piula Haina is over 9 miles from the shoreline and is not coastal dependent. It is suitably located in an area dedicated to forest preservation and research.

- Coastal Hazards: As the facility is over 9 miles from the shoreline in FIRM zone "X", there is no hazard to life and property from tsunami, storm waves, stream flooding, erosion, subsidence, and pollution.
- Managing Development: As the property is located over 9 miles from the ocean, no coastal resources are affected and therefore require no management. The public is being informed of the proposed action through the Chapter 343 Environmental Assessment process and the Conservation District Use Application process as required by law.
- Public Participation: The Conservation District Use Application involves an Environmental Assessment, and both are subject to public review.
- Beach Protection: The use of beaches by the public for recreation will not be impacted by the proposed actions which are located over 9 miles from the shoreline.
- Marine Resources: The location of the proposed actions, insure there will be no impact to marine resources. The proposed actions will provide an opportunity for researchers to study, conserve, protect and preserve our island's natural resources.

4. Lack of substantial adverse impact to existing natural resources within the surrounding area, community or region.

The proposed use of the subject property for reforestation and habitat enhancement demonstrates the applicant's commitment to management of the site and will conserve, protect and preserve the natural and historic features on the subject property. The portable research station will have minimal impact as it requires no permanent connection to the land and is entirely self sufficient for utilities, water supply and wastewater treatment. The proposed uses will not cause substantial adverse impact to existing natural resources on the site, within the surrounding area, community or region. The proposed actions will help protect, conserve and preserve the natural resources of the area and provide valuable information that could be used on the surrounding lands managed by DOFAW as they proceed to re-establish a native forest habitat.

5. Compatibility of proposed land use, including buildings, structures and facilities, with the locality and surrounding areas, and to the physical conditions and capabilities of the specific parcel or parcels.

The proposed demolition of dilapidated structures; erection of excluder fencing; reforestation of the subject property; and the temporary location of the research trailer and the use and maintenance of the access road will be compatible with the locality and surrounding areas, and to the physical conditions and capabilities of the specific parcel. Restoring the site to its natural state without the remnants of the water catchment system and the alien species will help to re-establish the native forest and provide the optimum habitat for the re-establishment of the native bird and invertebrate population. The research facility is an important structure to house researchers and their equipment so they can utilize this unique opportunity to analyze the re-forestation process and develop protocols that can be used on surrounding lands controlled by DOFAW. The portable research station will have minimal impact as it requires no permanent connection to the land and is entirely self sufficient for utilities, water supply and wastewater treatment. The proposed actions will improve the physical condition of the subject property and increase its' capabilities as a native forest and bird habitat. Research on the subject parcel

will also help enhance the neighboring state parcel as protocols developed here can be applied in the surrounding area.

6. Description of how the existing physical and environmental aspects of the land, such as natural beauty and open space characteristics, will be preserved or improved upon.

The proposed use of the subject property will preserve and improve the physical and environmental aspects of the land, such as natural beauty and open space characteristics. The removal of the remnants of the water catchment system, associated debris and the unwanted alien species will allow the re-establishment of the native forest and provide the optimum habitat for the re-establishment of the native bird population. These actions will enhance the natural beauty and open space in this upland area. The proposed research facility is designed to be as non-obtrusive as possible; it is portable, needs no permanent connection to the ground, is self sufficient for water and power and is sized to be below the canopy of the surrounding forest. If in the future the research opportunities have been exhausted, the facility will be relocated from Hale Piula Haina.

7. Subdivision of land may not be utilized to increase the intensity of land uses in the Conservation District.

The proposed actions do not involve or depend upon subdivision. The proposed action does not request further subdivision of the property and will not lead to any increase in intensity of use beyond the requested actions.

8. Description of how the proposed land use will not be materially detrimental to the public health, safety and welfare.

No effects to public health, safety, or welfare are involved.

3.6.4 Pu‘u Wa‘awa‘a Management Plan

On January 25, 2002 the Board of Land and Natural Resources transferred responsibility for State managed lands within the *ahupua‘a* of Pu‘u Wa‘awa‘a and Pu‘u Anahulu from the Land Division to the Divisions of Forestry and Wildlife (DOFAW) and State Parks. Subsequently, DOFAW and State Parks have worked both internally and with the Pu‘u Wa‘awa‘a Advisory Council to develop a management plan for Pu‘u Wa‘awa‘a and the lands of Pu‘u Anahulu *makai* of Queen Ka‘ahumanu Highway – an area comprising approximately 40,711 acres. These lands represent a remarkable diversity of historical, natural, cultural and recreational resources. These include archaeological and cultural sites, a rich history of ancient and contemporary human use, historic coastal trails, an undeveloped coastline environment, uncommon ecosystems that are highly unique in their species composition, livestock grazing and hunting to name but few of many. In recognition of the decline in suitable habitat for many rare and endangered species, DOFAW had already established the Pu‘u Wa‘awa‘a Forest Bird Sanctuary in 1984. In order to effectively conserve and manage the unique resources of these *ahupua‘a*, DOFAW has implemented traditional Hawaiian land planning and management in a contemporary context to promote sustainable resource management and community access to natural resources. The *Management Plan for the Ahupua‘a of*

Pu‘u Wa‘awa‘a and the Makai Lands of Pu‘u Anahulu (Hawai‘i State DOFAW 2003) presents 62 unique objectives that are intended to support the complex array of resource management needs and community interests that apply to Pu‘u Wa‘awa‘a and the *makai* lands of Pu‘u Anahulu. These objectives are intended to provide a framework for management of this area for a 10-year period beginning in July 2003, with a projected budget for this 10-year period of over $26 million. There is clearly a need to actively seek additional resources through such means as grants, cooperative agreements and partnerships in order to realize the full potential of this plan.

The guiding principles stated in the Plan are:

- The rich and diverse natural, cultural, and recreational resources of the *ahupua‘a* of Pu‘u Wa‘awa‘a and the *makai* lands of Pu‘u Anahulu shall be protected and enhanced for the enjoyment of current and future generations.
- Principal management efforts will be made in the areas of native ecosystem restoration including endangered species protection and recovery, preservation of cultural and archeological resources, fire prevention and control, reforestation, hunting, recreation, research, livestock grazing, environmental education, trails, public access and eco-tourism.
- The design and implementation of this management plan will emulate the concept and approach of *ahupua‘a* management, which was developed and practiced by ancient Hawaiians. The following Hawaiian phrase will be the foundation of these efforts: “E malama i ka ‘aina, a malama ka aina ia ‘oe” (“Care for the land and the land will care for you”)
- Revenue generated from any activity within the *ahupua‘a* should be used to directly support continuing management efforts and programs in the *ahupua‘a*.

The proposed action meets the stated need “to actively seek additional resources through such means as grants and partnerships in order to realize the full potential of this plan” by providing private planning and funding to meet, in whole or in part, a number of objectives of the plan, and thereby assist the State of Hawai‘i in achieving its stated goals in a rational and timely manner. Of particular note are the following objectives, which the proposed project clearly supports.

Objective 10. Protect native flora and fauna by controlling non-native predators
Objective 11. Control invasive weeds that suppress native plant populations
Objective 12. Protect isolated occurrences of rare and endangered species
Objective 13. Restore native plant populations including rare and endangered species
Objective 16: Preserve and protect unique native invertebrate populations at Pu‘u Wa‘awa‘a and the *makai* lands of Pu‘u Anahulu
Objective 17: Protect and enhance native bird populations and their habitat
Objective 23. Provide areas for scientific research supporting restoration efforts
Objective 24. Fund and hire permanent field staff to implement natural resource management objectives

PART 4: ANTICIPATED DETERMINATION

Based on the information to this point, the Hawai‘i State Department of Land and Natural Resources (DLNR) is expected to determine that the proposed project will not significantly alter the environment. It is therefore anticipated that an Environmental Impact Statement is not warranted and that the DLNR will issue a Finding of No Significant Impact (FONSI). A final determination will be made by the DLNR after consideration of comments on the Draft EA.

PART 5: FINDINGS AND REASONS

Chapter 11-200-12, Hawai‘i Administrative Rules, outlines those factors agencies must consider when determining whether an action has significant effects:

1. *The proposed project will not involve an irrevocable commitment or loss or destruction of any natural or cultural resources.* No valuable natural or cultural resources would be committed or lost by the project. The project would instead by provide a significant benefit by restoring natural resources.
2. *The proposed project will not curtail the range of beneficial uses of the environment.* The proposed project expands and in no way curtails beneficial uses of the environment. The direct physical impact of the project is minor and is designed to enhance the area’s forest ecosystem.
3. *The proposed project will not conflict with the State's long-term environmental policies*. The State’s long-term environmental policies are set forth in Chapter 344, HRS. The broad goals of this policy are to conserve natural resources and enhance the quality of life. The project is minor, and fulfills aspects of these policies calling for an improved natural/native environment. It is thus consistent with all elements of the State’s long-term environmental policies.
4. *The proposed project will not substantially affect the economic or social welfare of the community or State.* The project will benefit the social welfare of the community and State by enhancing the physical environment and through research of native reforestation efforts.
5. *The proposed project does not substantially affect public health in any detrimental way.* The proposed project will not adversely affect public health.
6. *The proposed project will not involve substantial secondary impacts, such as population changes or effects on public facilities.* No secondary effects are expected to result from the proposed action, which involves restoration of a native forest and will not lead to other types of effects.
7. *The proposed project will not involve a substantial degradation of environmental quality*. The project is minor but will also enhance environmental quality and reverse native degradation through the removal of invasive species.
8. *The proposed project will not substantially affect any rare, threatened or endangered species of flora or fauna or habitat.* The project will remove invasive alien species that are threatening native flora and fauna and replant appropriate native species of plants, including threatened and endangered species, to restore those lost through earlier actions.
9. *The proposed project is not one which is individually limited but cumulatively may have considerable effect upon the environment or involves a commitment for larger actions.* The project is minor and is not related to other activities in the region in such a way as to produce adverse cumulative effects or involve a commitment for larger actions.

10. *The proposed project will not detrimentally affect air or water quality or ambient noise levels.* Due to the character of the project no adverse effects on these resources would occur. Construction-phase air quality impacts, including fugitive dust emissions, would be minor and mitigated.
11. *The project does not affect nor would it likely to be damaged as a result of being located in an environmentally sensitive area such as a flood plain, tsunami zone, erosion-prone area, geologically hazardous land, estuary, fresh water, or coastal area.* Although the project is located in an area with wildfire, volcanic and seismic risk, the entire Island of Hawai‘i shares this risk, and the project is not imprudent to undertake.
12. *The project will not substantially affect scenic vistas and viewplanes identified in county or state plans or studies.* The project will enhance scenic vistas by removing dilapidated structures which detract from a scenic vista. The low-profile research station project will not otherwise affect viewplanes. The reforestation will fill in with scenic native vegetation the patches currently occupied by catchment structures.
13. *The project will not require substantial energy consumption.* The research station and accompanying activities will be self-sufficient for energy requirements and therefore will have no effect on the island's energy grid. Energy will be required to access and build the improvements, but the investment is justified by the environmental restoration.

For the reasons above, we anticipate that the approving agency will determine that the action would not have any significant effect in the context of Chapter 343, Hawai‘i Revised Statues and section 11-200-12 of the State Administrative Rules.

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ENVIRONMENTAL ASSESSMENT
HALE PIULA HAINA NATIVE FOREST AND BIRD HABITAT RESTORATION ACTIVITIES AND RESEARCH FACILITY

TMK (3rd): 7-1-001:003
Puʻu Waʻa Waʻa, North Kona District, County of Hawaiʻi, State of Hawaiʻi

APPENDIX 1a
Comments in Response to Pre-Consultation

Harry Kim
Mayor

Darryl J. Oliveira
Fire Chief

Glen P.I. Honda
Deputy Fire Chief

County of Hawai'i
HAWAI'I FIRE DEPARTMENT
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May 2, 2008

Mr. Ron Terry
Geometrician Associates, LLC.
PO Box 396
Hilo, Hawaii 96721

SUBJECT: EARLY CONSULTATION ON ENVIRONMENTAL ASSESSMENT
REFORESTATION ACTIVITIES AND RESEARCH FACILITY AT
PUU WAA WAA
TAX MAP KEY: 7-1-001-003

We have no comments to offer at this time in reference to the above-mentioned Early Consultation on Environmental Assessment.

DARRYL OLIVEIRA
Fire Chief

GA:lpc

5-3-08..

Aloha Ron.

I talked w/ Mike Donoho re the Pu'u Wa'ai Wa'a projects, and it sounds great. Please send us a copy of the completed EA.

Mahalo,
Paul Campbell, Chair

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HRD08/3652

May 21, 2008

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P.O. Box 396
Hilo, HI 96721

RE: Early consultation for the Environmental Assessment for reforestation activities and research facility at Pu'u Wa'a Wa'a, North Kona, Hawai'i Island, TMK: (1) 7-1-001: 003.

Aloha e Ron Terry,

The Office of Hawaiian Affairs (OHA) is in receipt of the above-mentioned request for early consultation dated April 23, 2008. Henk and Akemi Rogers are proposing a native forest restoration project for a 2.755-acre parcel, known as Hale Piula Haina, which is surrounded by land under the control of the State Division of Forestry and Wildlife. The property is located within the State Land Use Conservation District. The couple plan on removing alien species, installing a predator-proof fence and planting native trees, shrubs and herbs. OHA has reviewed the project and offers the following comments.

We ask the applicant to complete the various archaeological and cultural studies required under state law. The cultural impact assessment should examine the project's potential affects on constitutionally-protected, traditional and customary Native Hawaiian practices. The archaeology reports should be submitted to the State Historic Preservation Division for review and approval. OHA should be allowed the opportunity to comment on the criteria assigned to any cultural or archaeological sites identified within the archaeological inventory survey.

Furthermore, we request the applicant's assurances that should iwi kūpuna or Native Hawaiian cultural or traditional deposits be found during the construction of the project, work will cease, and the appropriate agencies will be contacted pursuant to applicable law.

OHA requests to receive the draft Environmental Assessment for this project for review and comment when the document becomes available.

Thank you for the opportunity to comment. If you have further questions, please contact Sterling Wong (808) 594-0248 or e-mail him at sterlingw@oha.org.

'O wau iho nō me ka 'oia'i'o,

Clyde W. Nāmu'o
Administrator

C: OHA Kona CRC Office

LINDA LINGLE
GOVERNOR OF HAWAII

LAURA H. THIELEN
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

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AQUATIC RESOURCES
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ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

STATE HISTORIC PRESERVATION DIVISION
601 KAMOKILA BOULEVARD, ROOM 555
KAPOLEI, HAWAII 96707

July 13, 2008

Mr. Ron Terry, Principal
Geometrician Associates, LLC
P.O. Box 396
Hilo, Hawaii 96721

LOG NO: 2008.1556
DOC NO: 0806TD18
Archaeology

Dear Mr. Terry:

Subject: **Chapter 6E-8 Historic Preservation Review –**
Early Consultation for an Environmental Assessment for Reforestation of a 2.75-acre Parcel Pu`u Wa`a Wa`a Ahupua'a, North Kona District, Island of Hawai'i
TMK: (3) 7-1-01: 03

Thank you for your letter dated May 02, 2008 requesting early consultation for an Environmental Assessment for the subject parcel. We apologize for the delay in responding. The 2.17-acre parcel is indicated as a tank site lot (Grant 10838) within the 3,807-acre State Conservation District (parcel 7). The parcel is also known as Hale Piula Haina.

The project will involve demolition of existing catchment structures, removal of invasive plants, fencing to exclude invasive animals, and construction of a new water catchment, plant nursery and a research station for purposes of a long-term study of management practices. These activities will require a Conservation District Use Permit Application (CDUA) from the Department of Land and Natural Resources.

Information presented in your letter indicates that the existing structures at the property date to the 1940s. We therefore request that information on the condition and integrity of these structures be included in the Draft EA, so that we can make a determination as to whether mitigation measures will be needed prior to approval of a demolition permit. In addition, we have no information regarding the potential or possibility of archaeological sites on the parcel. We would therefore ask for an assessment or inspection of the parcel by a qualified archaeologist to be part of the environmental assessment process. If archaeological resources are present, an inventory survey would then be recommended as part of our review of the Conservation District Use Application (CDUA).

Aloha,

Nancy A. McMahon
Digitally signed by Nancy A. McMahon
Date: 2008.07.13 14:31:44 -10'00'

Nancy McMahon, Archaeology and Historic Preservation Manager
Historic Preservation Division

ENVIRONMENTAL ASSESSMENT
HALE PIULA HAINA NATIVE FOREST AND BIRD HABITAT RESTORATION ACTIVITIES AND RESEARCH FACILITY

TMK (3rd): 7-1-001:003
Puʻu Waʻa Waʻa, North Kona District, County of Hawaiʻi, State of Hawaiʻi

APPENDIX 2
Archaeological Inventory Survey and Cultural Impact Assessment

RC-0589

Archaeological Inventory Survey and Cultural Impact Assessment for the Hale Piula Haina Native Forest and Bird Habitat Restoration Activities and Research Facility

(TMK:3-7-1-01-003)

Puʻu Waʻawaʻa Ahupuaʻa
North Kona District
Island of Hawaiʻi

PREPARED BY:

Robert B. Rechtman, Ph.D.
and
Kuʻulani Muise, B.A.

PREPARED FOR:

Henk and Akemi Rogers
1288 Ala Moana Blvd
Honolulu, HI 96814

April 2009

RECHTMAN CONSULTING, LLC
507-A E. Lanikaula St. Hilo, Hawaii 96720
phone: (808) 969-6066 fax: (808) 443-0065
e-mail: bob@rechtmanconsulting.com
ARCHAEOLOGICAL, CULTURAL, AND HISTORICAL STUDIES

Archaeological Inventory Survey and Cultural Impact Assessment for the Hale Piula Haina Native Forest and Bird Habitat Restoration Activities and Research Facility

(TMK: 3-7-1-01-003)

Puʻu Waʻawaʻa Ahupuaʻa
North Kona District
Island of Hawaiʻi

RECHTMAN CONSULTING

EXECUTIVE SUMMARY

At the request of Ron Terry, Ph.D. of Geometrician Associates, LLC on behalf of Henk and Akemi Rogers, Rechtman Consulting, LLC has prepared this Archaeological Inventory Survey and Cultural Impact Assessment of TMK:3-7-1-001:003 which is a roughly 2.7 acre parcel, located in the *mauka* portion of Puʻu Waʻawaʻa Ahupuaʻa, North Kona District, Island of Hawaiʻi. The study parcel was identified as a water catchment area originally associated with Puʻu Waʻawaʻa Ranch and known as *Hale Piula*. *Hale Piula* was first developed in the middle 1930s as a water source for Puʻu Waʻawaʻa Ranch, and was later expanded between 1938 and 1940, and again in the early 1960s. The current study is intended to accompany an Environmental Assessment (EA) and Conservation District Use Application (CDUA) compliant with Chapter 343 HRS, as well as fulfilling the requirements of the County of Hawaiʻi Planning Department and the Department of Land and Natural Resources with respect to permit approvals for land-altering and development activities.

Situated approximately five miles southwest of the Rogers Ranch (formerly Puʻu Waʻawaʻa Ranch) headquarters, *Hale Piula* is located within the Puʻu Waʻawaʻa State Wildlife Sanctuary on the northern side of Hualālai between 4,560 feet and 4,760 feet above sea level. The proposed action is a program of native forest and bird habitat restoration and scientific research that will restore the diverse native forest that will provide optimum habitat and food supply for native birds of the area. This will be achieved by demolishing the non-functional catchment system, removal of alien plants, and the planting of native trees, shrubs and herbs. Alien animal species would be fenced from the property using an advanced predator exclusion fence. This proposed action will also include a long-term scientific study of the management of the flora and fauna for bird habitat restoration.

Fieldwork for the current project was conducted on April 5th, 2007 by Robert B. Rechtman, Ph.D., Matthew R. Clark, B.A., and Amy Ketner, B.A. As a result of the current study one historic property was identified: SIHP Site 26171, the *Hale Piula* water catchment area. There were no Precontact resources observed during the current study. SIHP Site 26171 is considered significant under Criteria A, B, C, and D. It is recommended that data recovery of the remaining structures at *Hale Piula* be conducted prior to their being further dismantled. This data recovery should include scaled drawings and archive quality photo documentation of the resource. Such recordation would serve to mitigate the potential impact to this site from the current proposed forest restoration action.

