DEPARTMENT OF WATER SUPPLY • COUNTY OF HAWAI'I
345 KEKŪANAŌ'A STREET, SUITE 20 • HILO, HAWAI'I 96720
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November 27, 2006

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

PALANI ROAD TRANSMISSION MAIN AND RESERVOIR PROJECT
FINDING OF NO SIGNIFICANT IMPACT AND FINAL ENVIRONMENTAL ASSESSMENT (EA)
TAX MAP KEY 7-4-004:003; 7-4-009:072 AND 094; AND 7-4-008:001 AND 028
NORTH KONA, ISLAND OF HAWAI'I

The County of Hawai'i, Department of Water Supply, has reviewed the comments received during the comment period for the Draft EA, which began on July 8, 2006. Our agency has determined that the project will not have significant impacts and has issued a FONSI. Please publish notice of availability for this project in the next available *Environmental Notice*. We have enclosed the following:

- Four copies of the Final EA
- A completed OEQC Environmental Notice Publication Form
- A distribution list for the Final EA
- A hard copy of the project summary
- A sample "Dear Participant" letter

An e-mail with the project description, which changed slightly from the summary in the Draft EA, has been sent to your office by our consultant. Please contact Mr. Lawrence Beck of our Water Resources and Planning Branch at (808) 961-8070, extension 260, or Mr. Ron Terry at (808) 982-5831, should you have any questions.

Sincerely yours,

Milton D. Pavao, P.E.
Manager

LEB:sco

Enc.

copy – (w/o enc.) Mr. Ron Terry, Ph.D, Project Environmental Consultant
(w/o enc.) Mr. Sheldon Yamasato, Akinaka & Associates, Ltd.

... Water brings progress...

2006-12-23-HA-FEA-PALANI RD TRANSMISSION MAIN AND RESERVOIR

FINAL ENVIRONMENTAL ASSESSMENT

PALANI ROAD TRANSMISSION MAIN

AND RESERVOIR PROJECT

TMK (3rd): 7-4-04: 03; 7-4-09: 72 and 94; and 7-4-08: 01 and 28
North Kona District, Hawai'i Island, State of Hawai'i

November 2006

Prepared for:

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

FINAL ENVIRONMENTAL ASSESSMENT
PALANI ROAD TRANSMISSION MAIN
AND RESERVOIR PROJECT

TMK (3rd) 7-4-04: 03; 7-4-09: 72 and 94; and 7-4-08: 01 and 28
North Kona District, Island of Hawai'i, State of Hawai'i

PROPOSING/
APPROVING AGENCY:

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

CONSULTANTS:

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and

Akinaka & Associates
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Honolulu Hawai'i 96819-1947

CLASS OF ACTION:

Use of County Land
Use of County Funds

This document is prepared pursuant to:

The Hawai'i Environmental Protection Act,
Chapter 343, Hawai'i Revised Statutes (HRS), and
Title 11, Chapter 200, Hawai'i Department of Health Administrative Rules (HAR).

TABLE OF CONTENTS

SUMMARY OF THE PROPOSED ACTION, ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

The County of Hawai'i, Department of Water Supply (DWS), plans to construct water transmission mains and system improvements to its Palani Road System in order to supply the community with potable water from the high-level well sources. The project would install about 11,500 linear feet of transmission mains connecting the existing 16-inch water main in Mamalahoa Highway with three existing reservoirs: the 1.0 million gallon (mg) Kealakehe reservoir, the 50,000-gallon Palani Tank 3, and the 100,000-gallon Palani Tank 2. A new 2.0 mg and a new 1.0 mg concrete reservoir would also be built. In response to resident requests, DWS will study during final design the feasibility of installing a fire hydrant in the vicinity of Tomi Tomi Drive and Kuni Road. These improvements will be needed to accomplish a reduction in the pumping demand on the Kahalu'u Shaft Wells by improved transmission of water from the DWS high-level wells situated mauka of Mamalahoa Highway. The project is part of DWS' master long-range plan for improvements in North Kona. The facility would promote public health and safety by improving water service for this community. The water transmission mains would be installed underground with a 10-foot wide paved access road over them. The new 2.0 mg and 1.0 mg reservoirs would have asphalt concrete pavement driveways; perimeter fencing and appurtenances; and associated water mains to connect the reservoir to the water distribution system. The improvements were initially planned to be located within existing Palani Road right-of-way. DWS, after considering potential traffic impacts during construction, decided upon the current alignment. The proposed alignment traverses private properties and existing government road easements and minimizes the impact to traffic. A 20-ft. wide easement (for utilities and access) will be required from the private properties, and the new 2.0 mg and 1.0 mg tank sites will require land acquisition.

The contractor will be required to develop a traffic control plan during the design phase to minimize congestion and maintain access to adjacent properties during construction. The contractor will perform all earthwork and grading in conformance with Chapter 10, Erosion and Sediment Control, Hawai'i County Code. Because the site is greater than one acre in extent, the contractor will obtain an NPDES permit and develop and implement a Storm Water Pollution Prevention Plan (SWPPP) to contain sediment and storm water runoff during construction. Furthermore, construction equipment will be kept in good working condition to minimize the risk of fluid leaks that could enter runoff and groundwater. Significant leaks or spills, if they occur, will be properly cleaned up and disposed of at an approved site. DWS plans to build berms to partially conceal the reservoirs and ensure the visual compatibility of the facility with its residential surroundings. Archeological and cultural survey have determined that no significant cultural resources are present and that impact to historic-era archaeological sites can be mitigated through data recovery; if resources are encountered during construction activities, work in the immediate area of the discovery will be halted and the State Historic Preservation Division will be contacted.

PART 1: PROJECT DESCRIPTION, PURPOSE AND NEED AND ENVIRONMENTAL ASSESSMENT PROCESS

1.1 Project Location, Description and Property Ownership

The County of Hawai'i, Department of Water Supply (DWS), plans to construct water transmission mains and system improvements to its Palani Road System in order to supply the community with potable water from its high-level well sources. The project would install about 11,500 linear feet of transmission mains connecting the existing 16-inch water main in Mamalahoa Highway with three existing reservoirs: the 1.0 million gallon (mg) Kealakehe reservoir, the 50,000-gallon Palani Tank 3, and the 100,000-gallon Palani Tank 2. A new 2.0 mg and a new 1.0 mg concrete reservoir would also be built. In response to resident requests, DWS will study during final design the feasibility of installing a fire hydrant in the vicinity of Tomi Tomi Drive and Kuni Road. The project is part of DWS' master long-range plan for improvements in North Kona (Fukunaga & Assoc. 1997) (Figs. 1-2).

The water transmission mains would be installed underground with a 10-foot wide paved access road over them. The new 2.0 mg and 1.0 mg reservoir sites would have asphalt concrete pavement driveways; perimeter fencing and appurtenances; and associated water mains to connect the reservoirs to the water distribution system. The improvements were initially planned to be located within existing Palani Road right-of-way. DWS, after considering potential traffic impacts during construction, decided upon the current alignment.