While potential Traditional Cultural Properties (a trail segment and a *heiau*) may have once existed on state-owned land in the general vicinity of the current study parcel, there were no such resources or associated practices identified specific to the current project area. Some might argue that the forested slopes of Hualālai themselves are part of a general cultural landscape, and thus from an indigenous perspective, should be considered a cultural property. While this might be the case, the current proposed action—to restore the native forest in all its diversity and provide an optimum habitat and food supply for the native birds of the area—by it nature would only serve to enhance, and not impact, this potential cultural property.

It is the conclusion of the current study that the proposed action will have no impact any traditional cultural properties, and the impact to the historic resources (SIHP Site 26171) can be satisfactorily mitigated. It is further concluded that the proposed action will serve to enhance potential valued natural resources within and beyond the study area.

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FIGURES

INTRODUCTION

At the request of Ron Terry, Ph.D. of Geometrician Associates, LLC on behalf of Henk and Akemi Rogers, Rechtman Consulting, LLC has prepared this Archaeological Inventory Survey and Cultural Impact Assessment of TMK:3-7-1-001:003 which is a roughly 2.7 acre parcel, located in the *mauka* portion of Puʻu Waʻawaʻa Ahupuaʻa, North Kona District, Island of Hawaiʻi (Figures 1 and 2). The study parcel was identified as a water catchment area (recorded as SIHP Site 26171) originally associated with Puʻu Waʻawaʻa Ranch and known as *Hale Piula* (Ketner et al. 2008). *Hale Piula* was first developed in the middle 1930s as a water source for Puʻu Waʻawaʻa Ranch, and was later expanded between 1938 and 1940, and again in the early 1960s. The current study is intended to accompany an Environmental Assessment (EA) and Conservation District Use Application (CDUA) compliant with Chapter 343 HRS, as well as fulfilling the requirements of the County of Hawaiʻi Planning Department and the Department of Land and Natural Resources with respect to permit approvals for land-altering and development activities. This study was undertaken in accordance with the Rules Governing Minimal Standards for Archaeological Inventory Surveys and Reports as contained in Hawaiʻi Administrative 13§13–284, and has been prepared pursuant to Act 50, approved by the Governor on April 26, 2000; and in accordance with the Office of Environmental Quality Control (OEQC) *Guidelines for Assessing Cultural Impact*, adopted by the Environmental Council, State of Hawaiʻi, on November 19, 1997.

The current study was performed in consideration of both Federal and state guidelines, among which are the Advisory Council on Historic Preservation's "Guidelines for Consideration of Traditional Cultural Values in Historic Preservation Review" (ACHP 1985); National Register Bulletin 38, "Guidelines for Evaluating and Documenting Traditional Cultural Properties" (Parker and King 1990); the Hawaiʻi State Historic Preservation Statute (Chapter 6E), which affords protection to historic sites, including traditional cultural properties of on-going cultural significance; the criteria, standards, and guidelines currently utilized by the Department of Land and Natural Resources-State Historic Preservation Division (DLNR-SHPD) for the evaluation and documentation of cultural sites (cf. 13§13-275-8; 276-5); and the November 1997 guidelines for cultural impact assessment studies, adopted by the Office of Environmental Quality Control (OEQC).

An Archaeological Inventory Survey (Ketner et al. 2008) has already been submitted to DLNR-SHPD, which covered the current project area as well as the former Puʻu Waʻawaʻa Ranch headquarters property. DLNR-SHPD received the report and processing fee and responded (DOC NO: 0812ST55) to that submittal as follows: "This is in regards to the submittal of an archaeological inventory survey for Puʻu Waʻawaʻa Ranch. There is no stated scope of work therefore we cannot make a determination of effects to historic properties. We acknowledge and appreciate the historic property assessments. Should there be any proposed projects we would be grateful for their submittal to SHPD for our review, at which time a determination of effects to historic properties can be made. We appreciate the documentation recommendations stated in the section on 'Significance Evaluation and Treatment Recommendations' and will take them into consideration given the opportunity to review the proposals" As stated above, the current report is submitted in support of a CDUA that describes proposed uses and activities (summarized below) on the subject parcel. The *Hale Piula* (SIHP Site 26171) site description, significance evaluation, and treatment recommendation is extracted from the earlier study (Ketner et al. 2008) and reproduced in the current study.

Below is a description of the project area and the proposed development activities, a detailed cultural and historical background, and a presentation of prior archaeological and cultural studies (including the results of extensive prior consultation and limited follow-up consultation), which combined provide for the formulation of current study expectations and the setting and context to facilitate an understanding of the potential significance of *Hale Piula*. Also presented is an explanation of the project's methods, detailed description of the resources encountered, interpretation and evaluation of those resources, and treatment recommendations. This is followed by a discussion of potential cultural impacts and suggested appropriate actions and strategies to mitigate any potential impacts.

Figure 1. Project area location.

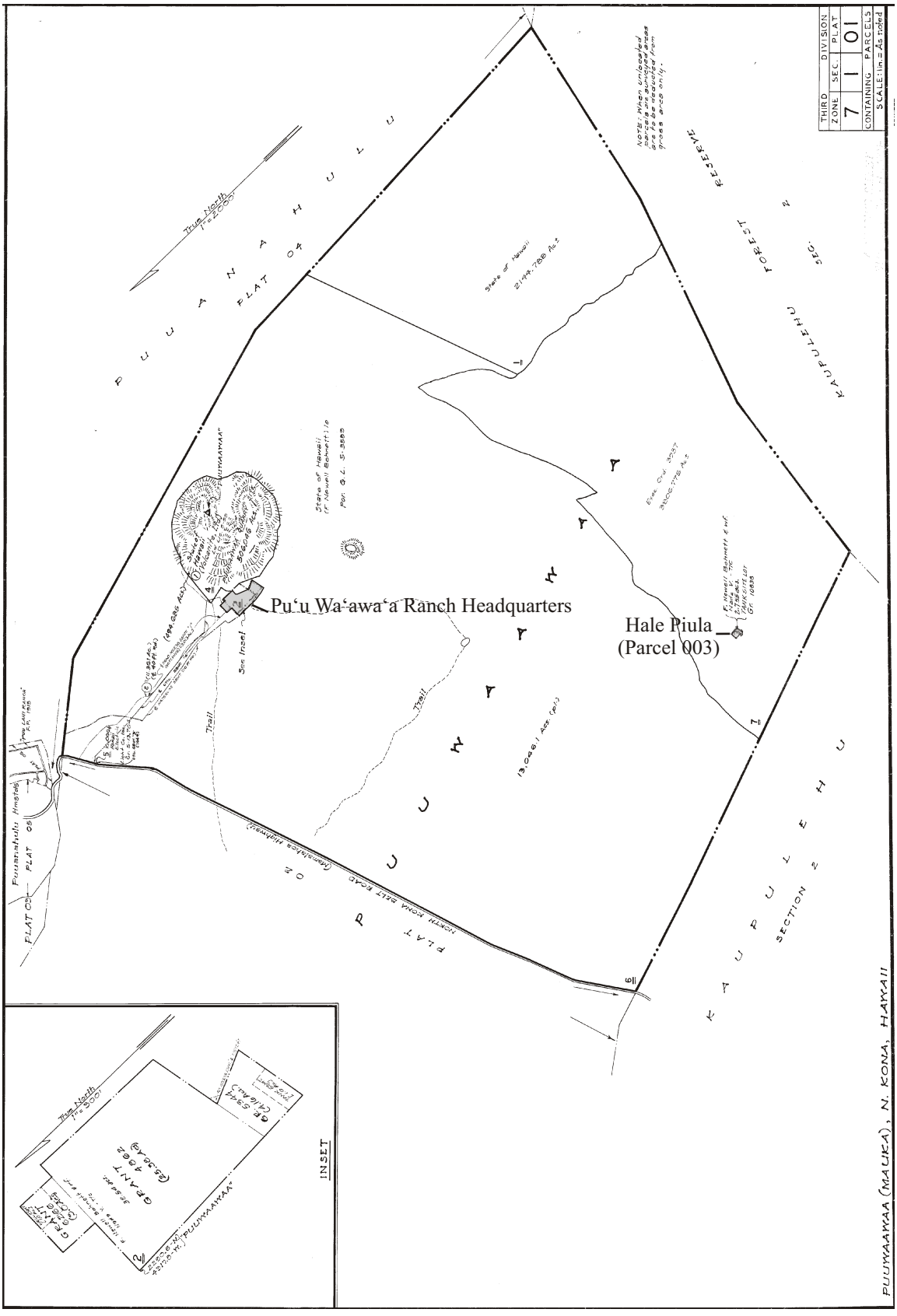

Figure 2. Tax Map Key 3-7-1-01 showing the current study area (Parcel 003).

PROJECT AREA DESCRIPTION AND PROPOSED ACTION

Situated in the State Conservation District approximately five miles southwest of the Rogers Ranch (formerly Pu‘u Wa‘awa‘a Ranch) headquarters, *Hale Piula* is located within the Pu‘u Wa‘awa‘a State Wildlife Sanctuary on the northern side of Hualālai between 4,560 feet and 4,760 feet above sea level. Soil within this area is described as Manahaa extremely stony silt loam (MND), a well-drained soil formed in volcanic ash with 3 to 15% of the surface covered in stones (Sato et al. 1973), which developed over a lava flow emanating from Hualālai between 1,500 and 3,000 years ago (Wolfe and Morris 1996). Within the State Wildlife Sanctuary exists a native forest with few introduced species (Figure 3); native flora growing around *Hale Piula* includes but is not limited to *‘ōhi‘a lehua* (*Metrosideros polymorpha*), *naio* (*Myoporum sandwicense*), *koa* (*Acacia koa*), and *‘ama‘u* (*Sadleria cyatheoides*). Non-native species include, but are not limited to banana poka (*Passiflora mollissima*), peach (*Prunus persica)* and various vines and grasses.

The proposed action is to restore and scientifically study native forest and bird habitat on the property. In order to restore a diverse native forest to provide optimum habitat and food supply for native birds of Pu‘u Wa‘awa‘a, the proposed action includes demolition of the remnants of the catchment system; removal of alien plants; planting of native trees, shrubs and herbs; and advanced predator exclusion fencing. A key aspect of the project is to build a rudimentary facility for the long-term scientific study of the management of the flora and fauna for optimum bird habitat restoration. The project also involves a request for formalization of an easement route and permission for minor repairs along an existing four-wheel-drive road from the Rogers Ranch headquarters (TMKs 7-1-001:006 and 007) to *Hale Piula*.

Figure 3. Forested lands within the *Hale Piula* area.

BACKGROUND

To generate a set of expectations regarding the nature of historic properties that might be encountered on the study parcel, and to establish an environment within which to assess the significance of any such resources, a historical context for the general North Kona region, and specifically Pu‘u Wa‘awa‘a Ranch is presented along with a discussion of previous archaeological studies relevant to the project area. Historic materials on Pu‘u Wa‘awa‘a Ranch were reviewed. These included the detailed collection of cultural and historical accounts of

the Nāpuʻu region, including oral history accounts, prepared by Kumu Pono Associates LLC (Maly & Maly 2006); other oral histories of ranch employees (Hawaii Cattlemen's Council 2003 and 2004); Marion Kelly's brief history of Puʻu Waʻawaʻa Ahupuaʻa (Kelly 1996); clippings about Puʻu Waʻawaʻa Ranch and Hind family members in the Hawaii Newspaper Morgue at the University of Hawaii Hamilton Library; other biographical materials on the Hinds in the *Men of Hawaii* series and elsewhere; and photo collections at the Bishop Museum Archives and Kona Historical Society.

Culture-Historical Context

While the current report is limited to a small portion of Puʻu Waʻawaʻa Ahupuaʻa (TMK:3-7-1-001:003; *Hale Piula*), an effort is made to provide a comprehensive and holistic understanding of the entire Puʻu Waʻawaʻa Ahupuaʻa and neighboring lands. In 2006, Kumu Pono Associates prepared a *Collection of Cultural and Historical Accounts of Puʻu Waʻawaʻa and the Nāpuʻu Region* (Maly and Maly 2006). Extensive research for that study included a review of archival-historical literature from both Hawaiian and English language sources, survey records of the Kingdom and Territory of Hawaiʻi; and historical texts authored or compiled by Malo (1951), Iʻi (1959), Kamakau (1961, 1964, 1976, and 1991), Ellis (1963), Fornander (1916-1919 and 1996), Thrum (1908), Beckwith (1970), Reinecke (n.d.); and Handy et al. (1972). That study also included several native accounts from Hawaiian language newspapers (compiled and translated from Hawaiian to English, by Kepā Maly), and historical narratives authored by eighteenth and nineteenth century visitors to the region; and involved the conduct of numerous oral-historical interviews. The information was presented within thematic categories and ordered chronological by the date of publication.

Over the last ten years, Kepā Maly of Kumu Pono Associates has researched and prepared several detailed studies—in the form of review and translation of accounts from Hawaiian language newspapers, historical accounts recorded by Hawaiian and non-Hawaiian residents, and government land use records—for lands in the Kekaha region of which Puʻu Waʻawaʻa is a part. Kepā Maly has also conducted a number of detailed oral history interviews with elder *kamaʻāina* documenting their knowledge of the Kekaha region (including Puʻu Waʻawaʻa).

As the information collected by Kumu Pono Associates (Maly and Maly 2006) was so complete, this report presents a condensed and slightly supplemented version of the cultural and historical background for Puʻu Waʻawaʻa Ahupuaʻa and the Kekaha region that was previously prepared. Sources of supplemental information are derived from recently conducted oral interviews (Ketner et al. 2008), oral histories of ranch employees (Hawaii Cattlemen's Council 2003 and 2004); Marion Kelly's brief history of Puʻu Waʻawaʻa Ahupuaʻa (Kelly 1996); newspaper clippings about Puʻu Waʻawaʻa Ranch and Hind family members in the Hawaii Newspaper Morgue at the University of Hawaii Hamilton Library; other biographical materials on the Hinds in the *Men of Hawaii* series and elsewhere; photo collections at the Bishop Museum Archives and Kona Historical Society; along with a review of climate and water resource of Puʻu Waʻawaʻa (Juvik 2003). It is a comprehension of this background information that facilitates a more complete understanding of the potential significance of the resources that exist within the current study area.

Origins and Dispersal

In Hawaiian society, natural and cultural resources are one and the same. Native traditions describe the formation (the literal birth) of the Hawaiian Islands and the presence of life on and around them in the context of genealogical accounts. All forms in the natural environment, from the skies and mountain peaks, to the watered valleys and lava plains, and to the shoreline and ocean depths were believed to be embodiments of Hawaiian deities. One Hawaiian genealogical account, records that Wākea (the expanse of the sky–father) and Papa-hānau-moku (Papa—Earth-mother who gave birth to the islands)—also called Haumea-nui-hānau-wā-wā (Great Haumea—Woman-earth born time and time again)—and various gods and creative forces of nature, gave birth to the islands. Hawaiʻi, the largest of the islands, was the first-born of these island children. It is these same god-beings, or creative forces of nature who were also the parents of the first man (Hāloa), and from this ancestor, all Hawaiian people are descended (cf. Beckwith 1970; Malo 1951:3; Pukui and Korn 1973). It was in this context of kinship, that the ancient Hawaiians addressed their environment and it is the basis of the Hawaiian system of land use.

Archaeologists and historians describe the inhabiting of these islands in the context of settlement that resulted from voyages taken across the open ocean. For many years, researchers have proposed that early Polynesian settlement voyages between Kahiki (the ancestral homelands of the Hawaiian gods and people) and Hawai‘i were underway by A.D. 300, with long distance voyages occurring fairly regularly through at least the thirteenth century. It has been generally reported that the sources of the early Hawaiian population—the Hawaiian Kahiki—were the Marquesas and Society Islands (Cordy 2000; Emory in Tatar 1982:16-18).

For generations following initial settlement, communities were clustered along the watered, windward (*ko‘olau*) shores of the Hawaiian Islands. Along the *ko‘olau* shores, streams flowed and rainfall was abundant, and agricultural production became established. The *ko‘olau* region also offered sheltered bays from which deepsea fisheries could be easily accessed, and near shore fisheries, enriched by nutrients carried in the fresh water, could be maintained in fishponds and coastal waters. It was around these bays that residential sites were established (McEldowney 1979:15), with the inhabitants primarily engaged in subsistence level agriculture and fishing (Handy et al. 1972:287).

Over a period of several centuries, areas with the richest natural resources likely began to feel the pressures of overpopulation, and by about A.D. 900 to 1100, the population began expanding to the *kona* (leeward side) and more remote regions of the island (Cordy 2000:130). In Kona, communities were initially established along sheltered bays with access to fresh water and rich marine resources. The primary “chiefly” centers were located in the Kailua (Kaiakeakua) vicinity, Kahalu‘u-Keauhou, Ka‘awaloa-Kealakekua, and Hōnaunau. The communities shared extended familial relations, and there was a subsistence focus on the collection of marine resources. By the fourteenth century, inland elevations to around the 3,000-foot level were being turned into a complex and rich system of dryland agricultural fields (today referred to as the Kona Field System). By the fifteenth century, residency in the uplands was becoming permanent, and there was an increasing separation of the chiefly class from the common people. In the sixteenth century the population stabilized and the *ahupua‘a* land management system was established as a socioeconomic unit (see Ellis 1963; Handy et al. 1972; Kamakau 1961; Kelly 1983; and Tomonari-Tuggle 1985).

By the time ‘Umi-a-Līloa rose to rule the island of Hawai‘i in ca. 1525, the island (*moku-puni*) was divided into six districts or *moku-o-loko* (cf. Fornander 1973–Vol. II:100-102). On Hawai‘i, the district of Kona is one of six major *moku-o-loko*. The district of Kona itself, extends from the shore across the entire volcanic mountain of Hualālai, and continues to the summit of Mauna Loa.

Kona, like other large districts on Hawai‘i, was further divided into *‘okana* or *kalana* (regions of land smaller than the *moku-o-loko*, yet comprising a number of smaller units of land). In the region now known as Kona *‘ākau* (North Kona), there are several ancient regions (*kalana*) as well. The southern portion of North Kona was known as “Kona *kai ‘ōpua*” (interpretively translated as: Kona of the distant horizon clouds above the ocean), and included the area extending from Lanihau (the present-day vicinity of Kailua Town) to Pu‘uohau (now known as Red Hill). The northern-most portion of North Kona was called “Kekaha” (descriptive of an arid coastal place). Native residents of the region affectionately referred to their home as *Kekaha-wai-‘ole o nā Kona* (Waterless Kekaha of the Kona District), or simply as the *‘āina kaha*. Pu‘u Wa‘awa‘a Ahupua‘a is located within a smaller district of Kekaha known as Nāpu‘u, literally translated as “the hills” (Pukui et al. 1974).

The *ahupua‘a* were also divided into smaller individual parcels of land (such as the *‘ili*, *kō‘ele*, *māla*, and *kīhāpai*, etc.), generally oriented in a *mauka-makai* direction, and often marked by stone alignments (*kuaiwi*). In these smaller land parcels the native tenants created fields and cultivated crops necessary to sustain their families, and the chiefly communities with which they were associated. As long as sufficient tribute was offered and *kapu* (restrictions) were observed, the common people, who lived in a given *ahupua‘a* had access to most of the resources from mountain slopes to the ocean. These access rights were almost uniformly tied to residency on a particular land, and earned as a result of taking responsibility for stewardship of the natural environment, and supplying the needs of the *ali‘i* (see Kamakau 1961; Malo 1951).

Entire *ahupua‘a*, or portions of the land were generally under the jurisdiction of appointed *konohiki* or lesser chief-landlords, who answered to *ali‘i-‘ai-ahupua‘a* (chiefs who controlled the *ahupua‘a* resources). The *ali‘i-‘ai-ahupua‘a* in turn answered to *ali‘i ‘ai moku* (chiefs who claimed the abundance of the entire district).

Thus, *ahupua‘a* resources supported not only the *maka‘āinana* and *‘ohana* who lived on the land, but also contributed to the support of the royal community of regional and/or island kingdoms. This form of district subdividing was integral to Hawaiian life and was the product of strictly adhered to resource management planning. In this system, the land provided fruits and vegetables and some meat in the diet, and the ocean provided a wealth of protein resources. Also, in communities with long-term royal residents there were strictly adhered to divisions of labor, with specialists in various occupations on land and in procurement of marine resources.