The proposed route runs from Mamalahoa Highway (County) down a private driveway (TMK 7-4-04:03) adjacent to an old government road easement to Kuni Road (County), which it follows downhill to Tomitomi Road (private), where it branches both left and right. The north branch follows Tomitomi Road north and then west, and then cuts back south across private land (TMK 7-4-09:72) to connect to the Kealakehe Tank and Palani Tank No. 3 (TMK 7-4-09:94). The south branch follows Tomitomi Road south and then heads south-southwest across lands belonging to Queen Liliuokalani Trust (TMK 7-4-08: 01) behind the Hale Palani subdivision, finally connecting with Palani Tank No. 2 (TMK 7-4-08:28). An easement about 20 feet in width for utilities and access will be required across all private properties. In addition, the new 2.0 mg and 1.0 mg tank sites will require land acquisition.

Construction will occur on both paved roads and undeveloped areas. On the paved roads, where construction has the potential to disrupt traffic and pose a hazard, contractors will utilize a "cut and cover" method, in which asphalt pavement will be saw cut and base course and underlying material removed by a backhoe. This material will be hauled to a stockpile site. The contractor will coordinate trench excavation, delivery of material to the work site, and pipeline installation to minimize inconvenience to the public. The pipeline will be placed in a maximum 42-inch wide trench at a minimum depth of five feet along its length.

Solid waste generated from clearing the corridor will be hauled to the West Hawai'i Quarry for disposal. Approximately one-half of the excavated material will be used for backfilling the trench. Any surplus material will become the property of the contractor for disposal as required by the County contract documents.

After the waterline is installed, it will be pressure-tested and disinfected per DWS standards. Assuming there are no leaks, the line will then be drained, the hydro-testing water disposed of, and the trench backfilled with engineered fill. A minimum of 36 inches of cover consisting of engineered fill, base course, and asphalt paving will be used. This process will be repeated until the line is completed. The entire line will then be disinfected with a solution of chlorine gas and water prior to being brought on-line. Hydro-testing and chlorinated water will be discharged along the roadside to percolate into the ground in adjacent undeveloped areas per National Pollutant Discharge Elimination System (NPDES) permit conditions (see Section 3.1.2). Excavated areas will then be restored to pre-construction conditions or better.

All work performed in State or County rights-of-way will be coordinated with the appropriate highway agency.

The cost of the project is estimated between $14 to $16 million. Design is ongoing and will be complete by 2007, when construction will begin and take about two years to complete.

1.2 Purpose and Need

These improvements are necessary in order to reduce the pumping demand on the current source, which is the Kahalu'u Shaft Wells located in the southern area (Area II) of the North Kona Water System, by improved transmission of water from the DWS high-level wells situated mauka of Mamalahoa Highway. The intent of this project is to transmit this "high-level" water by connecting the existing water main in Mamalahoa Highway to the Palani subsystem (Area I) and to provide greater flexibility in water management. The project is part of DWS' master long-range plan for improvements in North Kona (Fukunaga & Assoc. 1997).

The facility would promote public health and safety by improving water service for this community.

1.3 Summary of Regulatory Requirements

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 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 preliminary findings for each made by the Hawai'i County Department of Water Supply, the proposing agency. If, after considering comments to the Draft EA, DWS concludes that, as anticipated, no significant impacts would be expected to occur, it will then issue a Finding of No Significant Impact (FONSI), and the action will be permitted to occur. If DWS concludes that significant impacts are expected to occur as a result of the proposed action, and decides to continue with the project as described, then an Environmental Impact Statement (EIS) will be prepared.

1.4 Public Involvement and Agency Coordination

The following agencies and organizations were consulted in development of the environmental assessment.

State:

Department of Land and Natural Resources, Director
Department of Land and Natural Resources, Historic Preservation Division
Department of Transportation
Department of Health, Environmental Management Division

County:

Planning Department
Public Works Department
County Council

Private:

Sierra Club
Kona Outdoor Circle
Kona Hawaiian Civic Club

A letter was also sent to 24 property owners within 100 feet of the proposed waterline and reservoirs, which elicited a number of calls and e-mails that were responded to by project personnel. Copies of letters received during preconsultation are contained in Appendix 2a. Appendix 2b contains the notes from a public meeting held on July 20, 2006, along with written comments on the Draft EA and the responses to these comments. Various places in the EA have been modified to reflect input received at the meeting or in the comment letters; additional or modified text is denoted by double underlines, as in this paragraph.

PART 2: ALTERNATIVES

2.1 No Action

Under the No Action Alternative, the transmission lines would not be installed and the reservoirs would not be built. The interconnection of the system would not be accomplished per the Master Plan, and, in the future, there would increasing demand from the Kahalu'u Shaft Wells and less flexibility in water management in the North Kona Area I. Because of its mandate to provide reliable and high-quality water service to all its customers, the Hawai'i County Department of Water Supply considers the No-Action Alternative inadvisable.

However, the No Action Alternative would avoid property take, disturbance of land, and temporary construction-related impacts to air quality, noise and traffic, and is an important baseline for evaluating environmental impacts of the proposed project.

2.2 Alternative Locations or Strategies

Originally conceived as utilizing Palani Road, DWS redesigned the transmission alignment to the current route in order to minimize disruption to traffic on Palani Road during construction. Palani Road is one of the primary two-lane arterial highways that provide traffic circulation to and through the Kailua-Kona community. Population growth in the Kona area has increased the use of Palani Road to the extent that any disruption of its use during any prolonged construction would be a major impact. It would be unrealistic to close Palani Road during construction, as the existing roadway network in this area is very limited and there are no reasonable detour routes. Public safety during construction is also a concern. Conventionally, open trenches for the new water main are usually covered with steel plates during interim periods of the construction activities. The use of steel plates could create precarious driving conditions on Palani Road, with its steep grade, winding alignment, limited sight distance, and narrow right-of-way. Lastly, traffic maintenance through the construction zone will diminish efficiency and be cause for longer construction duration. Economic impact due to delays would be high.

A number of other potential routes not involving Palani Road were also considered, but all were more expensive or disruptive to undisturbed areas. As there did not appear to be any substantial environmental or other disadvantages associated with the proposed route, no alternative routes have been advanced in this EA.

DWS does not envision any alternative strategy approach to water storage and transmission that would accomplish the goals of the project and the orderly fulfillment of DWS' master long-range plan for improvements in North Kona, and therefore none are evaluated in this EA.

PART 3: ENVIRONMENTAL SETTING, IMPACTS AND MITIGATION MEASURES

Basic Geographic Setting

The transmission route and the reservoir sites are referred to throughout this EA as the *project site*. The term *project area* is used to describe the general environs of the area between Palani Road and Mamalahoa Highway, and, in some cases, all of North Kona.

The project site is located between elevations of approximately 600 and 1,420 feet above mean sea level feet in the *ahupua'a* of Kealakehe. Land use in the project area consists of residential subdivisions, farms and small ranches, and formerly grazed vacant land. The vegetation of most of the project area has been extensively modified for farming, ranching, and house sites, and the project site is landscaped or farmed, although there are also areas of heavily invaded native forest that has become almost completely alien in composition. The climate is warm, and annual rainfall averages roughly 60 inches, with a distinct summer maximum (U.H. Hilo-Geography 1998:57).