The *ahupua‘a* of Pu‘u Wa‘awa‘a is one of some twenty ancient *ahupua‘a* within the *‘okana* of Kekaha-wai-‘ole. The place name Pu‘u Wa‘awa‘a can be literally translated as “furrowed hill” (Pukui et al 1974). Pu‘u Wa‘awa‘a is located in the region that was commonly known as Nāpu‘u; and it wasn’t until the priestess/chiefess Anahulu, her husband Wa‘awa‘a, and their family moved to the area from Pū‘āla‘a, a hill near the Ka‘ū and Puna border, that Pu‘u Wa‘awa‘a was so named (Kihe in Maly and Maly 2006).

Pu‘u Wa‘awa‘a crosses several environmental zones that are generally called *wao* in the Hawaiian language. These environmental zones include the near-shore fisheries and shoreline strand (*kahakai*) and the *kula kai/kula uka* (shoreward/inland plains). These regional zones were greatly desired as places of residence by the natives of the land.

While the *kula* region of Pu‘u Wa‘awa‘a and the greater Kekaha region is now likened to a volcanic desert, native and historic accounts describe or reference groves of native hardwood shrubs and trees such as *‘ūlei* (*Osteomeles anthyllidifolia*), *ēlama* (*Diospyros ferrea*), *uhiuhi* (*Caesalpina kavaiensis*), and *ohe* (*Reynoldsia sandwicensis*) extending across the land and growing some distance shoreward. The few rare and endangered plants found in the region, along with small remnant communities of native dryland forest (Char 1991) give an indication that there was a significant diversity of plants growing upon the *kula* lands prior to the introduction of ungulates.

The lower *kula* lands receive 15 to 20 inches of rainfall annually, and it is because of this dryness that the larger region of which Pu‘u Wa‘awa‘a is a part, is known as “Kekaha.” While on the surface, there appears to be little or no potable water to be found, the lava flows which cover the land contain many underground streams that are channeled through subterranean lava tubes which feed the springs, fishponds and anchialine ponds on the *kula kai* (coastal flats). Also in this region, on the flat lands, about a half-mile from the shore, is the *Alanui Aupuni* (Government Trail), built in 1847, at the order of Kamehameha III. This trail or government roadway, was built to meet the needs of changing transportation in the Hawaiian Kingdom, and in many places it overlays the older near shore *ala loa* (ancient foot trail).

Continuing into the *kula uka* (inland slopes), the environment changes as elevation increases. The zones called the *wao kanaka* (region of man) and *wao nahele* (forest region) in Pu‘u Wa‘awa‘a are generally situated between the 1,800 to 2,400 foot elevations, and are crossed by the present-day Māmalahoa Highway (which also generally follows portions of an ancient *ala loa*, or foot trail that was part of a regional trail system). The highway is situated not far below the ancient *ala loa*, or foot trail, also known as Ke-ala‘ehu, and was part of a regional trail system passing through Kona from Ka‘ū to Kohala. Within the forest region, rainfall increases to 30 or 40 inches annually, and taller forest growth occurred. This region provided native residents with shelter for residential and agricultural uses, and a wide range of natural resources that were of importance for religious, domestic, and economic purposes.

Hawaiians see all things within their environment as being interrelated. That which was in the uplands shared relationships with that which was in the lowlands, coastal region, and even in the sea, and the *ahupua‘a* as a land unit was the thread that bound all things together in Hawaiian life. In an early account written by Kihe (in *Ka Hōkū o Hawai‘i*, 1914-1917), with contributions by John Wise and Steven Desha Sr., the significance of the dry season in Kekaha and the custom of the people departing from the uplands for the coastal region is further described:

> *…‘Oia ka wā e ne‘e ana ka lā iā Kona, hele a malo‘o ka ‘āina i ka ‘ai kupakupa ‘ia e ka lā, a o nā kānaka, nā li‘i o Kona, pūhe‘e aku la a noho i kahakai kāhi o ka wai e ola ai nā kānaka* – It was during the season, when the sun moved over Kona, drying and devouring

> the land, that the chiefs and people fled from the uplands to dwell along the shore where water could be found to give life to the people. (*Ka Hōkū o Hawai‘i*, April 5, 1917)
>
> "*Ola aku la ka ‘āina kaha, ua pua ka lehua i ke kai* — The natives of the Kaha lands have life, the lehua blossoms are upon the sea!" (*Ka Hoku o Hawaii*, February 21, 1928)

The *lehua* blossoms are likened to canoes returning to the sea. The coastal area of Pu‘u Wa‘awa‘a contains the protected bay at Kīholo and was the location of a significant fishpond; as well as numerous springs and water caves. The land provided sheltered canoe landings, deepsea and near-shore fisheries, and important salt making resources. The inland agricultural field systems and diverse forest and mountain resources, also attracted native residents to the area. Through these diverse resources, the native families were sustained on the land.

Native Traditions and Historical Accounts of Pu‘u Wa‘awa‘a and the Nāpu‘u Region

This section of the study presents *mo‘olelo*—native traditions and historical accounts (some translated from the original Hawaiian by Kepā Maly)—of the Kekaha region that span several centuries. Pu‘u Wa‘awa‘a was a favorable place to live in North Kona because of the freshwater springs and brackish pools along the coast and the more favorable agricultural land in the uplands. There are numerous native and historical accounts that mention Pu‘u Wa‘awa‘a specifically and even more that encompass the greater Kehaha region.

Perhaps one of the earliest datable traditions that reference the Nāpu‘u-Kekaha region was collected by Abraham Fornander (1916-1917) titled "*The Legend of Kaulanapokii*". The legend speaks of traveling through the uplands, viewing Kīholo and Kapalaoa from Hu‘ehu‘e, and describes the practice of salt making at Puakō (a practice that was also very important in the coastal lands of Pu‘u Wa‘awa‘a). By association with Hīkapōloa, chief of Kohala at the time of the events described in this story, the *mo‘olelo* dates to around the thirteenth century.

Native historian, Samuel Kamakau (1961) recorded that during the reign of Lono-i-ka-makahiki, Kamalālāwalu (the king of Maui), made plans to invade the island of Hawai‘i. Kamalālāwalu (Kama) sent spies to determine how many people lived on the island. The spies "landed at Kawaihae," and one of them, Ka-uhi-o-ka-lani, traveled the trail between Kawaihae to Kanikū (Kamakau 1961:56). Returning to his companions, Ka-uhi-o-ka-lani reported "I went visiting from here to the lava bed and pond that lies along the length of the land." He was told, "Kaniku is the lava bed and Kiholo, the pond" (Kamakau 1961:56).

In another historical account, Kamakau describes eighteenth century events in the Kekaha region, with particular emphasis on the lands of Pu‘u Wa‘awa‘a and Ka‘ūpūlehu. When Alapa‘i-nui—ruler of Hawai‘i—died in 1754, and his son Keawe‘ōpala was chosen as his successor (Kamakau 1961:78). In the years preceding that time, the young chief Kalani‘ōpu‘u, had been challenging Alapa‘i's rule. The challenge continued after Alapa‘i's death, and following a short reign, Kalani‘ōpu‘u killed Keawe‘ōpala and secured his rule over Hawai‘i. Kamakau also reports that in ca. 1780, as a result of their valor and counsel Kalani‘ōpu‘u granted "estate lands" in Kekaha to the twin chiefs Kame‘eiamoku and Kamanawa (ibid. 310). Kamakau also records, that at the time of Kalani‘ōpu‘u's death, Kame‘eiamoku was living at Ka‘ūpūlehu, and his twin, Kamanawa was living at Kīholo, Pu‘u Wa‘awa‘a (ibid. 118). Kamakau also states, "the land of Kekaha was held by the *kahuna* [priestly] class of Ka-uahi and Nahulu" (ibid. 231); to which the twin chiefs are believed to have belonged.

Shortly after Kalani‘ōpu‘u's death, Kamehameha I came into power. During his conquest of Kauai Island, he commissioned the building of war canoes. Waipa, a lesser chief of Hawai‘i island, built Kamehameha I a ship that was described as:

> The ribs were *koa* and *hau* wood, the flooring *wiliwili* wood, the nails of *kauila* wood from Napu‘u [near Pu‘uwa‘awa‘a] (Kamakau 1961:187).

David Malo (born ca. 1793), a native historian and prolific writer of tradition Hawaiian customs and lore wrote that the wood of the *kauila* tree was prized because it "is a hard wood, excellent for spears, *tapa* beaters and a variety of other similar purposes" and was made into spears for the army of Kamehameha I (Malo

1951:21 and 25). Kamehameha I retained Puʻu Waʻawaʻa Ahupuaʻa, among other reasons because it was "a wise thing for the king to keep as his own the *ahupuaʻa* or districts in which the *kauila*, the *aala*, or the *auau* is plentiful…" (ibid.:194).

One of the most significant natural events on the island of Hawai'i, which occurred during the reign of Kamehameha I, was the eruption of Hualālai in 1800-1801. Kamakau (1961) provides a written description of the eruptions and their affect on the land and impact on the people of the region between Kīholo and Kalaoa:

> One of the amazing things that happened after the battle called Kaipalaoa, in the fourth year of Kamehameha's rule, was the lava flow which started at Huʻehuʻe in North Kona and flowed to Mahaiʻula, Kaʻupulehu, and Kiholo. The people believed that this earthconsuming flame came because of Pele's desire for *awa* fish from the fishponds of Kiholo and Kaʻupulehu and *aku* fish from Kaʻelehuluhulu; or because of her jealousy of Kamehameha's assuming wealth and honor for himself and giving her only those things which were worthless; or because of his refusing her the *tabu* breadfruit (*ʻulu*) of Kamehaʻikana which grew in the uplands of Huʻehuʻe where the flow started . . . The reasons given for the flow may be summed up as: first, Pele's wanting the *aku* of Haleʻohiʻu and the *awa* fish of Kiholo; second, her anger at being denied the *ʻulu* (breadfruit) of Kamehaʻikana in upper Huʻehuʻe; third, her wrath because Kamehameha was devoting himself to Ka-heihei-malie and neglecting Ka-ʻahu-manu. [Kamakau in *Kuokoa*, July 13-20, 1867 and 1961:184-186]

There is no information pertaining to the original date of the Kīholo fishpond construction, but Kamehameha I was responsible for having it rebuilt between the mid 1790s and 1810 (Kelly 1996).

John Papa Iʻi, a native historian and companion to the Kamehameha family, adds to the historical record of the fishpond Paʻaiea that extended from the Mahaiʻula vicinity to Kalaoa, and was destroyed by the 1801 lava flows. Iʻi reports that in the 1790s, as a result of his exceptional abilities at canoe racing, Kepaʻalani "became a favorite of the king, and it was thus that he received [stewardship of] the whole of Puuwaawaa and the fishponds Paaiea in Makaula and Kaulana in Kekaha" (Iʻi 1959:132). In 1853, Iʻi traveled to the Island of Hawaiʻi to escape the smallpox epidemic spreading on Oʻahu. During his sail around Hawaiʻi Island he stopped at Luahinewai (at the south end of Kīholo Bay in Puʻu Waʻawaʻa) to "bathe and visit that strange water in the lava" (1959:171).

Hawaiian traditions document land use practices and features of the cultural landscape. The narratives also convey values and expressions of the relationship between ancient Hawaiians and their environment. One of the most prolific native writers of the late nineteenth and early twentieth centuries lived on the island of Hawaiʻi at Puʻu Anahulu. His name was John Whalley Hermosa Isaac Kihe, who also wrote under the penname Kaʻohuhaʻaheoinākuahiwiʻekolu (The proud mist on the three mountains). Born in 1853, Kihe's parents came from Honokōhau and Kaloko. During his life, Kihe taught at various schools in the Kekaha region, served as legal counsel to native residents applying for homestead lands, and worked as a translator on the Hawaiian Antiquities collections of A. Fornander. In the later years of his life, Kihe lived at Puʻu Anahulu with his wife, Kaimu (Puʻu Anahulu Homestead Grant No. 7540), and served as the postman of Nāpuʻu. Kihe, who died in 1929, was also one of the primary informants to Eliza Maguire, who translated some of Kihe's writings, publishing them in abbreviated form in her book "*Kona Legends*" (Maguire 1926).

During his career, Kihe collaborated with several other noted Hawaiian authors, among them were John Kaʻelemakule of Mahaiʻula, John Wise (who also worked with Kihe on translations of the Fornander Collection), and Reverend Steven Desha, Sr., editor of the Hawaiian newspaper, *Ka Hoku o Hawaii*. Kihe was the preeminent historian of Nāpuʻu and Kekaha, and from his pen (with contributions from his peers), came a rich collection of native traditions. His narratives ranged from native traditions to historical commentary and include historical accounts that were place-based. Readers are directed to Maly and Maly (2006) for translations of some of Kihe's contributions to the history, traditions, beliefs, customs, and practices of Nāpuʻu and the Kekaha region.

In the series of articles entitled "*Na Hoonanea o ka Manawa, Kekahi mau Wahi Pana o Kekaha ma Kona*" (Pleasant Passing of Time [Stories] About Some of the Famous Places of Kekaha at Kona), Kihe presented

detailed narratives of native traditions of Nāpuʻu and Kekaha (*Ka Hoku o Hawaii*; Dec. 6th 1923 to Feb. 21st 1924). Kihe described some of the famous places (*wahi pana*), and how they came to be named. He also identified some of the early residents of the region, and practices associated with water catchment and agriculture. The account of the priest Moemoe, and the shark-man, ʻĪwahaʻouʻou from *Ka Hoku o Hawaii*; January 3, 1924 includes in it several important place names in the lowlands of Puʻu Waʻawaʻa. Significantly, there are named caves and sites, and descriptions of cultivating practices in the uplands of Nāpuʻu. The former residence of sharkman, ʻĪwahaʻouʻou, situated near the Puʻu Waʻawaʻa-Puʻu Anahulu boundary, overlooking the *kula* (plains) is still pointed out by elder *kamaʻāina* of the land. The locality bears the name, ʻĪwahaʻouʻou.

Later in 1924, Kihe, described the changes which had occurred in the Kekaha region since his youth. In the article titled *Na Hoʻomanao o ka Manawa* (in *Ka Hōkū o Hawaiʻi* June 5th & 12th 1924), Kihe wrote about the villages that were once inhabited throughout Kekaha, identifying families, practices, and schools of the Historic Period (ca. 1860-1924). In this two part series he also shared his personal feelings about the changes that had occurred, including the demise of the families and the abandonment of the coastal lands of Kekaha.

Kekaha and Nāpuʻu Described in the Missionary and Explorer Journals

The writings of early visitors (explorers, missionaries, and local travelers) to Hawaiʻi provide descriptions of the environment, villages, land use and cultural practices that occurred during the time of their visit. Narratives recorded by early visitors to the Kekaha-Nāpuʻu region with specific references to localities such as Kīholo and Lae Manō, which are situated in Puʻu Waʻawaʻa are provided below. The travelers who came from afar, the foreigners, looked at the land very differently than the natives who had developed spiritual and kinship attachments to it. The themes common to most of the narratives of the foreign visitors include descriptions of an arid and desolate land that was only sparsely inhabited by the time of recording the various accounts.

The Journal of William Ellis (1823)

Following the death of Kamehameha I in 1819, the Hawaiian religious and political systems began undergoing radical change. Just moments after Kamehameha's death, Kaʻahumanu proclaimed herself "*Kuhina nui*" (Prime Minister), and within six months the ancient *kapu* system was overthrown. Less than a year after Kamehameha's death, Protestant missionaries arrived from America (cf. Iʻi 1959, Kamakau 1961, and Fornander 1973). In 1823, British missionary William Ellis and members of the American Board of Commissioners for Foreign Missions (ABCFM) toured the island of Hawaiʻi seeking out communities in which to establish church centers and schools for the Calvinist mission. Ellis' writings (1963) offer important glimpses into the nature of native communities and history as spoken at the time. Following his last visit to Kawaihae, Ellis visited several of the coastal villages along the way. In Nāpuʻu, Ellis stopped at Kapalaoa, Wainānāliʻi, and Kīholo.

> About four in the afternoon I landed at Kihoro, a straggling village, inhabited principally by fishermen. A number of people collected, to who I addressed a short discourse… …This village exhibits another monument of the genius of Tamehameha. A small bay, perhaps half a mile across, runs inland a considerable distance. From one side of this bay, Tamehameha built a strong stone wall, six feet high in some places, and twenty feet wide, by which he had an excellent fish-pond, not less than two miles in circumference. There were several arches in the wall, which were guarded by strong stakes driven into the ground so far apart as to admit the water of the sea; yet sufficiently close to prevent the fish from escaping. It was well stocked with fish, and water-fowl were seen swimming on its surface. (Ellis 1963:294-5)

The Journals of Lorenzo Lyons and Cochran Forbes (ca. 1835-1859)

On July 16 1832, Lorenzo Lyons (*Makua Laiana*), replaced Reverend Dwight Baldwin as minister at Waimea, Hawaiʻi. Lyons' "Church Field" was centered in Waimea, at what is now the historic church ʻImiola and included both Kohala and Hāmākua (Doyle 1953:40 & 57).

Lyons described his walk on the *ala loa* (main trail) along the coast from Kohala through Puʻu Waʻawaʻa, and described Kīholo Fishpond, while on his way to Kailua:

> Aug. 8, 1843. Took the road from Kapalaoa to Kailua on foot. Passed the great fish pond at Kiholo, one of the artificial wonders of Hawaii; an immense work! A prodigious wall runs through a portion of the ocean, a channel for the water, etc. Half of Hawaii worked on it in the days of Kamehameha… [Doyle 1953:137]

During the time that Lyons was tending to his mission in South Kohala, Cochran Forbes (his South Kona counterpart), visited him and reports having walked to Kīholo from Kailua where he stayed a short while prior to continuing on to Wainānāliʻi and Kohala. Forbes (1984) described the 1841 journey with the following narratives:

> Jany. 1. On the 29th left home for Kohala… [On Dec. 31] …had a long & tedious journey by land to Kiholo. Arrived there at dark. Our canoe with baggage had not got along in the bad sea & head wind, *mumuku* & *hoolua* blowing. Spent the night at Kiholo & preached. Next morning our canoe got along as far as Wainanalii where we took breakfast and leaving the canoe, a strong *mumuku* blowing, we came by land over the lava to Puako, arrived there about 3 oclock and encamped with Daniela (Loli) one of Bro Lyons' deacons. Here we spent the night and early this morng. The men returned for the baggage & brought it by land as the sea is rough & strong winds blowing… [Forbes 1984:91]

The Wilkes Expedition (1840-41)

In 1840-41, Charles Wilkes of the United States Exploring Expedition traveled through the Kekaha region. Wilkes' narratives offer readers a brief description of agricultural activities in coastal communities and also document the continued importance of fishing and salt making to the people who dwelt in Kekaha:

> ...A considerable trade is kept up between the south and north end of the district. The inhabitants of the barren portion of the latter [i.e., Kekaha] are principally occupied in fishing and the manufacture of salt, which articles are bartered with those who live in the more fertile regions of the south [i.e. Kailua-Keauhou], for food and clothing... (Wilkes 1845, 4:95-97)

The practice of inter-regional trade of salt and other articles described by Wilkes above, was based on traditional customs (cf. Malo 1951 & Kamakau 1961), and remained important to the livelihood of residents in the Nāpuʻu-Kekaha region through the ca. 1930s (see oral history interviews in Maly and Maly (2006)).

Land Tenure in Puʻu Waʻawaʻa Ahupuaʻa and Vicinity

Through the traditions and early historical accounts cited above, we see that there are descriptions of early residences and practices of the native families on the lands of Puʻu Waʻawaʻa and within greater Kekaha. Kalaniʻōpuʻu gave Kameʻeiamoku and Kamanawa various lands of the Kekaha region, as their personal properties (Kamakau 1961). Kamehameha I rose to power with the help of Kameʻeiamoku and Kamanawa, and their rights to the lands were retained, and handed down to their descendants (ibid. 1961). Among the best government records documenting residency in Puʻu Waʻawaʻa are those of the *Māhele ʻĀina*, the Boundary Commission, the Government Survey Division, and the Government lease and homesteading programs.

The Māhele ʻĀina

By the middle of the nineteenth century the ever-growing population of Westerners forced socioeconomic and demographic changes that promoted the establishment of a Euro-American style of land ownership in Hawaiʻi, and the *Māhele* became the vehicle for determining ownership of native lands. During the *Māhele*, land interests of the King (Kamehameha III), the high-ranking chiefs, and the low-ranking chiefs, the *konohiki*, were defined. The chiefs and *konohiki* were required to present their claims to the Land Commission to receive awards for lands provided to them by Kamehameha III. They were also required to provide commutations to the government in order to receive royal patents on their awards. The lands were identified by name only, with the understanding that the ancient boundaries would prevail until the land could be surveyed. This process expedited the work of the Land Commission (Chinen 1961).

During the *Māhele* all lands were placed in one of three categories: Crown Lands (for the occupant of the throne), Government Lands, and *Konohiki* Lands. All three types of land were subject to the rights of the native tenants therein. In 1862, the Commission of Boundaries (Boundary Commission) was established to legally set

the boundaries of all the *ahupua‘a* that had been awarded as a part of the *Māhele*. Subsequently, in 1874, the Commissioners of Boundaries were authorized to certify the boundaries for lands brought before them. The primary informants for the boundary descriptions were old native residents of the lands, many of which had also been claimants for *kuleana* during the *Māhele*. This information was collected primarily between A.D. 1873 and 1885 and was usually given in Hawaiian and transcribed in English as they occurred. Boundary descriptions were not collected for all *ahupua‘a*.

Mikahela Kekauonohi (a granddaughter of Kamehameha I) claimed Pu‘u Wa‘awa‘a Ahupua‘a during the *Māhele*; however, the *ahupua‘a* was relinquished to the government perhaps in lieu of commutations for other lands awarded. Five *kuleana* claims, all in the coastal portion of the *ahupua‘a* near Kiholo Bay, were made, but none were granted (Maly and Maly 2006).

Boundary Comission Proceedings

As Pu‘u Wa‘awa‘a was retained as crown land during the *Māhele*, it was not until 1873 that its boundaries were surveyed. The boundary testimonies and survey records provide a good summary of traditional knowledge of places, and identify localities ranging from the shore to the upper most boundaries of the *ahupua‘a*.

The narratives describe: trails and forest resources of Pu‘u Wa‘awa‘a; the occurrence of historical features, including residences and agricultural fields; the practice of salt making; and name many localities on the land:

Volume B
Puawaa [Pu‘u Wa‘awa‘a]
August 13, 1873
Aoa K. Sworn:

> I was born at Puawaa North Kona Hawaii at the time of Keoua 1st [ca. 1791] lived there till a few months ago when I moved to the adjoining land of Puanahulu [Puuanahulu]. I am kamaaina and know the boundaries. Lono an older cousin of mine, now dead, pointed out the boundaries to me; as the different lands had different Konohiki and different Koele [agricultural fields] &c. The land of Puawaa is bounded on the south side by Kaupulehu and mauka by the same. On the North by the land of Puanahulu, and makai by the sea. The ancient fishing rights of the land extend out to sea.
>
> The boundary at sea shore between this land and Kaupulehu, is at Pohakuokahai, a rocky point in the aa on the lava flow of 1801; the flow from Hualalai to sea. I think it is the third point from Kiholo, in the flow as you go toward Kona. Thence the boundary between these lands runs mauka on aa to Keahupuaa, a pile of stones, a short distance makai of the Government road, on a spot of old lava in the new flow. Thence mauka to Oweowe, a hill covered with trees said hill being surrounded by the flow, the kipuka pili [an area of pili grass growth] to the south is on Kaupulehu. Thence mauka to mawae [fissure] on a narrow strip of aa in the middle of the flow with smaller branches of the flow on each side of this strip, thence [page 253] mauka to where the aa turns toward Kona, as you go up Hualalai; thence the boundary follows up the East side of the flow to Puuako [Puuakowai], a water hole in the Pukiiawe trees on the old trail from Kainaliu to Puanahulu above the woods.
>
> There the boundary of these lands turns toward Kohala, along the old trail to Waikulukulu, a cave with water dripping from the sides, a little above the woods. Thence along the trail to Punahaha, a hill with cracks running along the top; this is above the large hill at the base of Hualalai; mauka of here, it can be seen from here when the mountain is clear. This hill is the corner of Puawaa where Kaupulehu and Puanahulu unite and cut it off. From this boundary point the boundary between Puawaa and Puanahulu runs makai to Iana o Maui [Ana-o-Maui], a large cave in the Pahoehoe, thence makai along the edge of the aa (the pahoehoe being on Puanahulu, to Kapohakahiuli a large cave with water in it). Thence makai and running along edge of aa, on south side of Haahaa, a place with old cultivating ground at the foot, thence to Kaluakauwila, a pali running towards the sea and along the Northern edge of the aa near the foot of the pali. Thence the boundary runs to Kukuihakau, a place where people used to live, along the edge of aa. Thence to Kalanikamoa and along an old iwi aina [boundary or planting field wall] through this place. Thence the boundary runs to Ahuakamalii; a pile of stones, built

in olden times on soil. Thence along old trail to Ahinahina running through the middle of the old cultivating ground; thence makai along the road to Uliulihiaka, a Kahawai [stream channel] now covered by lava flow of 1859; thence makai on the flow of 1859 to Kuanahu, an ahua in lava; thence makai to Mimiokauahi, an *ahua* covered by flow of 1859. Thence *makai* between Puuoa Lonoakai on Puawaa, and Puuoa Kaualii on Puanahulu, now covered with lava, except small portions of the one on this land. Thence to Kalaiokekai a point on old lava, on the edge of the flow of 1859 near Keawaiki. *I used to go on the mountain after sandal wood, and know these boundaries*. C.X.d. A hill called Mailihahei is the corner of Keauhou and Kaupulehu. I do not know the boundaries of Keauhou beyond this point. Keauhou does not reach Puawaa. [page 254]

Nahinalii K. Sworn:

I was born here [Puʻu Waʻawaʻa] at the time of the building of Kiholo [ca. 1810], and lived here till 1865 when I moved to Kawaihae. Keopu an old Kamaaina, now dead, told me some of the boundaries, and afterwards I went and saw them. Pohakuokahai is the boundary on the shore, between this land and Kaupulehu. From this point the boundaries between these two lands, runs mauka to Keahukaupuaa. Paniau is the name of the place where the ahu stands, thence mauka to Oweowe; which is as far as I know the boundaries on that side.

The kamaaina of this land told me that the boundary at shore between Puawaa and Puanahulu, is between Lonokai on Puawaa and Puuokaualii on Puanahulu, they are very close to the shore.

The kamaaina of Puanahulu, told me that the boundary is at Laeokaaukai, on the Kona side of the house at Kaawaiki.

I do not know the boundaries mauka of this point, until you come to Ahuaokamalii, an ahua on the Kona side of the pali some distance from the base; from thence the boundary runs mauka to Puuloa, a pali in the woods which runs mauka toward Hualalai. Thence the boundary runs mauka to Kaluakauila, a long iwi aina [usually a boundary- or planting field-wall] through a cultivating ground

This is as far as I know the boundaries and have not heard what the other boundaries are. Have heard that Kaupulehu cuts Puawaa off, above the woods and joins Puanahulu C.X.d. [page 255]

Volume B:428
Puawaa, No. Kona, Hawaii. June 14, 1876
D.H. Hitchcock filed a map & notes of survey.
D.H. Hitchcock K. Sworn:

> I surveyed Puawaa taking Aoa for my Kamaaina. I found no dispute as to boundary between Puawaa and Puanahulu. On the boundary between Kaupulehu and Puawaa there is a dispute. The witness Kahueai of Kaupulehu, I found was dead. Commencing on the beach at place called Laemano, old salt works, I took it at an old wall with sand at each side, and old salt works on the south side, and salt works some distance off on the north side. Thence, we surveyed to Ahu at Mawae a short distance below road, as Aoa pointed out to me. The other kamaaina pointed out towards Kona, taking old cultivating ground Oweowe, that Aoa said always belonged to Kaupulehu. The Ahu Aoa pointed out is near a cave. Thence I ran mauka to a point of aa running down into a kipuka, thence I ran a straight line to Puuakowai. I found the witness of Puawaa & Kaupulehu all meet at Puuakowai, but Keliihanapule's evidence cropped the land of Puawaa to Puuiki and then back to Puuakowai.
>
> From Puuakowai I ran a straight line to Pohakunahaha. It is a prominent mark on the side of mountain, an old crater with three divisions in it, middle division belongs to this land. One of the other divisions belongs to Kaupulehu and another to Puuanahulu. Punihaole was with me when I surveyed Puawaa on the Puuanahulu side, and said he was satisfied with the survey. He is the lessee of Puawaa. C.X.d… [page 428]

Hawaiian Government Survey Records

Another significant collection of Historic government records, are the field notebooks of Kingdom Surveyor, Joseph S. Emerson. Born on Oʻahu, J.S. Emerson (like his brother, Nathaniel Emerson, a compiler of Hawaiian traditions) had the ability to converse in Hawaiian, and was greatly interested in Hawaiian beliefs, traditions, and customs. As a result of this interest, his survey notebooks record more than coordinates for developing maps. While in the field, Emerson sought out knowledgeable native residents of the lands he surveyed to use as guides. While he was in the field, he recorded their traditions of place names, residences, trails, and various features of the cultural and natural landscape (including the extent of the forest and areas impacted by grazing). Emerson worked extensively in the Nāpuʻu and the greater Kekaha regions of North Kona and South Kohala.

Another unique facet of the Emerson's field notebooks is that his assistant, J. Perryman, was a talented artist. While in the field, Perryman prepared detailed sketches that now help to bring the landscape of that period to life. In a letter to W.D. Alexander, Surveyor General, Emerson described his methods and wrote that he took readings off of:

> …every visible hill, cape, bay, or point of interest in the district, recording its local name, and the name of the Ahupuaa in which it is situated. Every item of local historical, mythological or geological interest has been carefully sought & noted. Perryman has embellished the pages of the field book with twenty four neatly executed views & sketches from the various trig stations we have occupied… [Emerson to Alexander, May 21, 1882; Hawaiʻi State Archives – DAGS 6, Box 1]

In his field communications (letter series to W.D. Alexander), Emerson comments on, and identifies some of his native informants and field guides. While describing the process of setting up triangulation stations from Puakō to Kaloko, Emerson reported that the "two native men are extra good. I could not have found two better men by searching the island a year." (State Archives, HGS DAGS 6, Box 1; February 15, 1882). We learn later, that the primary native guides were Iakopa and Kaʻilihiwa—*kūpuna* of the Keākealani family of Nāpuʻu (State Archives, HGS DAGS 6, Box 1; May 5, and August 30, 1882). Selected sketches, cited in the following section of the study, provide readers with a glimpse of the countryside of Puʻuwaʻawaʻa and vicinity, of more than 125 years ago.

J.S. Emerson Field Notebook Vol. 1 Reg. No. 251
West Hawaii Primary Triangulation, Kona District
Nohonaohae; March 23 & 29,1882 (Figure 4)

Site # and Comment (Map Section 2):
1 – Lae o Mano.
2 – Kiholo Bay.
3 – Lae Hou.
4 – Lae o Kaiwi.
5 – Keawaiki Bay.
6 – Lae o Leleiwi.
7 – Kapalaoa Sch. H.

Site # and Comment (Map Section 1):
1 – Lae o Kawaihae.
2 – Lae o Honokoa.
3 – Lae o Waiakailio.
4 – Lae o Puulaula.
5 – Lae o Waima. [Book 251:93]

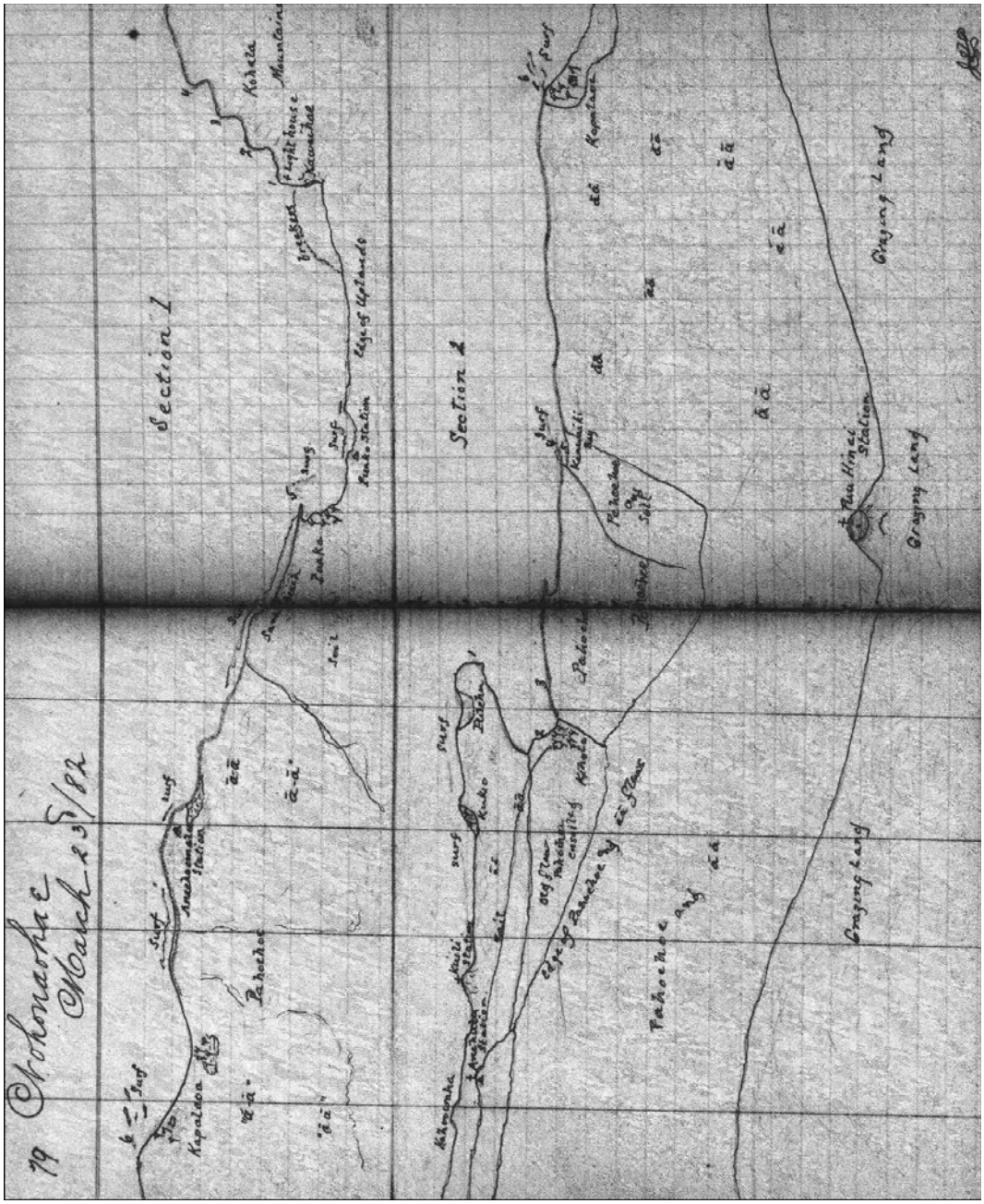

Figure 4. J.S. Emerson, Field Note Book Map – Book 251:79 (State Survey Division).

J.S. Emerson Field Notebook Vol. II Reg. No. 252
West Hawaii Primary Triangulation, Kona District
Puu Anahulu; April 29-30,1882 (Figure 5)

Site # and Comment:
1– Lae o Kawili. In Makalawena.
2 – Lae o Awakee. In Kukio.
3 – Bay this side of cape.
4 – Lae o Kukio iki.
5 – Large rock in sea.
6 – Kukio iki Bay.
7 – Lae o Kukio nui.
8 – End of reef
9 – Kukio nui Bay.
10 – Kaoahu's house in Kaupulehu Village.
11 – " " this side of house.
12 – Bay; tangent to head.
13 – Lae o Kolomuo (extremity in Kaupulehu).
14 – Nukumeomeo rock (opposite cape).
15 – Pohakuokahae. By authority of Kailihiwa – Boundary point between the ilis of Kaupulehu and Kiholo.
16 – small inlet.
17 – small cape.
18 – small bay.
19 – Lae o Nawaikulua.
20 – Small inlet.
21 – Keawawamano.
22 – Waiaelepi.
23 – *Lauhala* Grove.
24 – Keanini's Grass house.
25 – Kauai's Grass house.
26 – Kiholo meeting house. [church and school house]

Puu Waawaa.
27 – Lae o Keawaiki.
28 – Honuakaha.
29 – Lae Iliili.
30 – inside bay [Book 252:69-71]

While conducting the Puʻu Anahulu survey, Perryman prepared a sketch of the region depicting the area from Puʻu Anahulu upland to Puʻu Waʻawaʻa and the southeastern slope of Hualālai. Though Perryman's sketch is not keyed, it includes important visual references and is included here as Figure 6.

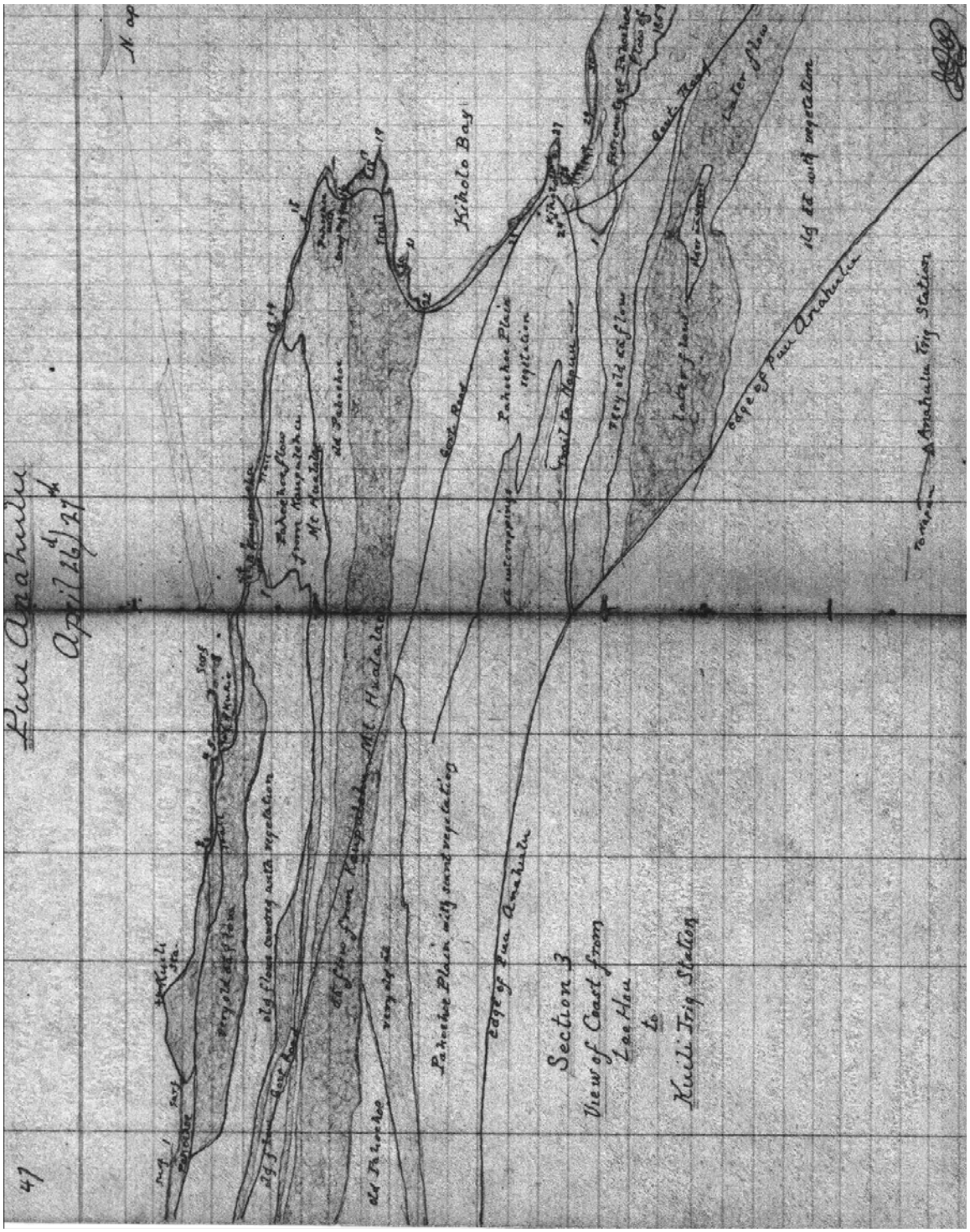

Figure 5. J.S. Emerson, Field Note Book Map – Book 252:47 (State Survey Division).