3.1 Physical Environment

3.1.1 Geology, Soils and Geologic Hazards

Environmental Setting

The surface consists of a portion of a roughly 3,000-year old lava flow from Hualalai Volcano (Wolfe and Morris 1996). The project site soil is classified by the National Resources Conservation Service (formerly Soil Conservation Service) as Kaimu extremely stony peat and Punaluu extremely rocky peat, which develop over 'a'a and pahoehoe respectively. The Kaimu soil has rapid permeability, slow runoff and slight erosion hazard, and is in Capability subclass VIIs, which is often considered unsuitable for cultivation but may have small areas in coffee, macadamia nuts, and other crops. Punaluu soil is rapidly permeable in the peat layer but very slowly permeable within the pahoehoe. Because of rapid water movement through cracks, it generally has slow runoff and slight erosion hazard, and is in Capability Subclass VIIs as well (U.S. Soil Conservation Service 1973).

The entire Big Island is subject to geologic hazards, especially lava flows and earthquakes. The United States Geological Survey (USGS) classifies all of Kailua-Kona, which is on the slopes of the dormant volcano Hualalai, as Lava Flow Hazard Zone 4, on a scale of ascending risk 9 to 1 (Heliker 1990).

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.

The project site does not appear to be subject to subsidence, landslides or other forms of mass wasting.

Impacts and Mitigation Measures

In general, geologic conditions impose no constraints on the proposed action, and the proposed water system improvements are not imprudent to construct. The reservoirs will be designed in accordance with applicable American Water Works Association and American Concrete Institute standards for Seismic Zone 4, as well as all applicable County Building Department requirements. The wall of each tank will be wire-wound, pre-stressed concrete with seismic cables extending into the wall footing. In addition, to avoid over-stressing the top and bottom connection of the tank wall, the wall will be able to slide independently from the tank footing and roof slab on bearing pads and a specially designed interface.

3.1.2 Drainage, Water Features and Water Quality

Existing Environment

Because of the dry climate and young, lava flow-based geology, no surface water bodies are present in the project site or project area. No Flood Insurance Rate Maps (FIRM) maps have been printed for the area, which is classified within Flood Zone X, outside of the 500-year flood plain. As in all areas of mauka Kona, however, heavy rainstorms can produce local flooding in sheet flow and minor channels.

Groundwater in the area consists of perched aquifers at depths of hundreds of feet, and below this, a basal water table near sea level.

Impacts and Mitigation Measure

Because of the limited scale of construction and the environmental setting, the risks for flooding or impacts to water quality during construction are negligible. However, in order to further minimize this potential for sedimentation and erosion, the contractor shall perform all earthwork and grading in conformance with Chapter 10, Erosion and Sediment Control, Hawai'i County Code. Because the project will disturb more than one acre of soil and will involve discharge of hydrotesting and chlorinated water (see below), a National Pollutant Discharge Elimination System (NPDES) permit must be obtained by the contractor before the project commences. The NPDES permit will also include completion of a Storm Water Pollution Prevention Plan (SWPPP). In order to properly manage storm water runoff, the SWPPP will describe the institution of a number of best management practices (BMPs) for the project. These BMPs may include, but will not be limited to, the following:

- Minimization of soil loss and erosion by revegetation and stabilization of slopes and disturbed areas of soil, possibly using hydromulch, geotextiles, or binding substances, as soon as possible after working;
- 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;
- Construction and use of a stabilized construction vehicle entrance, with designated vehicle wash area that discharges to a sediment pond;
- Washing of vehicles in the designated wash area before they egress the project site;
- Use of drip pans beneath vehicles not in use in order to trap vehicle fluids;
- Routine maintenance of BMPs by adequately trained personnel;
- Coordination of storm water BMPs and wind erosion BMPs whenever possible; and
- Significant leaks or spills, if they occur, shall be properly cleaned up and disposed of at an approved site.

The transmission line will be tested under DWS supervision following State of Hawai'i Water System Standards. The line will be disinfected with a solution of water and chlorine gas before being put into service. Water system standards for disinfecting water lines require flushing the system adequately with chlorinated water with a concentration of at least 50 milligrams (mg) of chlorine/liter (l) of water and leaving the water inside the pipe overnight, or exposing interior surfaces of the pipe with chlorinated water (300 mg/l) for three hours. Because the project involves discharging of water, the NPDES permit will also specify conditions to minimize adverse impacts to adjacent areas, surface waters or groundwater. Conditions of the permit will include specifications on the non-sensitive locations along the project corridor where hydrotesting and chlorinated water will be discharged. If no suitable location for discharge is available, the water will be discharged into water trucks for appropriate off-site disposal.

3.1.3 Flora, Fauna and Ecosystems

Existing Environment

Based on rainfall, geologic substrate, and existing vegetation, prior to human disturbance, the project area probably supported a Lowland Dry-Mesic Forest (Gagne and Cuddihy 1990), with 'ohi'a (*Metrosideros polymorpha*), lama (*Diospyros sandwicensis*) and alahe'e (*Psydrax odoratum*) as dominants. Coffee and sisal farming and perhaps other activities have extensively transformed the vegetation, although traces of the original structure remain in certain locations. Table 1 is a list of plant species detected.

Table 1
Project Site Plant Species List

Scientific Name	Family	Common Name	Life Form	Status
DICOTS				
Abrus precatorius	Fabaceae	Rosary Pea	Vine	A
Acacia koa	Fabaceae	Koa	Tree	I
Ageratina riparia	Asteraceae	Hamakua Pamakani	Herb	A
Ageratum conyzoides	Asteraceae	Ageratum	Herb	A
Aleurites moluccana	Euphorbiaceae	Kukui	Tree	A
Amaranthus spinosus	Amaranthaceae	Spiny Amaranth	Herb	A
Artocarpus altilis	Moraceae	Ulu	Tree	A
Asclepias physocarpa	Asclepiadaceae	Ballon Plant	Herb	A
Bidens pilosa	Asteraceae	Beggar's tick	Herb	A
Boerhavia coccinea	Nyctaginaceae	Boerhavia	Herb	A
Buddleia asiatica	Loganiaceae	Buddleia	Shrub	A
Caesalpinia bonduc	Fabaceae	Kakalaioa	Vine	I
Canavalia cathartica	Fabaceae	Maunaloa	Vine	A
Cannabis sativa	Cannabaceae	Marihuana	Shrub	A
Canthium odoratum	Rubiaceae	Alahe'e	Shrub	I
Carica papaya	Caricaceae	Papaya	Shrub	A
Cascabela thevetia	Apocynaceae	Be-still Tree	Shrub	A
Castilleja arvensis	Scrophulariaceae	Indian Paintbrush	Herb	A
Chamaecrista nictitans	Fabaceae	Partridge Pea	Herb	A
Chamaesyce hirta	Euphorbiaceae	Hairy Spurge	Herb	A
Chamaesyce hypericifolia	Euphorbiaceae	Graceful Spurge	Herb	A
Clusia rosea	Clusiaceae	Autograph Tree	Tree	A
Cocculus trilobus	Menispermaceae	Huehue	Vine	I
Coffea arabica	Rubiaceae	Coffee	Shrub	A
Convolvulus arvensis	Convolvulaceae	Field Bindweed	Vine	A
Conyza bonariensis	Asteraceae	Conyza	Herb	A
Crotolaria incana	Fabaceae	Rattlebox	Herb	A
Desmodium incanum	Fabaceae	Desmodium	Vine	A
Desmodium cajanifolium	Fabaceae	Desmodium	Herb	A
Dissotis rotundifolia	Melastomataceae	Dissotis	Herb	A
Dodonaea viscosa	Sapindaceae	A'ali'i	Shrub	I
Drymaria cordata	Caryophyllaceae	Pipili	Herb	A
Emilia sonchifolia	Asteraceae	Pualele	Herb	A
Eriobotrya japonica	Rosaceae	Loquat	Tree	A
Eucalyptus sp.	Myrtaceae	Eucalyptus	Tree	A
Eucalyptus a.f. saligna	Myrtaceae	Eucalyptus	Tree	A
Euphorbia sp.	Euphorbiaceae	Euphorbia	Herb	A
Ficus microcarpa	Moraceae	Banyan	Tree	A
Grevillea robusta	Proteaceae	Silk Oak	Tree	A
Hevea brasiliensis	Euphorbiaceae	Para Rubber Tree	Tree	A
Hyptis pectinata	Lamiaceae	Hyptis	Vine	A
Impatiens sp.	Balsaminaceae	Impatients	Herb	A
Indigofera suffruticosa	Fabaceae	Indigo	Herb	A
Ipomoea alba	Convolvulaceae	Moonflower	Vine	A
Ipomoea indica	Convolvulaceae	Morning Glory	Vine	I
Jacaranda mimosifolia	Bignoniaceae	Jacaranda	Tree	A