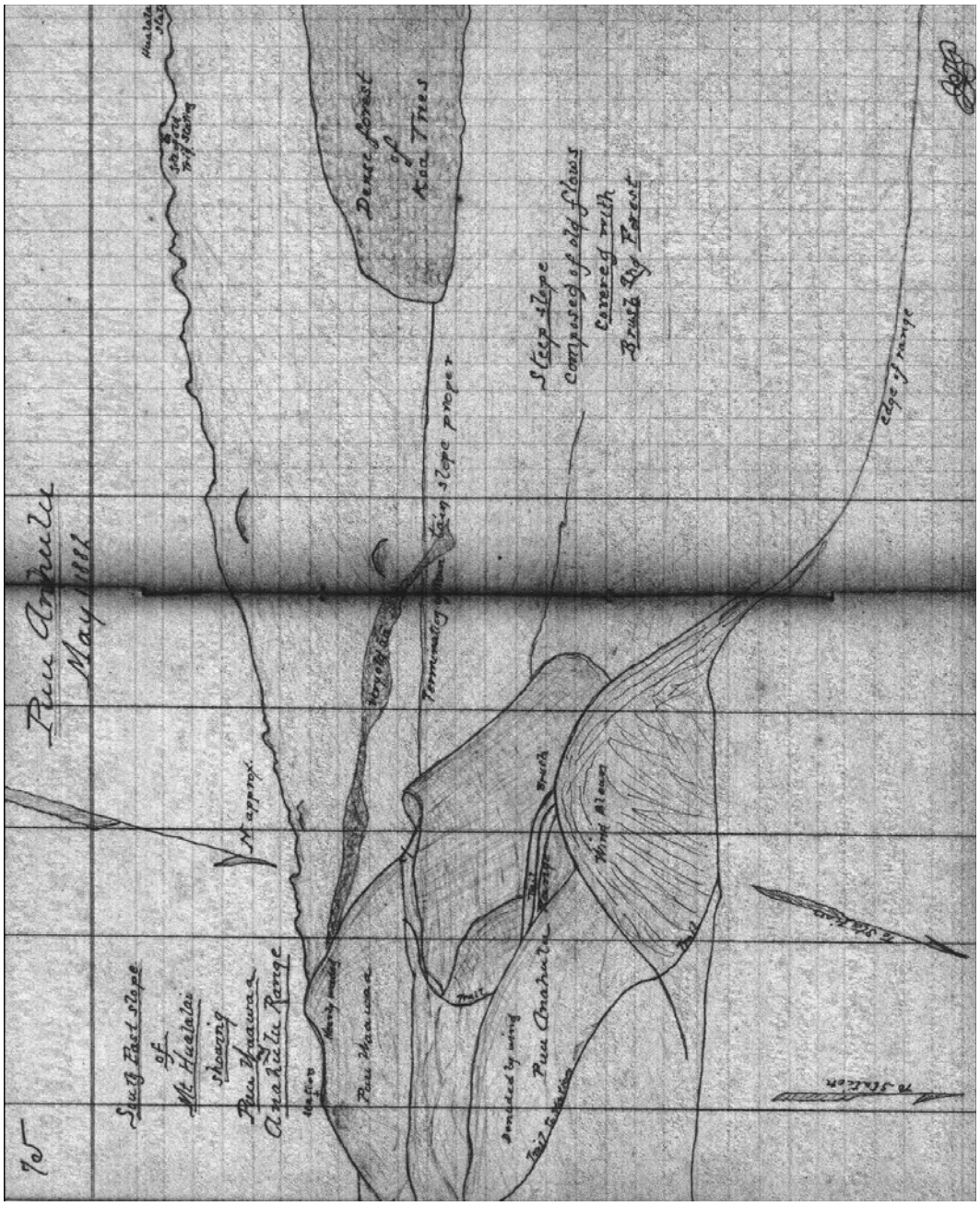

Figure 6. J.S. Emerson, Field Note Book Map – Book 252:75 (State Survey Division).

J.S. Emerson Field Notebook Vol. II Reg. No. 252
West Hawaii Primary Triangulation, Kona District
Puu Waawaa; May 16th, 1882 (Figure 7)

Site # and Comment:

Puu Waawaa.
1 – Aea's grass house. On Puu Huluhulu.
2 – School house, framed. On Kaipohaku.
3 – Jacob's [Iakopa's] house, grass. On Pawaa. Kapalaoa Sch. House.
4 – Puu Kuahiku. Anahulu range.

5 – Puu Pohakau.
6 – Puu o Lili.
7 – Kumua o iwi Kau.
8 – Mauiloa
9 – Puu Anahulu.
•Puu Iki. In Puu Anahulu – Boundary of P.A. and Waawaa Ahupuaa, half way between this station and Puu Iki according to the "boy."
Ana o Maui. In Anahulu covered with rock. [Book 252:116]

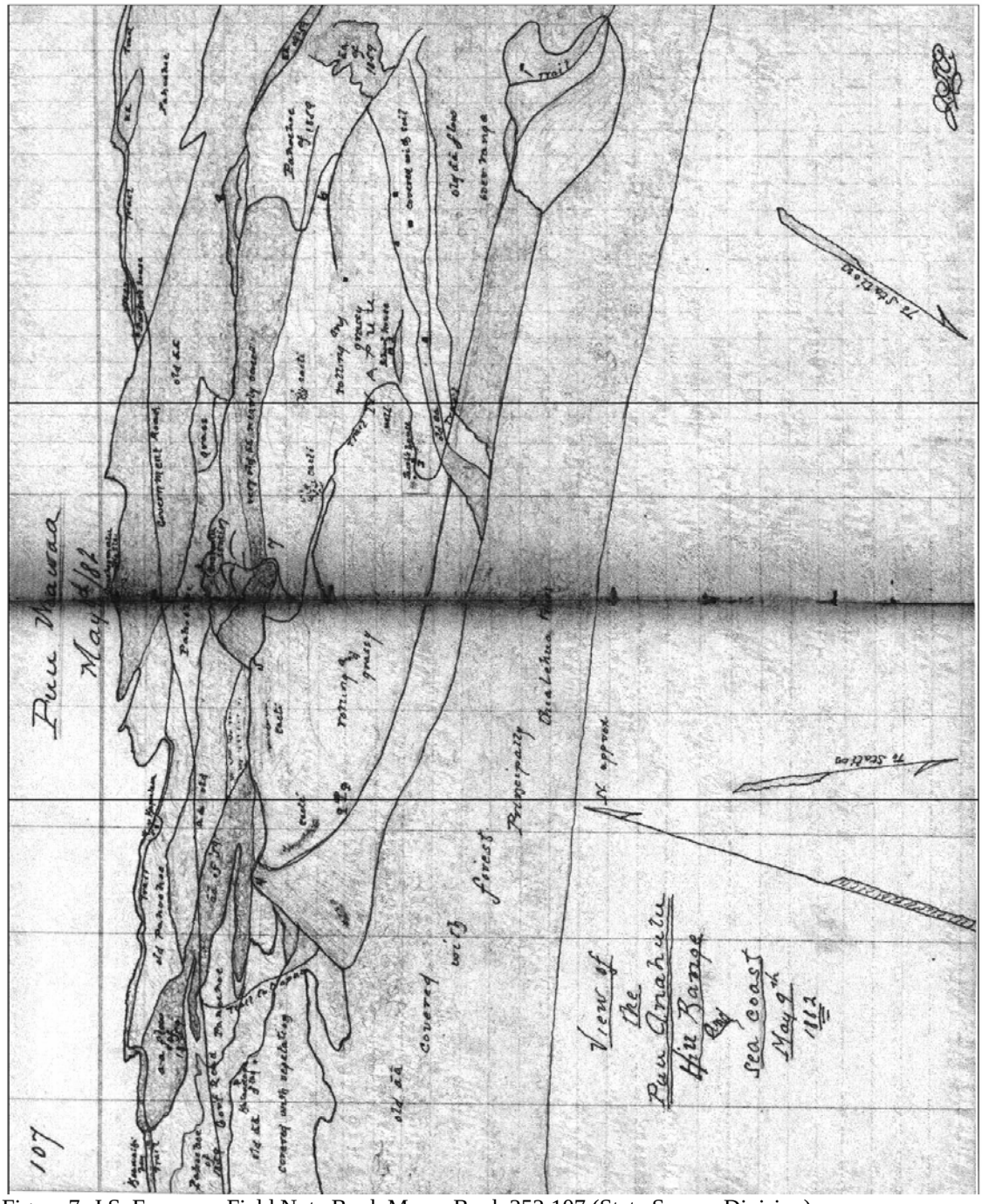

Figure 7. J.S. Emerson, Field Note Book Map – Book 252:107 (State Survey Division).

J.S. Emerson Field Notebook Vol. II Reg. No. 252
West Hawaii Primary Triangulation, Kona District
Kuili Station; May 19-20,1882 (Figure 8)

Site # and Comment:

34 – Keonenui Bay; long black sand beach.
35 – Lae o Nukumeomeo.
36 – Kiholo Bay; site on surf – indefinite.
37 – Lae Hou – extremity.
38 – Ohiki Bay.
39 – Lae o Kaiwi, needle shaped.
40 – Akina kahi Bay.
41 – Lae o Naubaka, Puu Anahulu.
42 – Kahamoi Bay. "Ha" = outlet to fishpond. "Moi" = a choice fish.
43 – Pohakuloa rock. On cape of same name, P. Anahulu.
44 – Lae o Pohakuloa.
45 – Akahukaumu. Indefinite, head of bay.
The lighting – "Akahu" of the oven "Kaumu."
[now written as Akahu Kaimu]
46 – Lae o Leleiwi, bone cape on a/c of sharpness.
47 – Kapalaoa bay.
Anaehoomalu Station
48 – Kuaiwa rock. Name from "Kuaiwa" chief of Anahulu Ahupuaa who in the time of Kaahumanu raised a revolt in favor of heathenism and being bound hand and foot, was thrown into the sea at Kailua.

Lae Makaha. Outlet of fishpond [Book 252:131-132]
Hale o Mihi rock. Mihi an ancient demigod or *Kupua*.
Koukealii Bay, sight on surf at head.
Lae o ka Auau. Anaehoomalu.
Waiulua inlet, abounding in "*ulua*" fish.
Waiulua Cape, nearly on level with sea.
Anaehoomalu Bay. Head of bay. [Book 252:131]

J.S. Emerson Field Notebook Vol. 111 Reg. No. 253
West Hawaii Primary Triangulation, Kona District
Akahipuu; May 29,1882 (Figure 9)

Site # and Comment:

1 – Kiholo meeting house. Puu Waawaa.
2 – Kauai's frame house. Puu Waawaa, Kiholo village.
3 – Keanini's frame house. Puu Waawaa, Kiholo village.
4 – Honuakaha Bay. Puu Waawaa.
5 – Keawaiki Cape. Puu Waawaa.
6 – Kiholo Bay. Puu Waawaa.
7 – Lae Iliili. Cape of lava stones.
8 – Inside bay.
9 – Lae Hou. [Book 253:39]

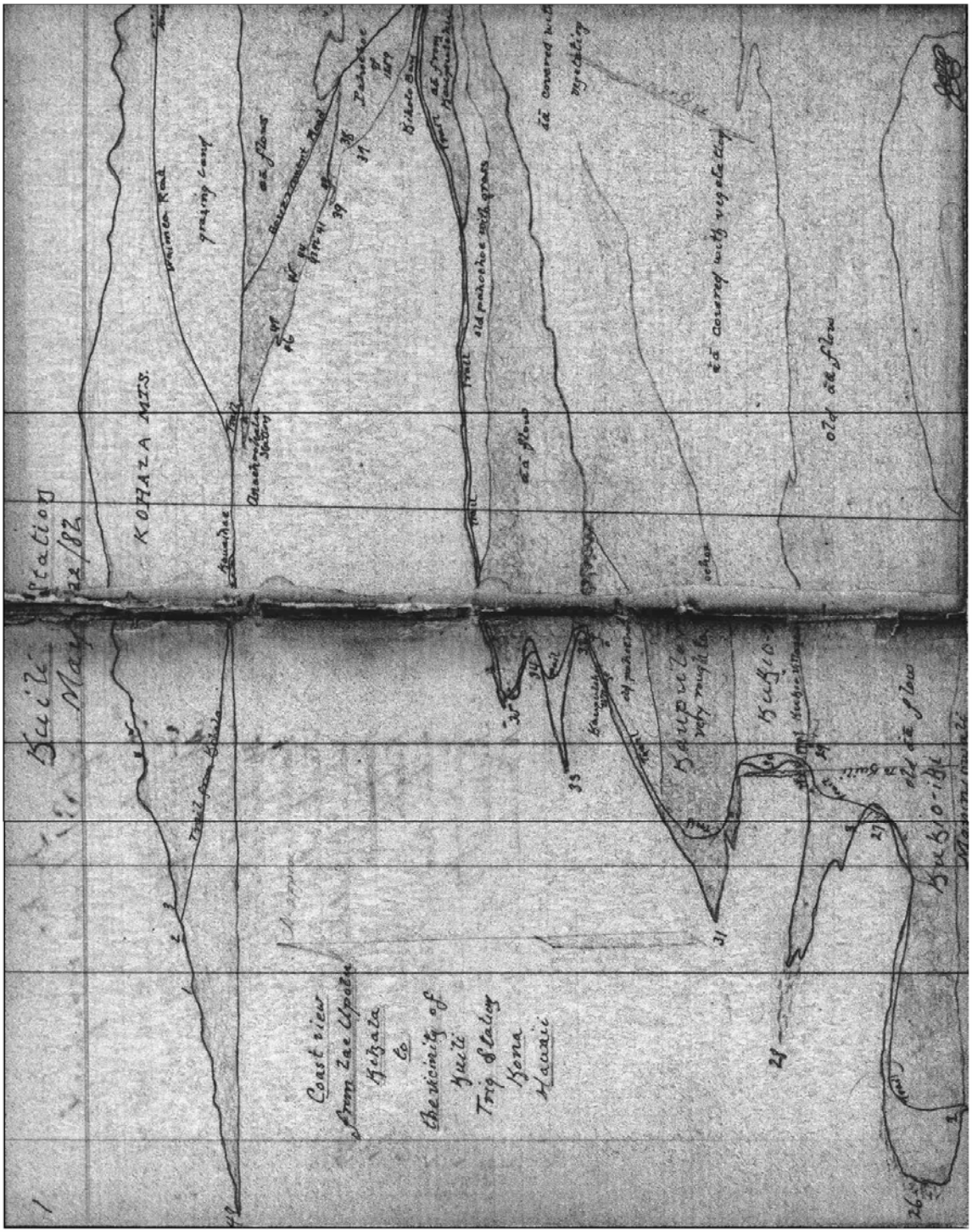

Figure 8. J.S. Emerson, Field Note Book Map – Book 253:1 (State Survey Division).

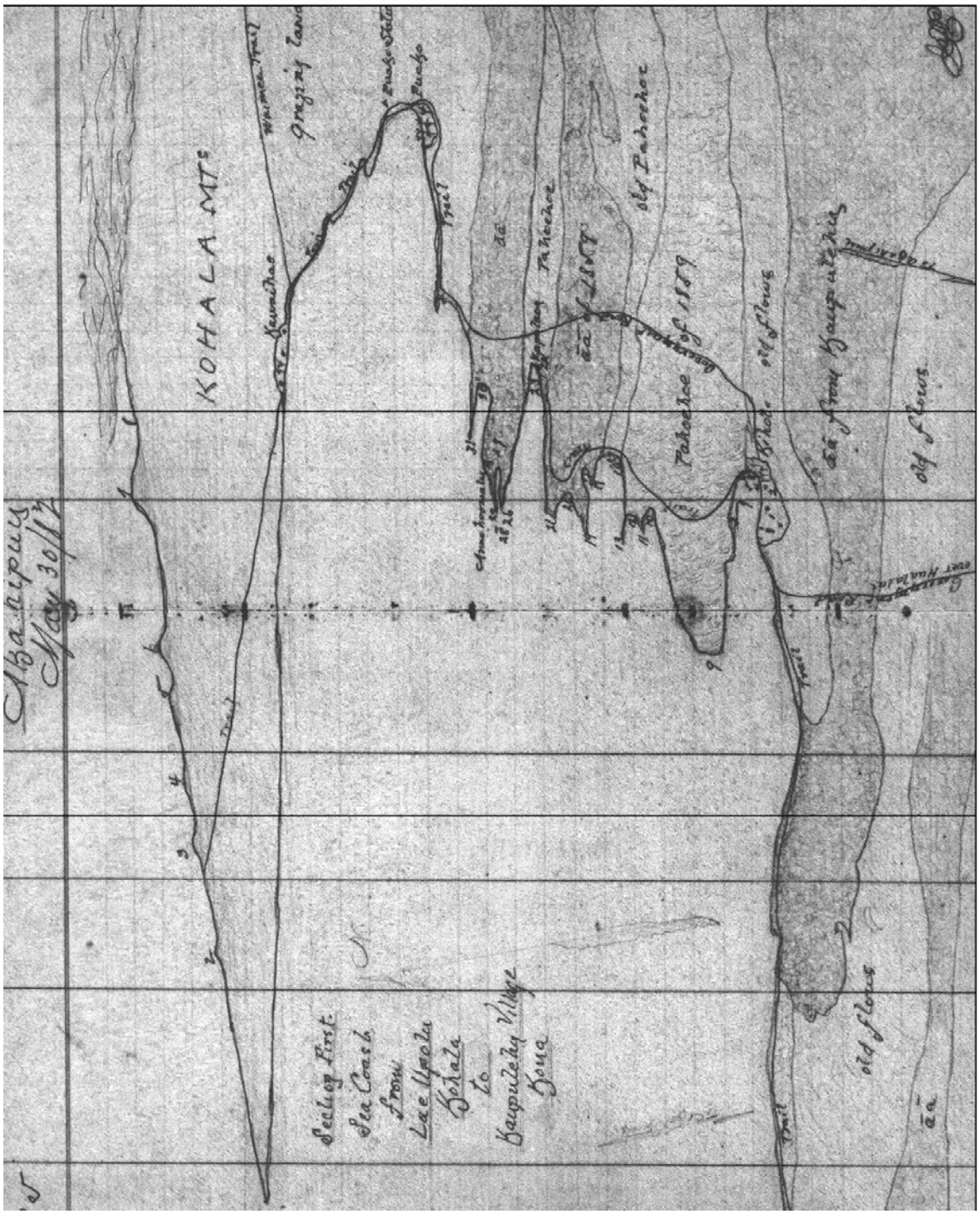

Figure 9. J.S. Emerson, Field Note Book Map – Book 253:25 (State Survey Division).

Akahipuu – May 31, 1882

10 – Ohiki Bay. In Puu Waawaa.
11 – Lae Ohiki. “
12 – Koholapilau bay. “
13 – Konalimu. “
14 – Keawakeekee bay. “

15 – Keawakeekee cape. “
16 – Keawaiki bay. “
17 – Lae Akinakahi. In Puu Waawaa.
18 – Akinakahi Bay. [Book 253:49]
19 – Lae o Naubaka. In Puu Anahulu.
20 – Kaluaouou Bay. “
21 – Lae o Namahana... “ [Book 253:51]

J.S. Emerson Field Notebook Vol. 4 Reg. No. 254
Primary Triangulation, West Hawaii, Kona District
Station Descriptions – August 1882

Puu Waawaa

Is too prominent not to be easily found without a description.

A copper triangle and marked stone show the position of the point under ground. The stones above ground are close to the signal. There is a quantity of the cans underground also.

The rocks for the marking purposes had to be brought from the plains below on jackasses as there were none to be found on the hill. *The soil is very soft and rich, and the summit is covered with a dense forest.* [Field Book 254:123]

Government Leases and the Homesteading Program

It appears that the first formal lease (issued in 1863) for lands in the Nāpuʻu region was for ranching operations. On March 20, 1863, the entire *ahupuaʻa* of Puʻu Anahulu (“*with the exception of the land rights of the native tenants upon the land*”) was leased to three Hawaiian lessees—G. Kaukuna, M. Maeha, and S. Kanakaole, listed as residents of Honolulu, Oʻahu (State Archives files – General Lease No. 106; DLNR2- Vol. 15). Two years after Kaukuna, Maeha and Kanakaʻole acquired the lease, they sold their interest to Francis Spencer for incorporation into the holdings of the Waimea Grazing and Agricultural Company. From the 1860s until the 1970s, ranching was the primary, large-scale land use operation in the region. Over time, the land area under lease, ranged from approximately 4,000 acres to more than 120,000 acres of Puʻu Waʻawaʻa and Puʻu Anahulu. A 1902 map of the Puʻu Waʻawaʻa-Puʻu Anahulu lease lands depicts the lands described in various lease documents (Figure 10).

In 1893, with the lease of Puʻu Anahulu (Government Land) and Puʻu Waʻawaʻa (Crown Land), held by Francis Spencer drawing to a close, new applications for the lands were tendered by native residents, Francis Spencer, and the party of Eben Low and Robert Hind. The Crown Land of Puʻu Waʻawaʻa, was brought before the Commissioners of Crown Lands, where discussion ensued. On June 27, 1893, it was noted that the native Hawaiian residents had applied for an interest in the land, but that the land agent had determined the land was inadequate for residency needs (though the families had resided there for generations). Governor Sanford Dole (also the father-in-law of Eben Low), observed that the forest on the land was an “important matter;” and also that a lease of the land should go to a “reliable tenant”. What follows are communications regarding the lease agreement of Puʻu Waʻawaʻa Ahupuaʻa.

> Executive Building
> Honolulu June 27, 1893
> Meeting of the Commissioners of Crown Lands:
>
> …The special matter for consideration was an application from Mr. Low for the lease of the Crown Land known as Puuwaawaa in Kona Hawaii.
>
> Mr. Dole in referring to the general land policy of the Government, stated that special care be taken, when leasing lands, to reserve all such as may be adapted for settlement and homestead purposes. When any land is available for lease, he would favor leasing the same to a good and reliable tenant who will make extensive improvements and could be relied upon to carry out certain requisite conditions more especially that in reference to the care of the forest, now a most important matter.

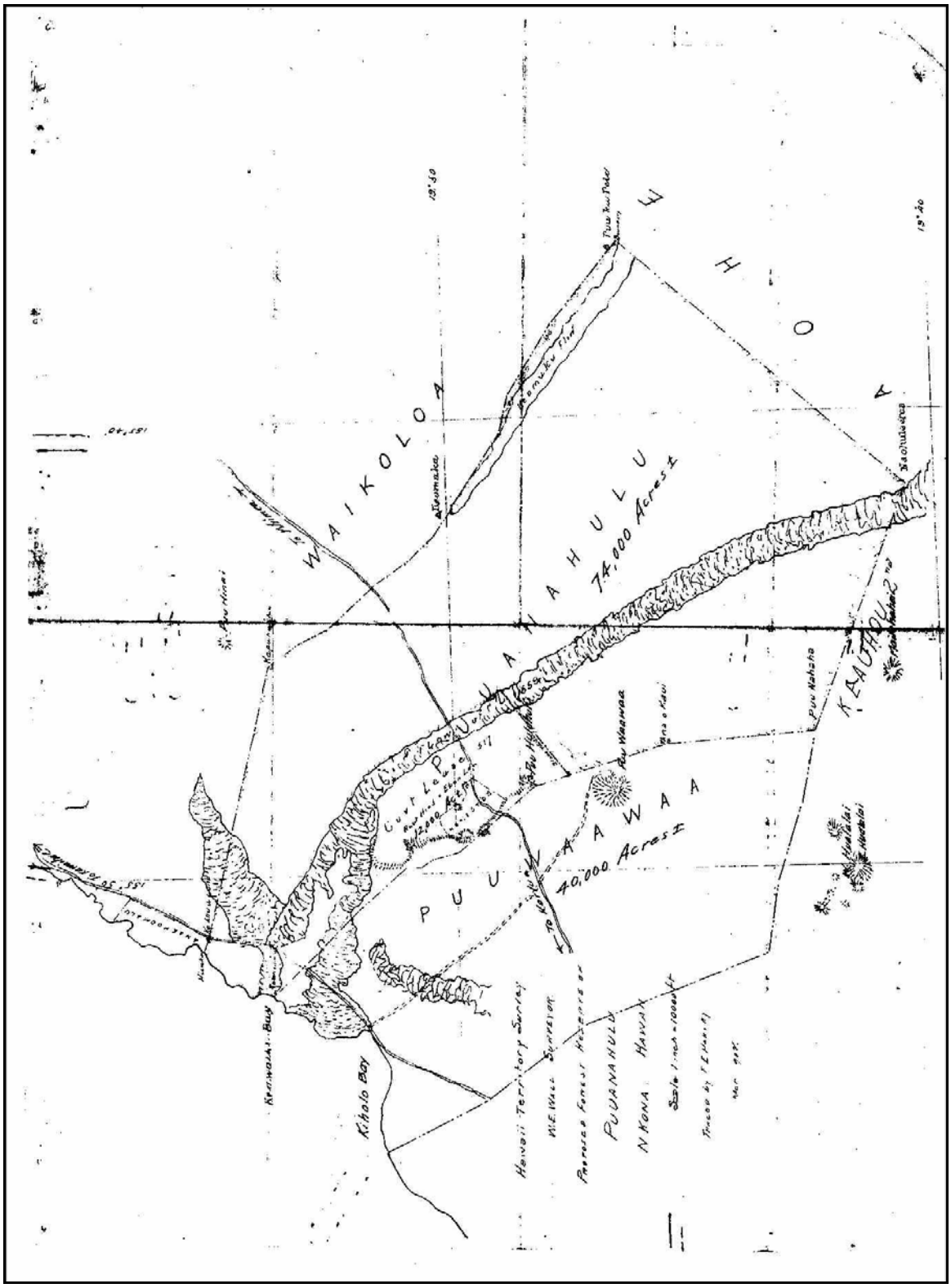

Figure 10. Pu‘u Anahulu and Pu‘u Wa‘awa‘a lease (Lease 971) lands (1902).

> The Agent states that the land of Puuwaawaa, though covering a very large area, between 30 and 40 thousand acres, is mostly comprised of *aa* and *pahoehoe*. At the request of certain native Hawaiians who claimed to be residents, he had visited Kiholo where they were living, and found that the land was not suitable for homesteading. In support of his observations, the Agent read the report of the Special Commission appointed at the Extra Session of the Legislature of 1887, which stated that this land offered no inducements to settlers.
>
> The application of Mr. Low was then read, making the following propositions, viz.
>
> In consideration of a lease of Puuwaawaa for the term of 30 years at an annual rental of $300. First 3 years to be free of rent, the lessee agrees to preserve the forest substantially in status quo, and prevent the Lantana from spreading further. Will within 3 years from commencement of lease, make permanent improvements in value not less than $2,500 and construct a good wagon road from Puuwaawaa Cone to Kiholo, distant about 6 miles.

An application from Paul Jarrett for the same land was also read, and also one from Mr. F. Spencer… (HSA – Series 367 Minutes of the Crown Lands Commission, pages 65-66)

> Honolulu July 17, 1893
>
> Meeting of the Commissioners of Crown Lands:
>
> In the matter of the Puuwaawaa Lease, His Excellency S.B. Dole gave instructions this day to advertise the lease for sale at public auction at some convenient date, under the following terms and conditions, viz.:
>
> - Term — 25 years
> - Rent — (upset / $350 per an. payable semi-annually in advance).
> - To keep up the forest to it present aggregate area.
> - To keep the Lantana from making any further headway.
> - To put upon the land within 3 years from commencement of lease substantial improvements of a permanent character to the value of $3000…
>
> The lease of the above land was duly sold by Mr. F. Morgan Auctioneer this 16th day of August at his sales room, and knocked down to R. Hind for $1200 per an. this being the highest amt. bid… (HSA – Series 367, Minutes of the Crown Lands Commission)

In an 1893 communication, C.P. Iaukea, on behalf of the Minister of the Interior, reported that he would be traveling to Puʻu Waʻawaʻa with R. Hind and E. Low to inspect development of their ranching lease and determine conditions of the forest. Iaukea's report and subsequent work in the region led to conservation conditions being incorporated into the leases issued.

> August 26, 1893
>
> C.P. Iaukea, Interior Department; to S.B. Dole:

…I have arranged to go to Puuwaawaa with Mr. Eben Low tomorrow, who is taking over his first lot of store cattle, 200 head. Mr. Hind I think, will accompany us so both the lessees will therefore be present when I am taking notes of the extent of the forest & c.

> March 1, 1894
>
> Indenture Between the Commissioners of Crown Lands; and Robert Hind, Jr., and Eben P. Low
>
> For lease of Puʻu Waʻawaʻa:
>
> …All that tract of land situate in the district of North Kona, Island of Hawaii, known as the *ahupuaa* of *Puuwaawaa*, by its ancient boundaries or as may be hereafter determined by legal authority, and containing 40,000 acres more or less… …except the timber trees, and all young trees fit and proper to be raised and preserved for timber trees, now growing or being, or which shall hereafter grow, or be in and upon the above demised premises, or any part

thereof; together with free liberty of ingress, egress and regress, to and for the said parties of the first part [i.e., the Commissioners of Crown Lands] and their successors in office… …For and during the term of Twenty five (25) YEARS, to commence from the fifteenth day of August A.D. 1893…paying…the yearly rent of Twelve Hundred & Ten Dollars…

[handwritten amendments]:
Provided that they may take such timber and other trees for their own use as fire wood or for mechanical, fencing or building purposes, to be used only on the demised premises… **And also** that they will and shall during the term of the present demised keep up and maintain the forest substantially according to the description hereinafter set forth; **And also** keep the Lantana from spreading or making any further headway on said demised premises; And further that they will within three years from commencement of the terms hereof, put and erect upon the premises hereby demised substantial improvements of a permanent character to the value of three thousand ($3000.) dollars, and the same to keep and maintain in good repair during the full term hereof…

Signed J.A. King
William O. Smith Interior Department
C.P. Iaukea
Robert Hind, Jr.
Eben P. Low Lessees

Kohala, July 20/94

Messrs. P.C. Jones, C.P. Iaukea,
Commissioners of Crown Lands:

Dear Sirs;
We respectfully beg to make application for a reduction of $710.00 on the rental of the land of Puuwaawaa, making the rental to $500.00 per annum. We find it strictly necessary to ask for the reduction so that we will be in a position to keep up the strict conditions that are stipulated in the lease.

The writer goes to Honolulu by the "*Kinau*" and will give every detail, in person, to you, and will also be happy to give any information that you may require.

We remain, Dear Sirs,
Your obedient servants,
Eben P. Low,
Robert Hind, Jr.
(Attachment)
Statement of a few facts in regards to Improvements, Situation, Roads etc. etc., on the Land of *Puuwaawaa*, North Kona, Island of Hawaii.

Improvements. There are on the Premises, improvements in the way of Buildings, fences to the extent of $3000--- viz. Watersheds, Dairy Building, Stables, Dwelling quarters Six—5000 Gal. Tanks, 1—1200 gal. tank and over 30,000 gal. Cistern not quite completed.

Roads and Trails. The land of Puuwaawaa has only 4 outlet or trails, one by way of the mountain, one by land of Puuanahulu, one by Kapalaoa and one by Kiholo, none of these are Government trails, it is impossible to go by any other way without inconvenience and trouble. The distance of road from Kohala via Waimea to Puuwaawaa is 47 miles. The distance via Kawaihae is 36 miles.

It takes an average going with cattle from P'waa [Puuwaawaa] to Waimea 12 hours, Waimea to Kohala 9 hours, Puuwaawaa to Kawaihae, distance of twenty-one miles 13 hours. No way of making a wagon road under a cost of $1,000.00 per mile.

Land. There are 40,000 Acres in this piece of property to be divided namely:
20,000 Acres Worthless
10,000 Acres Good for only 6 mos. in the year or when it rains.
1,000 Acres Very rich soil suitable for cultivation.
9,000 Acres Good for grazing only.

Rainfall. October to March plentiful.
March to May very slight, drizzily.
May to October hardly any, very dry.

No water holes or springs of any nature on the land.

Trees and Plants.
• Out of 1200 *kiawe* trees planted, about 209 growing.
• 50 Ironwood, none growing.
• 300 Eucalyptus, 2 growing.
• 100 Coffee Trees (for experiment), none growing.
• 150 Silk Oak, all growing.
• 50 Peach Trees, all growing.
• 50 Cheramois Trees, all growing.
• 12 Mangoes, Apricots, Lemons, all growing.

The great portion of the trees that died was from want of moisture, we could not save them, for no water could be spared.

We have rooted up every lantana visible, this will be our worst enemy on a count of the numerous quails that carry the berries from John Maguire's property [Kaupulehu], adjoining ours which is largely covered with this weed.

The cactus or the *Papipi* is also spreading fast, and so is the Scotch Thistle; We are trying to keep them from spreading any further.

Hawaiian trees and shrubs of numerous kinds abound luxuriantly on this land. Viz; the koa, pua, mamane, koko, naio, iliahi, opiko, kolea, kou, kukui, lama & etc. etc.

Stock. Cattle, Hind & Low, 1,000 head.
Horses 7, mules, Hind & Low 135 head.
Cattle & Horses, Spencer, 400 head.
Cattle & Horses, Natives, 150 head.

We have lost 3 mules and 2 horses from packing lumber from Kiholo, 70 head of cattle from want of water during summer of last year, and equivalent of 7% of our herd of 1,000.

Expenses. The expense of looking after this place is very large, our shoeing account alone is $37.50 per month, and that is done right on the ranch by our men.

It takes 5 men, and no less, to look after this property, 10 miles of fences, and also fighting against lantana, cactus, thistle and keeping sundry trails in order – $1500.00.

We pay freight per ton per S.S. to Kawaihae, $5.00. We pay freight per ton per sloop to Kiholo, $5.00. From Kiholo to P'waa Hill a distance of 9 miles by road, by pack mules and horses ½ cent per lb., on ordinary mds, as rice, flour & etc.-- $10.00. 1 ½ cents per foot on lumber, $15.00. My personal overseeing is not counted.

> We intend to put in a large area under coffee, but we cannot see our way to it on account of the heavy rent we are bound under, especially when you have to lay out money besides rent and then wait for 3 years to get any returns.

Honolulu, July 24, 1894.
Eben P. Low.

General Lease No. 1039
(Replacing previous Lease Agreements)
Commissioner of Public Lands to Robert Hind

Sept. 27, 1917

> Puuwaawaa – Lease of 40,000 acres for the period of 21 years, commencing August 15th, 1918. (Hawaii State Land Division Files)

April 5th and 8th, 1919
Governor McCarthy; to Commissioner Bailey:

> Communications noting the request of Mr. Muller for a lease of a portion of the Puuwaawaa Beach Lots from the lease of Robert Hind, to be used as a salt works. Commissioner urged Governor to have Muller develop lease arrangement personally with Hind23. (Hawaii State Archives – Ex. & C.P.L. Files)

In the 1880s, the Hawaiian Kingdom undertook a program to form Homestead lots on Government lands as a way to get more Hawaiian tenants in possession of fee-simple property (Homestead Act of 1884). On Hawai‘i, several lands in the Kekaha region of North Kona were selected, and a surveying program initiated to open up the lands. Because it was the intent of the Homestead Act to provide residents with land upon which they could cultivate crops or graze animals, most of the lots were situated near the *mauka* road that ran through North Kona. Native tenants of Nāpu’u requested Homestead lands as early as 1894, but the granting process was slow, and homesteaders competed for land that was also desirable for grazing use by Pu‘u Wa‘awa‘a Ranch. Indeed, the first applicants and recipients of fee simple title to land in Pu‘u Anahulu were James Hind (brother of the primary lessee), Eben Parker Low, Elizabeth Napoleon-Low (wife of Eben P. Low), and Sanford Dole (the adoptive father of Elizabeth Napoleon-Low). Subsequently, by 1914, only a short time after native families began receiving title to their homestead lots in Pu‘u Anahulu, Robert Hind began acquiring title to homestead lots from the native residents (Maly and Maly 2006). Generally speaking, the people who applied for homestead lots in a given land were long-time residents of the *ahupua‘a* or of neighboring lands. The documentation associated with the applications, also reveals that as a result of the conditions of the homesteading application process, the applicants had to live on the land requested, and had to prove that they had jobs and a secure income. Pu‘u Wa‘awa‘a Ranch offered the only available jobs in the remote Nāpu‘u Region. Because of this the native tenants had to maintain good relations with the ranch.

Robert Hind was clearly a significant individual with respect to the emerging sociopolitical economy of Hawai‘i and in 1916 became a significant political figure both regionally and nationally as he was appointed Hawai‘i Territorial Senator. A position he held for several years. It was during this tenure the Pu‘u Wa‘awa‘a Ranch, and the primary residence that was built there between 1905-1910 (named *Pihanakalani*), was visited by dignitaries from around the world. Pukui and Elbert (1986: 326) translate *Pihanakalani* as “gathering place [of] high supernatural beings.”

By the late 1920s, Hind began consolidating his interests in Pu‘u Wa‘awa‘a Ranch (including the lease lands of Pu‘u Anahulu and Pu‘u Wa‘awa‘a and the various homestead parcels he acquired) under the corporation name “Robert Hind, Limited.” The following transaction was recorded in the Bureau of Conveyances Liber No. 911:1-4—

> Mortgage – Robert Hind To Robert Hind, Limited, a Hawaiian Corporation Transferring General Leases of Puuanahulu and Puuwaawaa, and Grant No.’s — 4862 to Robert Hind, 25.38 acres; 5344 to Robert Hind, 4.16 acres; 6266 to Robert Hind, 3 acres; 6498 to Robert Hind, 3 acres; 6748 to Robert

Hind, 3 acres; 5038 to Nipoa Pahia, 18.8 acres; 4594 to Eben P. Lowe, 116.1 acres, except 8.16 acres sold by the grantor to Margaret Mitchell by deed dated May 10, 1927; 5914 to Kinihaa Amona, 13.5 acres; 6147 to Kalani Nakupuna, 23.74 acres; 6148 to Kailihiwa Kuehu, Jr., 13.67 acres; 6156 to Keakealani Kuehu, 31.93 acres; 6159 to J.P. Cundell, Administrator of the Estate of J.W. Kaumelelau, 15.16 acres; 6149 to Joe Keoho, 7.30 acres, except for 2.33 acres sold by the grantor to D.H. Kahuila by deed dated May 31, 1927; and all livestock, improvements and equipment thereon comprising the PUUWAAWAA RANCH. (October 20, 1927)

In 1929, L.A. Henke, published a "Survey of Livestock in Hawaii," University of Hawaii Research Publication No. 5. The publication included historical narratives of ranches throughout the Hawaiian Islands. Henke reported the following description of Pu'u Wa'awa'a Ranch, including land tenure, source of livestock, and feed sources:

> Puuwaawaa Ranch in North Kona, with the ranch headquarters beautifully located three miles above the government road, consists of a total of about 128,000 acres, but about 100,000 are waste lands covered with lava flows. Of the remaining 28,000 acres only 1,500 are really good grazing lands. About 100 acres are planted to cultivated crops. All but 300 acres held in fee simple are government leased lands. These lands run from sea level to an elevation of 6,000 feet. Some of the best grazing lands are found at 5,000 feet elevation.
>
> For many years there was practically no water on the ranch other than what the cattle could get from the dew and succulent vegetation. However, as the vegetation became scarcer water was required in all but a few paddocks well supplied with cactus where the cattle still grow to maturity without ever having access to free water. The limited water now available is secured from roofs, and a pipe line from Huehue Ranch.
>
> A total of about thirty miles of fences, half stone and half wire, are found on the ranch. At present, the ranch carries about 2,000 Herefords. All the bulls and thirty of the females are purebred. About 500 head, ranging between two and three years of age and dressing out at 500 pounds are marketed annually,—practically all are sent to Honolulu, being loaded on the steamers at Kailua.
>
> Only rarely are the bulls left with the breeding herd throughout the year. Usually they are turned out only during the seasons when grazing conditions are good, for the owner does not like to risk losing valuable bulls during adverse seasons. The good and bad seasons do not follow the same schedule year after year, so a definite pre-arranged breeding schedule, which would be preferable to get calves at the same time, is impossible.
>
> Calves are weaned at about six months of age, depending on the season. In bad seasons they are weaned earlier and taken to the best paddocks, which helps both the calf and the cow. An 85% calf crop was secured in 1928, but such a good percentage is not always secured.
>
> When bulls range with the cows throughout the year they average about one bull to thirty cows. For restricted breeding seasons more bulls are needed. The ranch carries about sixty light horses and raises about ten mules per year. Practically no swine and no sheep are kept.
>
> About two hundred dairy cattle of the Holstein and Guernsey breeds, ranging in age from four months to about two years can be found on the ranch at all times. These are the young calves from the Hind-Clarke dairy in Honolulu which are carried to the calving age at Puuwaawaa Ranch and then sent back to the dairy in Honolulu again.
>
> Bermuda grass (*Cynodon dactylon*) is considered one of the best grasses. Other grasses that do well are *Kukaipuaa* or crab grass (*Panicum pruriens*), Kentucky blue grass (*Poa priatensis*), Spanish needles (*Bidens pilosa*), Rhodes grass (*Chloris gayana*), Mesquite or Yorkshire fog (*Holcus lanatus*) on high elevations, orchard grass or cocksfoot (*Dactylis glomerata*), *Paspalum compressum*, bur clover (*Medicago denticulata*) and red top (*Agrostis*