Table 1, cont'd

Scientific Name	Family	Common Name	Life Form	Status
Justicia betonica	Acanthaceae	Shrimp Plant	Herb	A
Kalanchoe pinnata	Crassulaceae	Airplant	Herb	A
Lantana camara	Verbenaceae	Lantana	Shrub	A
Leucaena leucocephala	Fabaceae	Haole Koa	Shrub	A
Macadamia sp.	Proteaceae	Macadamia	Shrub	A
Macroptilium lathyroides	Fabaceae	Cow pea	Herb	A
Mangifera indica	Anacardiaceae	Mango	Tree	A
Malvastrum coromandelianum	Malvaceae	Malvastrum	Herb	A
Morinda citrifolia	Rubiaceae	Noni	Shrub	A
Nerium oleander	Apocynaceae	Oleander	Shrub	A
Oxalis corniculata	Oxalidaceae	Wood Sorrel	Herb	I?
Oxalis corymbosa	Oxalidaceae	Wood Sorrel	Herb	A
Paederia scandens	Rubiaceae	Maile Pilau	Vine	A
Passiflora edulis	Passifloraceae	Lilikoi	Vine	A
Passiflora suberosa	Passifloraceae	Huehue Haole	Vine	A
Peperomia leptostachya	Piperaceae	Peperomia	Herb	I
Persea Americana	Lauraceae	Avocado	Tree	A
Phyllanthus debilis	Euphorbiaceae	Niuri	Herb	A
Plectranthus parviflorus	Lamiaceae	Spurflower	Herb	I
Pluchea crolinensis	Asteraceae	Sourbush	Shrub	A
Plumeria sp.	Apocynaceae	Plumeria	Shrub	A
Polyscias sp.	Araliaceae	Panax	Shrub	A
Portulaca oleracea	Portulacaceae	Portulaca	Herb	A
Portulaca pilosa	Portulacaceae	Portulaca	Herb	A
Psidium cattleianum	Myrtaceae	Waiawe	Tree	A
Psidium guajava	Myrtaceae	Guava	Tree	A
Ricinus communis	Euphorbiaceae	Castor Bean	Shrub	A
Rivinia humilis	Phytolaccaceae	Coral Berry	Herbs	A
Rubus rosifolius	Rosaceae	Thimbleberry	Herb	A
Samanea saman	Fabaceae	Monkey Pod	Tree	A
Sambucus mexicana	Caprifoliaceae	Elderberry	Shrub	A
Senna sp.	Fabaceae	Senna	Shrub	?
Schefflera actinophylla	Araliaceae	Octopus tree	Tree	A
Schinus terebinthifolius	Anacardiaceae	Christmas berry	Shrub	A
Sida fallax	Malvaceae	Ilima	Shrub	I
Sida rhombifolia	Malvaceae	Sida	Shrub	I?
Sida spinosa	Malvaceae	Prickly sida	Shrub	A
Silene gallica	Caryophyllaceae	Catchfly	Herb	A
Spathodea campanulata	Bignoniaceae	African Tulip	Tree	A
Spermacoce assurgens	Rubiaceae	Buttonweed	Herb	A
Synedrella nodiflora	Asteraceae	Synedrella	Herb	A
Syzygium cumini	Myrtaceae	Java plum	Tree	A
Taraxacum officinale	Asteraceae	Dandelion	Herb	A
Thunbergia alata	Acanthaceae	Black eyed Susan vine	Vine	A
Trema orientalis	Ulmaceae	Gunpowder Tree	Tree	A
Tridax procumbens	Asteraceae	Coat Buttons	Herb	A

Table 1, cont'd

Scientific Name	Family	Common Name	Life Form	Status
Waltheria indica	Sterculiaceae	Waltheria	Herb	A
Wedelia trilobata	Asteraceae	Wedelia	Herb	A
Wikstroemia a.f. phillyreifolia	Thymelaeaceae	Akia	Shrub	I
MONOCOTS				
Agave sisalana	Agavaceae	Sisal	Shrub	A
Andropogon virginicus	Poaceae	Broomsedge	Herb	A
Brachiaria mutica	Poaceae	California Grass	Herb	A
Chloris radiata	Poaceae	Fingergrass	Herb	A
Cocos nucifera	Arecaceae	Niu	Tree	A
Commelina diffussa	Commelinaceae	Honohono	Herb	A
Cordyline fruticosa	Agavaceae	Ki	Shrub	A
Digitaria insularis	Poaceae	Sourgrass	Herb	A
Digitaria setigera	Poaceae	Itchy crabgrass	Herb	I?
Digitaria violascens	Poaceae	Crabgrass	Herb	A
Dioscorea sp.	Dioscoreaceae	Hoi	Vine	A
Eleusine indica	Poaceae	Wiregrass	Herb	A
Eragrostis tenella	Poaceae	Lovegrass	Herb	A
Kyllinga sp.	Cyperaceae	Kylinga	Herb	A
Melinis minutiflora	Poaceae	Molasses	Herb	A
Oplismenus hirtellus	Poaceae	Basket grass	Herb	A
Panicum maximum	Poaceae	Guinea Grass	Herb	A
Paspalum conjugatum	Poaceae	Hilo Grass	Herb	A
Pennisetum purpureum	Poaceae	Kikuyu Grass	Herb	A
Pennisetum setaceum	Poaceae	Fountain Grass	Herb	A
Pycreus polystachyos	Cyperaceae	Cyperus	Herb	A
Rhynchelytrum repens	Poaceae	Natal Red Top	Herb	A
Schizachyrium condensatum	Poaceae	Beardgrass	Herb	A
Senna occidentalis	Faaceae	Coffee Senna	Herb	A
Setaria gracilis	Poaceae	Yellow Foxtail	Herb	A
Sporobolus africanus	Poaceae	Smut Grass	Herb	A
Sporobolus diander	Poaceae	Indian Dropseed	Herb	A
Zingiber zerumbet	Zingiberaceae	Awapuhi	Herb	A
FERNS AND FERN ALLIES				
Psilotum nudum	Psilotaceae	Moa	Herb	I
Blechnum appendiculatum	Blechnaceae	Blechnum	Fern	A
Lepisorus thunbergianus	Polypodiaceae	Ekoha	Fern	I
Nephrolepis exaltata	Nephrolepidaceae	Sword Fern	Fern	I
Phelbodium aureum	Polypodiaceae	Golden Polypody	Fern	A
Phymatosorus grossus	Polypodiaceae	Maile Scented Fern	Fern	A
Pteris cretica	Pteridaceae	Cretan brake	Fern	I

A = alien, E = endemic, I = indigenous, End = Federal and State listed Endangered Species

No listed, candidate or proposed endangered plant species were found or would be expected to be found on the project site. In terms of conservation value, no botanical resources requiring special protection are present.

Most animal species in this part of Kona, including birds, mammals and invertebrates, are alien. However, two native endangered species species, Hawaiian Hawks (*Buteo*

CORRECTION

THE PRECEDING DOCUMENT(S) HAS
BEEN REPHOTOGRAPHED TO ASSURE
LEGIBILITY
SEE FRAME(S)
IMMEDIATELY FOLLOWING

Table 1, cont'd

Scientific Name	Family	Common Name	Life Form	Status
Waltheria indica	Sterculiaceae	Waltheria	Herb	A
Wedelia trilobata	Asteraceae	Wedelia	Herb	A
Wikstroemia a.f. phillyreifolia	Thymelaeaceae	Akia	Shrub	I
MONOCOTS				
Agave sisalana	Agavaceae	Sisal	Shrub	A
Andropogon virginicus	Poaceae	Broomsedge	Herb	A
Brachiaria mutica	Poaceae	California Grass	Herb	A
Chloris radiata	Poaceae	Fingergrass	Herb	A
Cocos nucifera	Arecaceae	Niu	Tree	A
Commelina diffussa	Commelinaceae	Honohono	Herb	A
Cordyline fruticosa	Agavaceae	Ki	Shrub	A
Digitaria insularis	Poaceae	Sourgrass	Herb	A
Digitaria setigera	Poaceae	Itchy crabgrass	Herb	I?
Digitaria violascens	Poaceae	Crabgrass	Herb	A
Dioscorea sp.	Dioscoreaceae	Hoi	Vine	A
Eleusine indica	Poaceae	Wiregrass	Herb	A
Eragrostis tenella	Poaceae	Lovegrass	Herb	A
Kyllinga sp.	Cyperaceae	Kylinga	Herb	A
Melinis minutiflora	Poaceae	Molasses	Herb	A
Oplismenus hirtellus	Poaceae	Basket grass	Herb	A
Panicum maximum	Poaceae	Guinea Grass	Herb	A
Paspalum conjugatum	Poaceae	Hilo Grass	Herb	A
Pennisetum purpureum	Poaceae	Kikuyu Grass	Herb	A
Pennisetum setaceum	Poaceae	Fountain Grass	Herb	A
Pycreus polystachyos	Cyperaceae	Cyperus	Herb	A
Rhynchelytrum repens	Poaceae	Natal Red Top	Herb	A
Schizachyrium condensatum	Poaceae	Beardgrass	Herb	A
Senna occidentalis	Faaceae	Coffee Senna	Herb	A
Setaria gracilis	Poaceae	Yellow Foxtail	Herb	A
Sporobolus africanus	Poaceae	Smut Grass	Herb	A
Sporobolus diander	Poaceae	Indian Dropseed	Herb	A
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Nephrolepis exaltata	Nephrolepidaceae	Sword Fern	Fern	I
Phelbodium aureum	Polypodiaceae	Golden Polypody	Fern	A
Phymatosorus grossus	Polypodiaceae	Maile Scented Fern	Fern	A
Pteris cretica	Pteridaceae	Cretan brake	Fern	I

A = alien, E = endemic, I = indigenous, End = Federal and State listed Endangered Species

No listed, candidate or proposed endangered plant species were found or would be expected to be found on the project site. In terms of conservation value, no botanical resources requiring special protection are present.

Most animal species in this part of Kona, including birds, mammals and invertebrates, are alien. However, two native endangered species species, Hawaiian Hawks (*Buteo*

solitarius) and Hawaiian hoary bats (*Lasiurus cinereus semotus*), are often seen in the here and in many other parts of the island of Hawai'i. The native trees favored by Hawaiian Hawks for nesting are not present in the alien vegetation on the project site, but the habitat is suitable for both foraging and roosting for Hawaiian hoary bats, which are relatively indiscriminate.

Impacts and Mitigation Measures

Because of the lack of native ecosystems, or threatened or endangered plant species, no adverse impacts to botanical resources would occur as a result of clearing and improvements. DWS will develop a plan to mitigate any impact to the erosion control functions of the existing vegetation.

The principal potential impact that the project poses to the endangered Hawaiian hoary bats is during the clearing and grubbing of the site. Female bats while caring for their young are extremely vulnerable to disturbance. While carrying young and feeding them the adult bats are under immense stress, and move relatively slowly. If a lactating bat carrying young were to be roosting in vegetation that was removed during clearing and grubbing operations it is possible that she would not be able to flee the vegetation as it was being cleared. To reduce the potential for interactions between clearing and grubbing activity and Hawaiian hoary bats, it recommended that clearing and grubbing not be undertaken during the period that bats are caring for young, which occurs between the months of June and August.

3.1.4 Air Quality, Noise, and Scenic Resources

Environmental Setting

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 levels on the project site are fairly low and derived mainly from motor vehicles (near Palani Road and Mamalahoa Highway), farm activities, residences, and natural sources (wind and birds).

The scenery project area is characteristic of rural and residential areas of Kona. It contains no sites considered significant for their scenic character in the Hawai'i County General Plan.

Impacts and Mitigation Measures

The proposed action would not measurably affect air quality or noise levels except minimally during construction. At least some level of fugitive dust and construction noise are likely to occur.

Contractors will be required as part of the their contract with the County to include a dust control plan and to implement measures such as water sprinkling and site housekeeping measures to minimize dust.

Development would entail limited excavation, grading, compressors, vehicle and equipment engine operation, and construction of new infrastructure. These activities would generate noise exceeding 95 decibels at times, impacting nearby sensitive noise receptors. In cases where construction noise is expected to exceed the Department of Health's (DOH) "maximum permissible" property-line noise levels, contractors would obtain a permit per Title 11, Chapter 46, HAR (Community Noise Control) prior to construction. DOH would review the proposed activity, location, equipment, project purpose, and timetable in order to decide upon conditions and mitigation measures, such as restriction of equipment type, maintenance requirements, restricted hours, and portable noise barriers.