> *stolonifera*). Native weeds supply some forage and in droughty seasons the cactus (*Opuntia* spp.) is a great asset for the cattle eat not only the young leaves but also manage to break off the spines with their feet and survive. Rat tail or New Zealand Timothy (*Sporobolus elongatus*) has also been introduced and seems to be spreading.
>
> The real beginning of Puuwaawaa Ranch was about 1892 when Robert Hind and Eben Low leased about 45,000 acres from the government and purchased about 2,000 head of cattle, —a mixture of Shorthorned, Angus and Devon breeds, from Frank Spencer, who had previously leased the lands of Puuanahulu, consisting of approximately 83,000 acres from the government. In 1893 Hind and Low acquired the lease on 12,000 acres of this area and in about 1917 Hind acquired the lease on the other 71,000 acres formerly in the Spencer lease. No cattle were carried on these 71,000 acres during the period 1893- 1917, but the land was pretty well overrun with goats… Since 1902 Robert Hind has been the sole owner of Puuwaawaa Ranch and he is still general manager of the ranch. (Henke 1929:43-44)

One of the significant problems faced by Hind in his ranching operation was competition that his herd faced from wild goats. By the turn of the century, the impact of goats on Hawaiian forests and lands valued by ranchers for economic purposes was causing alarm among land officials. On October 12, 1922, Charles Judd, Superintendent of Forestry in the Territory of Hawaii forwarded a communication to Governor Farrington describing conditions in the Nāpuʻu – Kekaha region. He observed:

> Not only are thousands of acres robbed of valuable forage grasses which should properly go to cattle for the meat supply of this Territory but the undergrowth of bushes, ferns, and herbaceous plants which form valuable ground cover is being consumed or destroyed by goats and the trees which form the complement in the scheme of water conservation are being barked and killed by this voracious pest. At Kiholo in North Kona almost every *algaroba* tree, established in this dry region with great difficulty and most valuable here for the production of forage beans has been girdled by the wild goats… Senator R. Hind of Puuwaawaa, North Kona, Hawaii, is one who has felt, probably the most seriously, losses from an over-population of wild goats and in addition has suffered much loss of forage for cattle from wild sheep…
>
> He has, therefore, undertaken, on his own initiative, active measures to relieve his ranch of this pest and on June 26 and 27, 1922 conducted a drive which resulted in ridding his ranch of 7,000 wild goats… [Hawaii State Archives Territorial Fish and Game Commission; Com-2, Box 15]

It was estimated in the 1920s that there was one goat on every five acres of land, and Judd reported that in the ranch lands of Puʻu Waʻawaʻa and Puʻu Anahulu, which comprised 105,000 acres, there were 21,000 wild goats. The lands of Kaʻūpūlehu and Kealakekua were combined, totaling 40,000 acres, meaning the goat population was estimated at 8,000 head (Hawaii State Archives Territorial Fish and Game Commission; Com-2, Box 15).

Another concern for the ranch was the acquisition of water. Beginning in the 1930s on a 2.7 acre property located between 4,560 and 4,760 feet in elevation, that Hind eventually obtained in fee simple in 1940, a water catchment system was established (Ketner et al. 2008). This parcel is known as Hale Piula, a descriptive name referring to the corrugated roofing structure that was built low to the ground over most of the parcel. Rain water falling on the structure was gathered by gutters, transported by flumes, and collected in tanks. This water was then piped from the tanks at *Hale Piula* down to the ranch. The catchment was later expanded to adjacent lease land during the Dillingham-era of ranch ownership.

Following the development of the Puʻu Waʻawaʻa Ranch leases and operations, Robert Hind and several business associates applied for, and were granted fee simple title to parcels of land on the coast of Puʻu Anahulu and Puʻu Waʻawaʻa. Those include the following parcels:

Land Patent Grant No. 6498 to Robert Hind; Nov. 26, 1915.
Kiholo Beach Lot 1 – 3.0 acres; Puuwaawaa.
Land Patent Grant No. 6748 to Robert Hind; Jan. 4, 1917.
Kiholo Beach Lot 2 – 3.0 acres; Puuwaawaa.
Land Patent Grants No.'s 9943, 9944, and 9945 to Robert Hind; Dec. 22, 1930.
Kiholo Beach Lots 8, 7 and 9 – three parcels at 3.0 acres each; Puuwaawaa.
Land Patent Grant No. 10,433 to Dorothy Von Holt; Aug. 28, 1936.
Weliweli Beach Lot 13 – 2.70 acres; Puuanahulu-Puuwaawaa Beach Lots.
Land Patent Grant No. 10,431 to Robert Hind; Aug. 19, 1936.
Kiholo Beach Lot 11 – 0.71 acres; Puuwaawaa.
Land Patent Grant No. 10,432 to R. Leighton Hind; Aug. 15, 1936.
Kiholo Beach Lot 12 – 3.0 acres; Puuwaawaa.
Land Patent Grant No. 9071 to Frances H.I. Brown; July 15, 1926.
Keawaiki Beach Lot 4 – 3.0 acres; Puuwaawaa-Puuanahulu.
S.S.A. 1612 to Sanji Abe; February 24, 1937.
Kiholo Beach Lot 14 (Luahinewai Lot) – 2.65 acres; Puuwaawaa.
(Transferred to Marjorie C. Hind, March 16, 1937)

Several changes were occurring between the years of 1936 and 1937 with the land leases held by Robert Hind Limited. In October 1936, leases were surrendered for consolidation into one lease (covering an area of approximately 126,000 acres), in an effort to remove private parcels from the existing lease language. By this time, Hind and several friends and associates had acquired fee simple title to beach lots along the shore of Pu‘u Anahulu and Pu‘u Wa‘awa‘a. On April 19, 1937, Robert Hind, Limited and the Commissioner of Public Lands entered into an agreement modifying Puuanahulu-Puuwaawaa leases (No.'s 1038 and 1039), in which beach lots were removed from Lease No.'s 1038 and 1039 (Land Division Files).

In the same time period, the Commissioner announced that bidding for the leases would be opened, and for the first time, there was active competition against Hind's interests. On October 12, 1937, the bidding closed with Hind retaining the lease, paying almost three times the original asking price, for the period of twenty-one years (effective August 15, 1939). The Commissioner of Public lands subsequently issued a new General Lease, No. 2621 (boundaries described in C.S.F. 8592), with descriptions of the boundaries and consolidation of all lands from General Lease No.'s 971, 1038 and 1039. (see General Leases in Land Division and State Survey Division Files; and Honolulu Advertiser and Star Bulletin articles of October 12 & 13, 1937).

C.S.F. 8592 (Figure 11) dated March 24, 1938, provides the survey coordinates for the revised and combined lease, containing a total area of 125,000 acres. The lease excluded the following —

Puuanahulu Homesteads (Lots 1 to 40 inclusive and roads	853.41 Acres
Puuanahulu-Puuwaawaa Beach Lots 1 to 14 inclusive	39.06 “
Grant 4862 to Robert H. Hind	25.28 “
Grant 5344 to Robert H. Hind	4.16 “
Grant 6266 to Robert H. Hind	3.00 “
Grant 9513 to S.L. Desha, Sr.	1.22 “
Grant 10286 to A.W. Carter, Trustee	25.09 “
Grant 10290 to A.W. Carter Trustee	20.72 “
North Kona Belt Road (F.A.P. 10-A and F.A.P. E-10-B)	79.67 “
	1051.71 Acres

Leaving a Net Area of 123,948.29 Acres.

…Also excepting and reserving there from all existing roads and trails within this tract and such other roads, trails and other rights-of-way that may be required for public purposes, said rights-of-way to be designated by the Commissioner of Public Lands. (C.S.F. 8592)

Robert Hind died in December 1938. Robert Hind, Limited, under the direction of Trustee John K. Clarke (who oversaw the trust until his death in 1951), continued operation of the Pu‘u Wa‘awa‘a Ranch holdings, and various interests both on Hawai‘i (Pu‘u Wa‘awa‘a, Captain Cook, and Honomalino) and O‘ahu (Aina Haina).

Paddocks of the ranch (both older walled pastures and newer fenced pastures) as they exist in the present-day were basically in place by the 1940s. The paddocks range from approximately the 1,000 foot elevation, through the forest lands, to the upper boundary of Pu‘u Wa‘awa‘a, and also take in the rich *kula* lands of Pu‘u Anahulu (that surround the historic homestead lots). In 1948, the ranch contracted surveyor, Charles Murray to prepare a map of the ranch paddocks and fencing projects that were underway. The map (Figure 12) also identifies the names of the paddocks, as they were remembered by the *kama‘āina* cowboys.

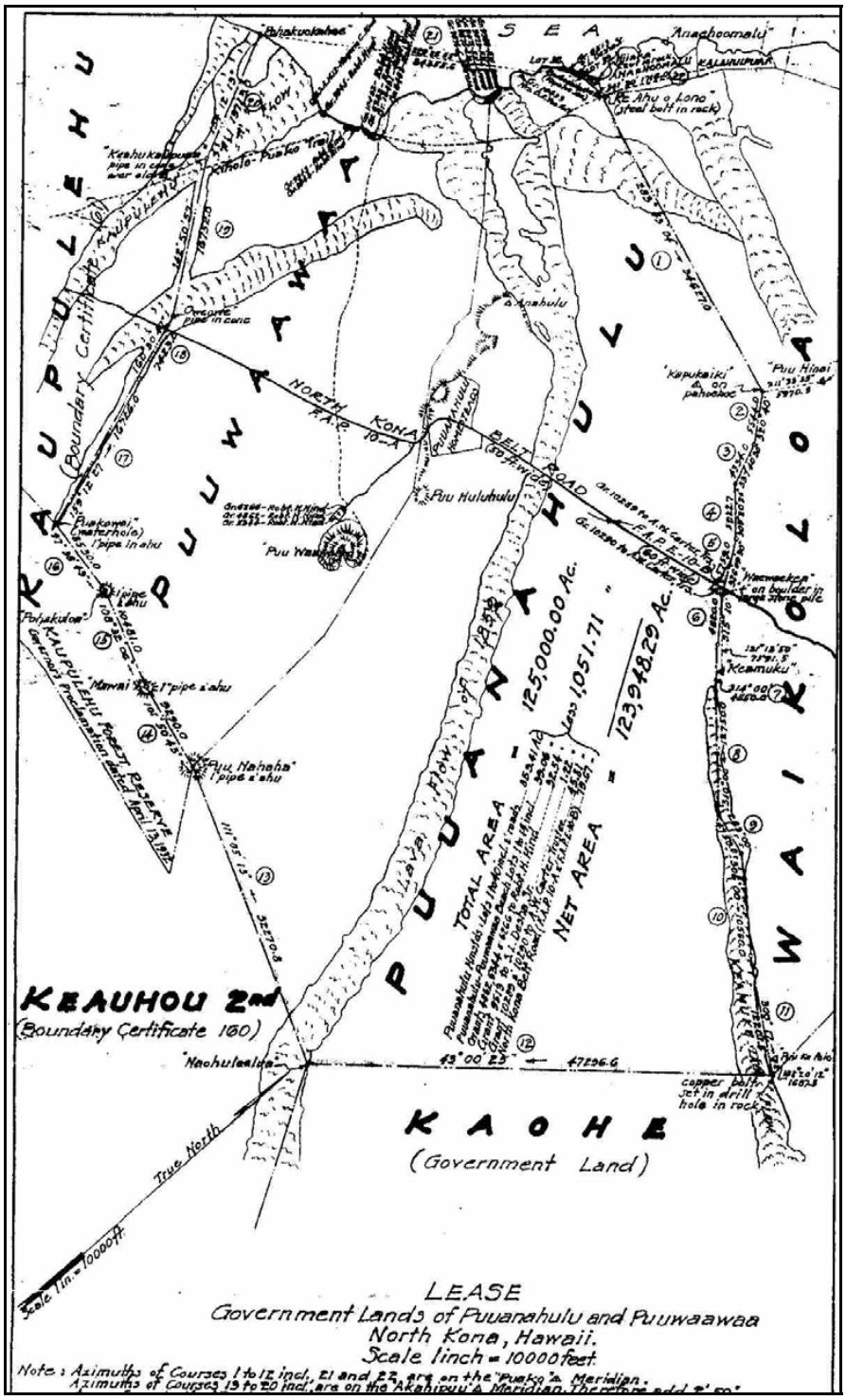

Figure 11. Pu‘u Anahulu and Pu‘u Wa‘awa‘a (C.S.F. 8592), Feb. 25, 1938.

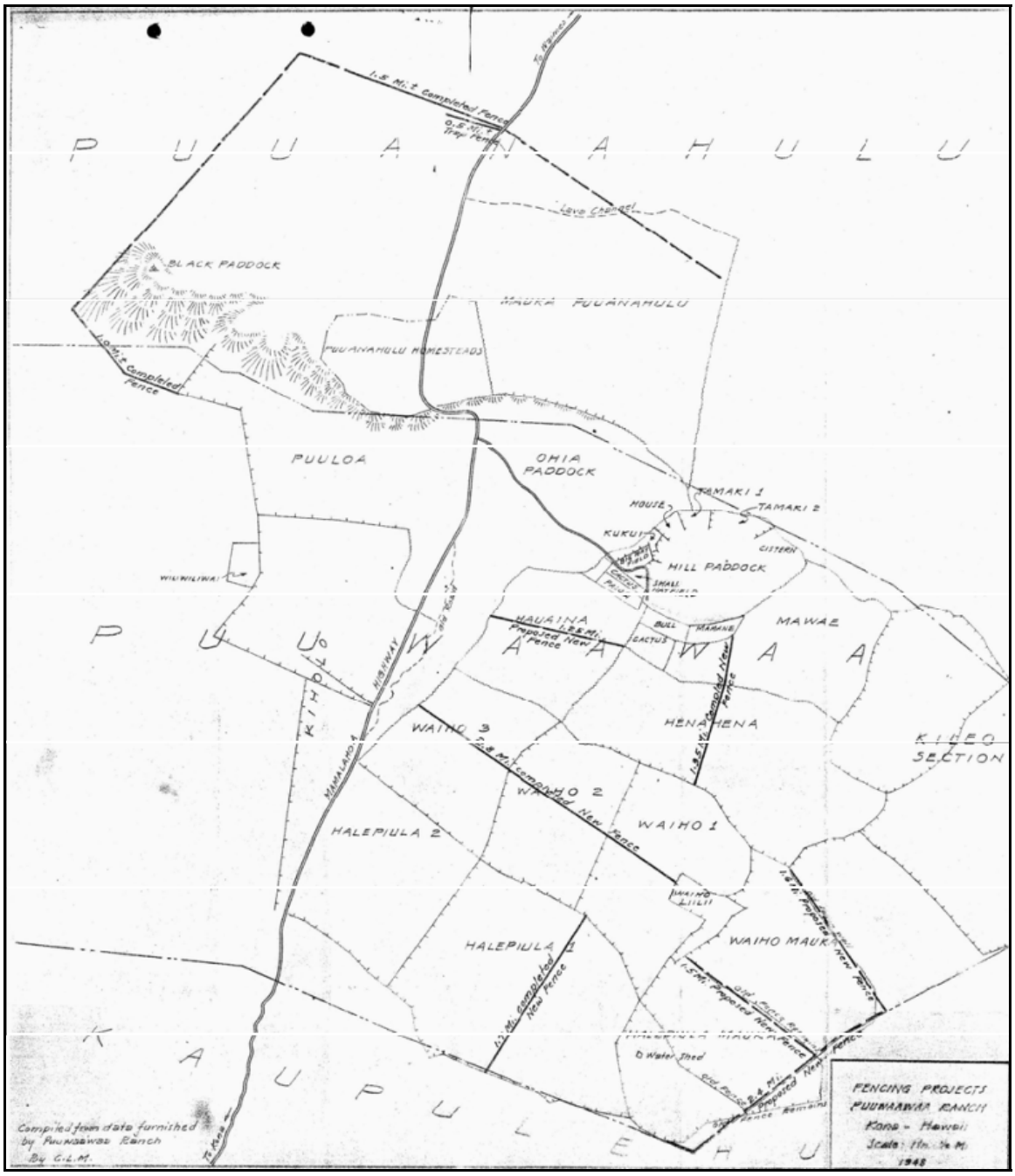

Figure 12. Paddocks of Pu‘u Wa‘awa‘a Ranch (reduction of map compiled by Chas. L. Murray, 1948).

In 1955, the Commissioner of Public Lands proposed to Robert Hind, Limited (R. Hind, Ltd.), removing approximately 500 acres of land—consisting of the area made up by Pu‘u Wa‘awa‘a—from General Lease No. 2621. The goal being to lease it out to a firm interested in mining rights. The proposal was accepted by R. Hind, Ltd., with the provision that measures would be taken to protect Hinds' private and remaining leasehold interests. The Puuwaawaa Quarry Site was auctioned on November 8, 1955, and the lease (No. 3528) sold to Volcanite, Limited (also known as Hawaiian Ornamental Concrete Products, Ltd.), for the period of 21 years (Land Division File – Lease No. 3528). The survey description and map of the Puuwaawaa Quarry Site is recorded in C.S.F. 12,205 (in the collection of the State Survey Division). The lease allowed Volcanite, Ltd.:

a. to dig, excavate, blast and quarry trachyte-pumice, for the primary purpose of utilizing or selling the same for concrete aggregate or for the manufacture of clay products…but not for the primary purpose of extracting mineral of any sort except trachyte-pumice.

b. to construct, maintain and operate a plant (together with camps and other structures appurtenant thereto) for the purpose of crushing materials; and

c. to remove, use and sell trachyte-pumice, pursuant to the provisions of paragraph (a) above, and also soil and quarry waste incidentally derived from digging, excavating, blasting and quarrying… (General Lease No. 3528)

The lease included a number of conditions, among which were two conditions regarding protection of "the triangulation stations located on Puuwaawaa Hill" and:

9. That the Licensee shall in no way deface the northwest half or rim of said Puuwaawaa Hill, and shall not unduly deface any of the remainder of said Hill…above the Rim, which Rim, for the purposes herein is that irregular line ranging from the 3350-foot to 3600-foot contours… Further, the Licensee shall level and fill all pits and other excavated areas to the end that there will be a slope to enable the proper drainage of water and to prevent the stagnation of water… (General Lease No. 3528)

A review of communications in the packet of General Lease No. 3528, reveals that several complaints were made in the 1950s and 1960s regarding infractions by the lessee, of the above cited lease agreement. Volcanite Ltd. voluntarily surrendered its lease on October 13, 1967, and applied for a land license that was issued as Revocable Permit No. 2-4134. Revocable Permit No. 2-4134 remained in effect from April 1, 1968 to October 31, 1972, and was then covered under Land License No. S-99, which expired on March 31, 1988.