No important viewplanes or scenic sites recognized in the Hawai'i County General Plan would be affected. Some initial impact to visual character would occur because of vegetation clearing, mostly involving landscaped or non-native wild vegetation, and creation of paved surfaces and the reservoirs. DWS plans to build berms to partially conceal the new reservoirs from adjacent residences. The project would not substantially affect the scenic character of this area.

3.1.5 Hazardous Substances, Toxic Waste and Hazardous Conditions

Existing Environment, Impacts and Mitigation Measures

There are no indications that the project site contains any hazardous or toxic substances or exhibits any other hazardous conditions. No permanent or temporary land use that would tend to result in these conditions appears to have ever occurred on the project site.

The project would not introduce toxic or hazardous substances or conditions to the area. For discussion of line testing and disinfection during construction, refer to Section 3.1.2, above.

3.2 Socioeconomic and Cultural

3.2.1 Socioeconomic Characteristics

The project would affect and benefit the district of North Kona. Table 2 provides information on the socioeconomic characteristics of North Kona and Hawai'i County as a whole for comparison, from the U.S. 2000 Census of Population.

Impacts

The proposed project would benefit public health in North Kona through maintenance and improvement of the continued quality of water supply.

Table 2
Selected Socioeconomic Characteristics

Area	Population	Persons/ House-hold	Ethnic Characteristics (in percent)		Percent Hawaiian
North Kona (Keauhou to Kawaihae) Tracts 215.01, 215.02, 215.03, 216.01, 216.02, and 217.02	35,659	2.76	Asia/Pac: White Other	28 43 27	8.6
Hawai`i County	148,677	2.75	Asia/Pac: White Other	44 31 24	11.2

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).

3.2.2 Archaeology and Historic Sites

Cultural and archaeological studies of the subject area were conducted by Rechtman Consulting, Inc. They are attached in Appendix 3 and summarized in this and the next section. In the interest of readability, most scholarly references are not included in this summary but can be found in the full report.

Archaeological and Historical Background

Numerous archaeological studies have been conducted within Kealakehe and Keahuolū *ahupua'a* . These studies covered large portions of both *ahupua'a,* mostly *makai* of the current project area. Early archaeological work concentrated on coastal locations, and the findings suggested a pattern of coastal settlements near fishponds and rich marine resources, with a decrease in permanent habitation sites and an increase in agricultural features further inland. Since the late 1970s, many studies in *mauka* portions of Kealakehe and Keahuolū *ahupua'a* have documented numerous agricultural features in upland field systems, and in particular, the formal feature types that occur in the zone between the coast and upland

agricultural areas. These studies provide sufficient data to develop a predictive model for the current study area.

The current project area is located within the area of formal agricultural fields commonly referred to as the Kona Field System. A land use and settlement pattern model applicable to the project area delineates four environmental zones within the *ahupua'a*: the Coastal Zone from shoreline to roughly 15 feet elevation; the Middle Zone from 15 to 800-900 feet elevation; the Lower Upland Zone from 900 to 1,500 feet; and the Upland-Forest Zone between 1,500 and 6,000 feet elevation. The project area straddles the Middle Zone and Lower Upland Zone, which together form a transitional area between the coastal habitation and upland agricultural areas.

There is little archaeological evidence for permanent settlements in the Kona region throughout the first half of the Early Expansion Period of Hawaiian history (A.D. 600 to 1100). Although permanent habitation was still concentrated on the windward side, it is likely that windward residents may have traveled to the Kona coast to obtain needed resources. By the latter half of the Early Expansion Period, permanent settlements were established in Kona along the coast and on lowland slopes, and informal fields were likely established at higher elevations.

Radiocarbon data from within the *ahupua'a* of Kealakehe reveal initial human activity in this region in the 1200s to 1300s, followed by gradual increase, and then more intensive activity from the 1600s to early historic period. Agricultural fields and habitation areas expanded across the slopes and coastal area of Hualālai during the Late Expansion Period (A.D. 1100 to 1400). Walled agricultural fields, planting mounds, and temporary habitations were established at the higher elevations that received greater amounts of rainfall. The development of the extensive formal walled fields sometime during the initial stages of the Intensification Period (A.D. 1400 to 1600) marks the initiation of the Kona Field System. The development of these fields may have been, in part, a byproduct of the need to extract more subsistence resources from an increasingly limited agricultural base. Radiocarbon data indicates that the population in Kona increased dramatically during this period. By the time of the Competition Period (A.D. 1600 to 1800), the environment may have reached its maximum carrying capacity, resulting in social stress between neighboring groups. The resulting hostility is reflected archaeologically by the numerous refuge caves dating to this period.

During the first of the defined historic periods, Last of the Ruling Chiefs (A.D. 1778-1819), Kalaniopu'u was chief of the Island of Hawai'i and often resided in the Kona District. This period covers Kamehameha's consolidation of control over the island to his death at Kailua in 1819. The period ends with the overthrow of the old religion, which took place when Liholiho, Kamehameha's heir, broke the traditional *kapu* and won a battle against the supporters of the old religion at Kuamo'o, along the southern coastline of Keauhou. Early historical accounts emphasize that modern day Kailua Town during this period was a significant political seat and population center. The Kona Field

settlement and subsistence system continued to operate in the area through the first few decades of the historic era.

William Ellis, one of the first missionaries to arrive on the Island of Hawai'i, visited the area above Kailua (likely in the vicinity of the current project area) on a tour around the island in 1825. Ellis' described the appearance of the upland fields thus:

> "After traveling over the lava for about a mile, the hollows in rocks began to be filled with a light brown soil; and about half a mile further, the surface was entirely covered with a rich mould, formed by decayed vegetation and decomposed lava. Here through a beautiful part of the country, quite a garden compared with that through which they had passed, on first leaving town. It was generally divided into small fields, about fifteen rods square, fenced with low stone walls, made of fragments of lava which had been gathered from the surface of the enclosures. These fields were planted with bananas, sweet potatoes, mountain taro, tapa trees, melons, and sugar cane, flourishing luxuriantly in every direction. Having traveled about three or four miles through this delightful region, and passed several pools of fresh water, they arrived at the thick woods, which extends several miles up the sides of the lofty mountain that rises immediately behind Kairua" (1963:27-28) .

The second quarter of the 19th century, the Merchants and Missionaries Period (A.D. 1820-1847), was a time of profound social change in Hawai'i. Kamehameha I died in mid-1819, and a council of chiefs supported Kamehameha's son Liholiho as successor. Liholiho gained the council's support in exchange for the distribution of the profits from the sandalwood trade and the bounty of the land that moved up the hierarchy from the various *ahupua'a* under his control, privileges previously retained solely for the ruler. Within six months after Kamehameha's death, Liholiho, Ka'ahumanu, and Queen Keopuolani broke the *kapu* prohibiting men and women eating together. This act of "free eating" symbolized the end of the traditional *kapu* system. The changes in social and economic patterns began to affect the lives of the common people. Liholiho moved his court to O'ahu, considerably lessening the burden of resource procurement for the chiefly class. However, some of the work of the commoners shifted from subsistence agriculture to the production of foods and goods for trade to the early Western visitors. Introduced crops, such as yams, coffee, melons, Irish potatoes, Indian corn, beans, figs, oranges, guavas, and grapes, were grown specifically for trade with Westerners. Other commodities, especially sandalwood, were collected to purchase Western goods, often to the detriment of agricultural pursuits. The arrival of the missionaries to Hawai'i in the 1820s brought further changes to the social and religious systems of the islands.

The socioeconomic and demographic changes that took place in the period between 1790 and the 1840s promoted the establishment of a Euroamerican style of land ownership, and the *Māhele* was the vehicle for determining ownership of the native land. During this Legacy of the Great *Māhele* Period (1848-1899), the *Māhele* defined the land interests of

the King (Kamehameha III), the high-ranking chiefs, and the low-ranking chiefs, the *konohiki*. 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 and speeded the transfers. During this process 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. In 1862, the Commission of Boundaries (Boundary Commission) was established in the Kingdom of Hawai'i 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 was 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*. The information was collected primarily between A.D. 1873 and 1885. The testimonies were generally given in Hawaiian and simultaneously transcribed in English.

As a result of the *Māhele*, the *ahupua'a* of Keahuolū was awarded in its entirety to Ane Keohokālole as part of LCAw. 8452. Ane Keohokālole was the great-granddaughter of Kame'eiamoku, one of the most important chiefs who supported Kamehameha I. Keohokālole was married to Kapa'akea, and they were the parents of King (David) Kalākaua and Queen (Lydia Kamaka'eha) Lili'uokalani. Also, their youngest son, William Pitt Leleiohoku, was adopted at birth by Ruth Ke'elikōlani, the governess of Hawai'i Island from 1855 to 1874, and named for her first husband. Their youngest daughter, Miriam Likelike, was the mother of Ka'iulani, who was proclaimed heir apparent in 1891 after Queen Lili'uokalani took the throne following the death of her brother King Kalākaua. The *ahupua'a* of Kealakehe was reserved as Government land and sold as grants.

Eleven *kuleana* claims were awarded in the uplands of Kealakehe Ahupua'a, most of them at similar elevations to, but north of, the current project area. Twelve additional claims in Kealakehe were not awarded. Six *kuleana* claims were awarded in Keahuolū Ahupua'a, five of them in the uplands (all *mauka* of the current project area) and one at the coast. Four of the claims in Keahuolū describe the cultivation of taro, one mentions sweet potato, and one mentions coffee; no house lots are mentioned in the claims. The awardee at the coast claimed seven fan palms and a coconut grove, and described the land as salt land that is still yielding salt. Typical *kuleana* claims in Kealakehe Ahupua'a included house lots, cultivated fields of taro and sweet potato. LCA 7483 described the inland boundary of one claimed parcel as being a mountain banana patch, and the northern and southern boundaries of a second parcel are described as being *kua'iwi*.

In a letter dated July 8, 1869, David Kalākaua describes the land of Keahuolū and its possible uses to his sister Lydia Kamaka'eha (Lili'uokalani):

> "This land is situated in the District of North Kona. Bounded by the ahupuaa of Lanihau (in Kailua) belonging to Prince Lunalilo on the Ka'u side, and on the Kohala side, by Kealakehe, a government land and Honokoniki belonging to Keelilkolani. Keahuolu runs clear up the mountains and includes a portion of nearly one half of Hualalai mountains. On the mountains the koa, kukui and ohia abounds in vast quantities. The upper land or inland is arable, and suitable for growing coffee, oranges, taro, potatoes, banana & c. Breadfruit trees grow wild as well as Koli oil seed. The lower land is adopted for grazing cattle, sheep, goat, &c. The fishery is very extensive and a fine grove of cocoanut trees of about 200 to 300 grows on the beach. The flat land near the sea beach is composed chiefly of lava, but herbs and shrubbery grows on it and [it is] suitable for feed of sheep and goats. It is estimated at 15,000 to 20,000 acres or more" (Jensen 1990:A-4).

Following the *Māhele* the upper portions of Kealakehe Ahupua'a between about 500 and 1,400 feet above sea level were sold as grants. Later, the Homestead Act of 1884 directed the Minister of the Interior to make the land available for homesteads. The homestead lots were to be no more than 20 acres in size and the grantees had five years to comply with all conditions necessary for obtaining the homesteads. In 1886, King Kalākaua executed a 20-year lease for various lands in North Kona, including lands in the upper portion of Kealakehe, which were to be sold in two blocks (first and second series). Grant increment roads were established to allow the homesteaders access to their parcels. The current project area crosses portions of two of the first series of homestead grants in Kealakehe, Grant 3965 to W. H. Kalaiwaa in 1896 and Grant 3970 to Beniamina in 1896. The project area also follows the grant increment roads between several other homestead parcels including Grant 3742 to Kailiuaua in 1895, Grant 3967 to J. Kahookiekie in 1896, Grant 4144 to J. Peahi Jr. in 1898, Grant 4786 to Keaweualani in 1903, and Grant 6361 to J. S. Barros in 1915. Historic land use of these parcels likely included residential, diversified agriculture, and cattle ranching.

A short-lived but interesting agricultural pursuit began in Hawai'i in 1893, when the Hawaiian Commissioner of Agriculture and Forestry ordered 20,000 sisal plants from Florida. Subsequently, a mill that processed raw sisal into fibers was constructed by a man named McWayne in Keahuolū Ahupua'a, along Palani Road *makai* of the current project area, probably in the early 20th century. Minoru Inaba of Kona, who worked at the mill from 1920-21, stated that it was owned by Luther S. Aungst from 1917 until its closing in 1924, and over a thousand acres were in cultivation in Kealakehe and Keahuolū *ahupua'a* surrounding the mill along Palani Road. Workers would harvest the plants in the field and then bundle and transport by donkey to the mill, where they were thrashed, dried, baled and sent to San Francisco on steamers. Based on the fact that the mill was only about 2,000 feet makai of southern terminus of the proposed transmission line, along with the amount of "wild" currently growing within the survey corridor, it

appears likely that the sisal fields encompassed at least a portion of the current project area.

Based on the background information presented above, a set of field expectations can be generated. The project area is located within the Middle Zone and Lower Upland Zone, which are transitional areas between the coastal habitation zone and the upland agricultural zone. The Middle Zone is characterized by widely scattered sites consisting of *mauka/makai* trails, cairns, temporary habitations represented by crude enclosures and platforms or altered lava tubes and blisters, and various Historic sites primarily related to ranching. The Lower Upland Zone is characterized by informal agricultural plots marked by low-walls, terraces, modified outcrops, mounds, and temporary habitations similar to those found in the Middle Zone, as well as various Historic sites related to habitation, ranching, and agriculture. The findings of previous archaeological studies conducted in Kealakehe and Keahuolū Ahupua'a at elevations similar to the current project area have generally confirmed this model.