By the late 1950s, officers of R. Hind, Ltd., had decided to end their relationship with the lease-hold properties of Pu‘u Anahulu and Pu‘u Wa‘awa‘a. General Lease No. 2621 would end June 30, 1958, and the family could not justify the continuation of a negligible business endeavor. General Lease No. 2621 includes background documentation on the lease history, and also provides an "assets" statement detailing the varied resources of the ranch. Summing up the termination of the lease agreement between R. Hind, Ltd and the Territory of Hawai‘i, the Commissioner of Public Lands reported:

> Robert Hind, Limited, the lessee of these lands up to June 30, 1958, was able to operate a reasonably successful cattle operation on the Puuanahulu and Puuwaawaa lands prior to and including 1949. Due to periodic drought to which the area is subject and to increased operating costs the company suffered losses on cattle operations each year thereafter. Recognitions that only by greater beef production could the company meet increased operating costs and only by a large investment in water systems and range improvements could a greater production be achieved, were compelling factors in Robert Hind, Limited's decision to sell its Kona interests to Dillingham Investment Corporation and its wholly owned subsidiaries.
>
> Robert Hind, Limited was not in financial position to undertake the heavy investments necessary to effect more intensive use of its Kona lands. There being no prospect of either the County of Hawaii or the Territory of Hawaii being able to provide water supply for the widespread grazing areas, the only out for the owners of Robert Hind, Limited was sale to companies better able to finance extensive improvements. (G.L. No. 2621; State of Hawaii Land Division)

On July 1, 1958, R. Hind, Ltd., sold its fee-simple holding in North and South Kona (including properties in Puʻu Waʻawaʻa Ranch and the Puʻuanahulu Homesteads) to Dillingham Ranch, Inc. (Bureau of Conveyances Liber 3469:478-485). In public bidding, Dillingham Ranch, Inc. was the highest bidder at an auction on March 4, 1960, and secured State Lease No. 3589 for the period of forty years, expiring August 14, 2000 (Maly and Maly 2006). On September 15, 1972, State Lease No. 3589 was assigned to F.N. Bohnett. Upon termination of Bohnett's lease (August 14, 2000), the State of Hawaiʻi entered into short-term leases for sections of Puʻu Waʻawaʻa, while it worked with an Advisory Committee made up of native families of Nāpuʻu, and various parties including neighboring land owners, and others with interests in conservation, hunting, recreation, and business. The fee-simple lands at the core of Puʻu Waʻawaʻa Ranch remain in private ownership along with the *Hale Piula* parcel, which is the subject of the current study.

SUMMARY OF PRIOR RELEVANT STUDIES AND CONSULTATION

There have been several archaeological studies conducted within Puʻu Waʻawaʻa Ahupuaʻa (Ahlo 1982; Ching 1971; Ketner et al. 2008; McGerty and Spear 2000; Rechtman and Wolforth 1999; Reinecke n.d.; Rosendahl 1973). With the exception of Ketner et al. (2008), these studies were focused on portions of the *ahupuaʻa* that lie well *makai* of the current study parcel. There have also been cultural and oral-historical studies that are either regionally (Maly and Maly 2006) or topically (Mitchell 2004) relevant to the current study area. And, there has been one study (Juvik and Tango 2003) that has examined the climatic and water resources specific to *Hale Piula.*

As part of the Ketner et al. (2008) archaeological study, the current project area was identified as SIHP Site 26171. The description of this site is reproduced in the next section of the current report. Water was vital to the Puʻu Waʻawaʻa ranching operation, and as a result of the Ketner et al. (2008) study, the water collection constructions located on the *Hale Piula* parcel were considered to be a significant aspect of the overall ranch landscape. Ketner et al. (2008) recommended that if the remaining structures at *Hale Piula* (Site 26171) were to be further dismantled, then scaled drawings and archive quality photo documentation of those resources should take place. Such recordation would serve to mitigate any potential impact.

Juvik and Tango (2003) prepared a report entitled, *Climate and Water Resources Puʻu Waʻawaʻa North Kona, Hawaiʻi*, which focused on the *Hale Piula* area. They measured annual rainfall totals for the period between February 2002 and January 2003 (Figure 13), and based on the total surface area of the catchment, (present on the adjoining State-owned land) calculated a yearly volume yield of approximately 1.36 million gallons of water.

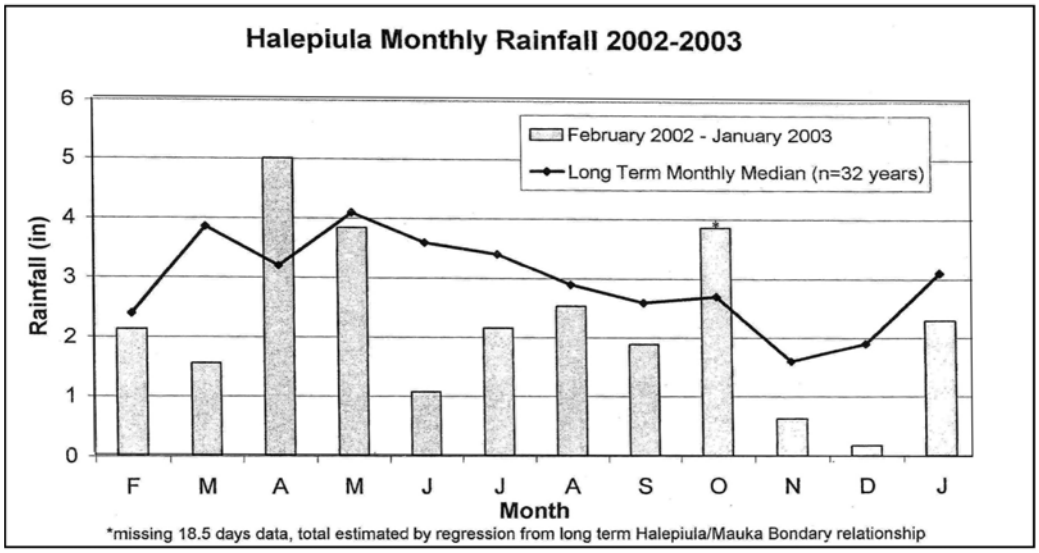

Figure 13. Rainfall amounts at *Hale Piula* between February 2002 and January 2003 (from Juvik and Tango 2003:21).

As part of a compilation for the Hawaii Cattlemen's Association's *Paniolo Hall of Fame*, La'i Mitchell conducted a 2004 interview of William Paris, a Hind descendant and a former manager of the Pu'u Wa'awa'a Ranch. Paris described the way in which the ranch dealt with water shortages:

> But ah but the cactus was wonderful because down in our lower Puuanahulu, Kukuiakau all those areas the cattle could get moisture from the young leaves. So they didn't drink- they could survive with very little water. So when ah when Parker Ranch brought the cactus blasters and the mealy bug in to get rid of their panini that was growing in the Keamoku in the in the plains and all that area Keamoku, Waikoloa ah it came to Puuwaawaa….wiped out our cactus so it really put a strain. We really had to really re-do our water systems. Because all of a sudden we had ah no moisture for these cattle in the lowlands and we had to provide water for them… And so we got that 8 acres up in Hale Piula. Then we put the watershed with the tanks up there but ah dry weather that was insufficient we used to have to ah when I was there dry time we'd have the trucks going twenty-four hours a day. (Mitchell 2004: Tape 1)

The 8 acres that William Paris referred to is the state-owned land that lies adjacent to the northwestern side of the current study area. As described earlier, it was during the Dillingham era of Ranch ownership (when Paris was Ranch Manager) that the *Hale Piula* water catchment was expanded, and it was during this period (early 1960s) that cultural properties seem to have been impacted. As Mikio Kato related to Kepā Maly in a 2006 interview (Maly and Maly 2006: 441-443):

> KM: Yes. So you guys were going out *holoholo, nānā ʻāina*?
> MK: Yes, *nānā ʻāina*. He just wanted to come down the *ʻāina* and come check the shed at Hale Piula.
> KM: They put in Hale Piula?
> MK: Yes.
> KM: In the early '60s?
> MK: It was in the early '60s.
> KM: Okay. You also showed me an area where they put in a reservoir, and you said it was one of the first lined ones?
> MK: The first lined reservoir on this island.
> KM: Yes, the Pa'akea section.
> MK: Pa'akea, yes. That's about where, down there.
> KM: You know from where we are now this *Alanui Ku'i* you were talking about, more *mauka* yet.
> MK: It crosses the catchment, right through the catchment [Hale Piula].
> KM: Oh, yes right through the catchment area.
> MK: Because we didn't know it was there, the *Alanui Ku'i.* And that guy was just dozing the forest and clearing the land for the catchment. Had all kind of humbug [chuckles]. So we called this *Kahu* Kahananui, Joe.
> KM: Joe Kahananui, yes.
> MK: He came up and he said "you know there's an *alanui* over here and there's supposed to be a *heiau*." The operator said "there was a pile of stones and he didn't know it was a *heiau,* it was under the fern." Then after I started thinking, I see the remnants of the trail coming up so got to go to the top.

The above citation references two historic properties that once existed in the vicinity of the current project area, a *heiau* and a trail. Neither is present on the current study parcel, but apparently did formerly exist on the adjacent state-owned land that was leased to Dillingham in the 1960s for the purposes of expanding the water catchment area. In follow-up interviews conducted as part of the current study both Willaim Paris and Mikio Kato confirmed that these sites were not within the boundary of the subject parcel.

As part of their extensive study, Kumu Pono Associates (Maly and Maly 2006) interviewed *kūpuna* of the Nāpu'u area, which as stated earlier includes Pu'u Wa'awa'a. In addition to Mikio Kata, other interviewees

shared information relative to *Hale Piula*, and the general current project area. None of the *kūpuna* interviewed shared knowledge of cultural properties or practices specific to the current study area. William Paris made reference to *Hale Piula* and the vegetation in the area:

> We went up here up to the Hale Piula water-shed, came across to Poho‘ohō and over to Shangri-La, and…But this is the section of the ranch, I couldn’t believe, when I was here this place was *pa‘a* [full] with *māmane*. (Maly and Maly 2006:279)

Another interviewee, Elizabeth Ruddle-Spielman, conveyed the importance of the water catchment system as follows:

> And he (Eben Low) told… Of course they didn’t have the watershed (Hale Piula), he told Uncle Leighton, or Uncle Robby I guess when they split, he said, “You’ve got to put a reservoir up on the mauka side. Because without water, this [Pu‘u Wa‘awa‘a] ranch is nothing, you have to have water. And you have to put a shed up.” (Maly and Maly 2006:249)

Historically, water and its continued availability was vitally important to the well-being of the ranch and in turn the livelihood of the residents of Pu‘u Wa‘awa‘a and neighboring Pu‘u Anahulu. The original catchment structures at *Hale Piula* (SIHP Site 26171) played a key role in the expansion of the ranch from the middle 1930s to the early 1960s.

AHUPUA‘A SETTLEMENT PATTERNS AND CURRENT SURVEY EXPECTATIONS

Archaeological studies undertaken within the greater North Kona District indicate that initial prehistoric settlement was concentrated primarily along the coast (Cordy 1981, Cordy et al. 1991). As coastal populations increased, so did the development of agricultural fields in the upland areas, reaching their greatest extent in the late 1700s. As the fields expanded so did native populations in the upland resource areas. By the sixteenth century, temporary and permanent habitations were found at higher elevations within the upland agricultural areas (Barrera 1991). There was a favorable coastline in Pu‘u Wa‘awa‘a Ahupua‘a that provided for edible coastal and marine resources, fishponds, cave shelters, and fresh water. The *mauka* portion of the *ahupua‘a* contained important upland resources such as birds, hunting either for food or for feathers used in ceremonial garments, wood for construction, canoe making, weaponry; and ample soil for agricultural pursuits. Between the *mauka* and *makai* areas, there existed a lava landscape with mesic forest resources in which temporary residences were located, accessed by *mauka*/*makai* trails. A socioeconomic exchange of resources occurred between the coastal and upland families. Families residing in the *mauka* areas likely spent time living at the coast taking advantage of prime fishing seasons and especially during the dry times of the year when water was scarce in the mountains, but available along the coast.

In Historic times, with the shift to a market economy and a western style of land ownership, populations shifted from the coast to the upland areas. Much of the old style of agriculture was abandoned in favor of coffee farms and cattle ranches, which have had a significant impact on the Precontact archaeological record.

Based on the historical information previously collected by Maly and Maly (2006), the findings of previous archaeological inventory studies conducted nearby the current project area, and the use of TMK:3-7-1-001:003 as a water catchment site, a fairly detailed set of project area expectations can be predicted. We can expect to find remnants of historic water collection including water tanks, corrugated iron, tank or building foundations, and road beds. If any Precontact features exist on the landscape within this area they would likely represent temporary habitations associated with upland resource procurement and may include feature types such as modified lava tubes and overhangs with possible *mauka/makai* trails nearby.

ARCHAEOLOGICAL FIELDWORK

Fieldwork for the current project was conducted on April 5th, 2007 by Robert B. Rechtman, Ph.D., Matthew R. Clark, B.A., and Amy Ketner, B.A.

Methods

The archaeological survey strategy included a pedestrian survey of the entire 2.7 acre study parcel as well as a visual inspection of all of the extant water catchment-related features. Ground visibility was excellent. No subsurface testing was conducted during the current inventory survey. The recording strategy included preliminary photographic documentation of the major structural elements of the water catchment system.

Findings

As a result of the current inventory survey one historic property was identified: SIHP Site 26171, the *Hale Piula* water catchment area. This resource dates from no earlier than the middle 1930s and exclusively contains architectural elements. There were no Precontact resources observed during the current inventory study.

SIHP Site 26171

Site 26171 is coterminus with TMK:3-7-1-1:003, a 2.7 acre parcel situated between 4,560 and 4,760 feet elevation on the slopes of Huālalai (see Figure 1), and dedicated for use as a water catchment area. A corrugated roofing structure (Figure 14) was built low to the ground covering the vast majority of the parcel. According to oral information obtained from William "Billy" Paris Jr., this roofing material came from closed down sugar mills in Hawī and Puakō. Rainwater that fell on this roof structure ran into wooden gutters (Figure 15) that emptied into a flume (Figure 16) that carried the collected water (Figure 17) to wooden tanks placed on concrete foundations in the extreme *makai* (downslope) portion of the parcel. A prior landowner removed these tanks and only the concrete foundation blocks remain (Figure 18). This parcel is referred to as the *Hale Piula* (referencing the metal roofing) lot, the Land Grant (No. 10,838) for which was issued May 31, 1940, but based on oral information obtained from Billy Paris the area may have been first developed for water catchment during the middle 1930s, and later added to between 1938 and 1942. A date etched into one of the concrete foundation elements does indicate construction activity took place in 1940 (Figure 19). This site provided the bulk of the water for Puʻu Waʻawaʻa ranching activities and during the Dillingham era of ranch operation (post 1956) was expanded to include adjacent state-owned land to the northwest, which was entirely paved with asphalt. The site is in a state of disrepair and no longer operational.

Figure 14. Corrugated roofing structure located at *Hale Piula*, view to the north.

Figure 15. Gutters at the ends of the roofing material, view to the southeast.

Figure 16. Flumes used to transport water to wooden tanks.

Figure 17. The end of the water flume where water would drop into large tanks.

Figure 18. Concrete water tank foundations at *Hale Piula.*

Figure 19. The year 1940 etched in a remaining concrete tank foundation.

ARCHAEOLOGICAL SIGNIFICANCE EVALUATION AND TREATMENT RECOMMENDATION, AND THE IDENTIFICATION AND MITIGATION OF POTENTIAL CULTURAL IMPACTS

The historic property described above is assessed for its significance based on criteria established and promoted by the DLNR-SHPD and contained in the Hawai‘i Administrative Rules 13§13-284-6. This significance evaluation should be considered as preliminary until DLNR-SHPD provides concurrence. For a resource to be considered significant it must possess integrity of location, design, setting, materials, workmanship, feeling, and association and meet one or more of the following criteria:

> A. Be associated with events that have made an important contribution to the broad patterns of our history;
>
> B. Be associated with the lives of persons important in our past;
>
> C. Embody the distinctive characteristics of a type, period, or method of construction; represent the work of a master; or possess high artistic value;
>
> D. Have yielded, or is likely to yield, information important for research on prehistory or history;
>
> E. Have an important traditional cultural value to the native Hawaiian people or to another ethnic group of the state due to associations with traditional cultural practices once carried out, or still carried out, at the property or due to associations with traditional beliefs, events or oral accounts—these associations being important to the group’s history and cultural identity.

Additionally, the OEQC guidelines identify several possible types of cultural practices and beliefs that are subject to assessment. These include subsistence, commercial, residential, agricultural, access-related, recreational, and religious and spiritual customs. The guidelines also identify the types of potential cultural resources, associated with cultural practices and beliefs that are subject to assessment. Essentially these are nature features of the landscape and historic sites, including traditional cultural properties. In the Hawai‘i Revised Statutes–Chapter 6E a definition of traditional cultural property is provided.

> “Traditional cultural property” means any historic property associated with the traditional practices and beliefs of an ethnic community or members of that community for more than fifty years. These traditions shall be founded in an ethnic community’s history and contribute to maintaining the ethnic community’s cultural identity. Traditional associations are those demonstrating a continuity of practice or belief until present or those documented in historical source materials, or both.

The origin of the concept of traditional cultural property is found in National Register Bulletin 38 published by the U.S. Department of Interior-National Park Service. “Traditional” as it is used, implies a time depth of at least 50 years, and a generalized mode of transmission of information from one generation to the next, either orally or by act. “Cultural” refers to the beliefs, practices, lifeways, and social institutions of a given community. The use of the term “Property” defines this category of resource as an identifiable place. Traditional cultural properties are not intangible, they must have some kind of boundary; and are subject to the same kind of evaluation as any other historic resource, with one very important exception. By definition, the significance of traditional cultural properties should be determined by the community that values them.

It is however with the definition of “Property” wherein there lies an inherent contradiction, and corresponding difficulty in the process of identification and evaluation of potential Hawaiian traditional cultural properties, because it is precisely the concept of boundaries that runs counter to the traditional Hawaiian belief system. The sacredness of a particular landscape feature is often times cosmologically tied to the rest of the

landscape as well as to other features on it. To limit a property to a specifically defined area may actually partition it from what makes it significant in the first place. However offensive the concept of boundaries may be, it is nonetheless the regulatory benchmark for defining and assessing traditional cultural properties. As the OEQC guidelines do not contain criteria for assessing the significance for traditional cultural properties, this study will adopt the above-stated state criteria for evaluating the significance of historic properties, of which traditional cultural properties are a subset.

While it is the practice of the DLNR-SHPD to consider most historic properties significant under Criterion D at a minimum, it is clear that traditional cultural properties by definition would also be significant under Criterion E. A further analytical framework for addressing the preservation and protection of customary and traditional native practices specific to Hawaiian communities resulted from the *Ka Pa‘akai O Ka‘āina* v Land Use Commission court case. The court decision established a three-part process relative to evaluating such potential impacts: first, to identify whether any valued cultural, historical, or natural resources are present; and identify the extent to which any traditional and customary native Hawaiian rights are exercised; second, to identify the extent to which those resources and rights will be affected or impaired; and third, specify any mitigation actions to be taken to reasonably protect native Hawaiian rights if they are found to exist.

SIHP Site 26171 is considered significant under Criteria A, B, C, and D. Established in the 1930s, *Hale Piula* was vital to the ranching operation; and the water collection constructions located on the *Hale Piula* parcel are a significant element of the overall ranch landscape, documenting an important aspect of the evolution of Hawai‘i Island’s ranching history. The current proposed project will involve the removal of the dilapidated water catchment remains and the restoration of native forest and allow for the scientific study of forest restoration and bird habitat. The catchment material will be recycled and reused as practical.

The following recommendation is made with respect to the demolition of existing structures within Site 26171. It is recommended that data recovery of the remaining structures at *Hale Piula* (Site 26171) be conducted prior to their being further dismantled. This data recovery should include scaled drawings and archive quality photo documentation of the resource. Such recordation would serve to mitigate the potential impact to this site from the current proposed forest restoration action.

While potential Traditional Cultural Properties (a trail segment and a *heiau*) may have once existed on state-owned land in the vicinity of the current study parcel, there were no such resources or associated practices identified specific to the current project area. Some might argue that the forested slopes of Hualālai themselves are part of a general cultural landscape, and thus from an indigenous perspective, should be considered a cultural property. While this might be the case, the current proposed action—to restore the native forest in all its diversity and provide an optimum habitat and food supply for the native birds of the area—by it nature would only serve to enhance, and not impact, this potential cultural property.

It is the conclusion of the current study that the proposed action will have no impact any traditional cultural properties, and the impact to the historic resources (SIHP Site 26171) can be satisfactorily mitigated. It is further concluded that the proposed action will serve to enhance potential valued natural resources within and beyond the study area.

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