Based on this model, Precontact feature types that may be encountered within the current survey corridor include mounds, modified outcrops, terraces and low rock walls (*kuaiwi*) related to agricultural use of the area, enclosures, platforms, lava tubes used for habitation purposes, and perhaps *mauka/makai* trails that connected coastal areas with inland areas. If any burials are present, they would likely be found within lava tubes or neatly constructed platforms. Historic feature types that may be encountered within the current survey corridor include core-filled walls used for ranching and boundary purposes, roads, habitation features (i.e. enclosures, platforms, cisterns, etc.) related to the homestead use of the area (especially in Kealakehe), and possibly agricultural features similar to those described above (but perhaps related to the commercial cultivation of sisal that briefly occurred in Keahuolū Ahupua'a). If any Historic Period burials are present they would likely be located in above ground mausoleums.

It should be noted that for much of its length the current survey corridor follows existing paved roads and the boundaries of residential subdivisions developed during modern times. Development activities related to the paving of these roads and the bulldozing of the subdivisions have likely impacted any archaeological features that were present prior to these activities.

Archaeological Fieldwork

Three archaeologists walked the entire survey corridor in transects spaced at 10-meter intervals oriented around the corridor centerline, which had been located by land surveyors. When archaeological resources were encountered, they were plotted on a map of the project area using Garmin 76s handheld GPS receivers, and then (when appropriate) cleared of vegetation, mapped in detail, photographed, and described using standardized site record forms.

As a result of the current inventory survey seven archaeological sites were recorded within the current project area (Figure 4; Table 3). One of the sites (Site 14239) is a continuation of a core-filled wall paralleling Palani Road that had been recorded by another archaeologist in 1990. Three of the sites (Temporary Site Nos RC-0161-1, RC-0161-19, and RC-0161-29), all related to Precontact/Historic agriculture, were previously recorded (but not formerly reported on) during inventory fieldwork conducted by Rechtman Consulting, LLC at TMK:3-7-4-09:72. Seven features of these three sites are present within the boundaries of the current survey corridor. The temporary site numbers were retained for these sites, however, as the bulk of these sites' features are located outside the boundaries of the current study area on a privately owned parcel. Three other sites (Temporary Site Nos T-1, T-2, and T-5) were newly recorded during the current study. These sites include a Historic boundary wall (Site T-1), a Historic residence (Site T-2), and a series of Historic wall segments following portions of two former Kealakehe grant increment roads (Site T-5). The grant increment roads included within the project area were constructed during Historic times, but are currently paved public right-of-ways known as Tomi Tomi Road and Kuni Road. In addition to the recorded sites, several agricultural features (likely Precontact in age) were noted to the east of the present survey corridor were it crosses the western edge of TMK 7-4-08:1 along the eastern edge of the Queen Liliuokalani Village Subdivision. Agricultural features were likely present within the present survey corridor prior to the development of the subdivision, as bulldozing for that development encroaches into the current project area.

Detailed descriptions of all the recorded sites and features are found in Appendix 3.

Impacts and Mitigation Measures: Significance Evaluation And Treatment Recommendations

The sites recorded during the current study are assessed for their significance based on criteria established and promoted by the DLNR-SHPD and contained in the Hawai'i Administrative Rules 13§13-284-6. These significance evaluations should be considered as preliminary until DLNR-SHPD provides concurrence. For resources to be considered significant they 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.

The significance and recommended treatments for the eight sites are discussed below and are presented in Table 3.

Table 3
Site Significance and Treatment Recommendations

Site No.	*Site Type*	*Temporal Assignment*	*Significance*	*Treatment*
14239*	Wall	Historic/Modern	D	No further work
T-1	Wall	Historic Period	D	Preservation
T-2	Habitation	Historic Period	D	Data Recovery
T-5	Wall	Historic Period	A, D	Preservation
RC-0161-1	Agricultural	Historic Period	D	No further work
RC-0161-19	Agricultural	Historic/Precontact	D	No further work
RC-0161-29	Agricultural	Historic Period	D	No further work

*The significance and treatment of this site has been previously approved by DLNR-SHPD as a result of an earlier archaeological study.

SIHP Site 14239 is a dry stacked rock wall that was previously assessed as significant under Criterion D. The earlier study concluded that the site was of relatively recent construction and no further work was the approved recommendation.

SIHP Site T-1 is a wall running along the Kealakehe/Keahuolū boundary. This core-filled wall is assessed as significant under Criterion D, and as it can be protected and avoided during construction activities it is recommended that this site be preserved.

SIHP Site T-2 is a Historic Period habitation site in Keahuolū Ahupua'a. This site is assessed as significant under Criterion D for information it has the potential to yield relative to late nineteenth and early twentieth century residential land use. Data recovery is the recommended treatment.

SIHP Site T-5 is a series of wall segments associated with the era of homesteading (1870-1920) within the Kealakehe area. These core-filled walls are assessed as significant under both Criterion A and Criterion D. Given the nature of the proposed project, these walls can be protected and avoided during construction activities; therefore, it is recommended that this site be preserved.

Sites RC-0161-1, RC-0161-19, and RC-0161-29 fall mostly outside of the current study area. The few features or portions of features that fall within the study corridor have been extensively documented during earlier fieldwork. The few resources within the current study area are considered significant under Criterion D, and no further work is recommended. If and when TMK: 3-7-4-009:72 gets developed (apart from the current waterline project) these sites will likely undergo further data collection.

In conclusion, all of the recorded sites provide evidence for the Historic Period use of the general project area, which matches the project expectations. The intensive residential and agricultural use of this area following the late nineteenth and early twentieth century granting programs obliterated or obscured much of evidence of the earlier Precontact land use. The resources previously documented on TMK: 3-7-4-009:72, however potentially do retain elements of earlier sites. Given the size and orientation of the waterline corridor through this parcel, the impact to these sites will be minimal. SIHP Site T-2 is recommended for data recovery, SIHP Sites T-1 and T-5 are recommended for preservation, and no further work is the recommended treatment for the other resources. Given adherence to these recommendations, all adverse effects will have been mitigated.

The archaeological inventory was submitted to the State Historic Preservation Division, which concurred with the findings and recommendations of the survey in a letter of February 3, 2006 (see App. 3). A letter detailing the lack of features found on a follow-up survey for the new 1.0 mg reservoir was submitted to SHPD on 5/10/06 (end of App. 3), and concurrence with these findings is expected by the publication of the Final EA.

In the unlikely event that other archaeological resources, iwi or Native Hawaiian cultural or traditional deposits are encountered during future development activities within the current study area, work in the immediate area of the discovery should be halted and DLNR-SHPD contacted as outlined in Hawai'i Administrative Rules 13§13-275-12.

3.2.3 Cultural Setting

Existing Environment

Cultural and archaeological studies of the area were conducted by Rechtman Consulting, Inc. They are attached in Appendix 3 and summarized in this and the previous section. The purpose of the cultural study was to document the presence of any historic properties or traditional cultural properties that might exist within the project area, assess the significance of any such resources, and provide a statement of impact to any such resources as a result of the proposed construction of the transmission line and reservoirs. The study used historic maps and documents, archaeological summaries of the area, interviews, and field investigation. This information provided a context for the search for potential historic or traditional cultural properties.

Much of the project site is made up of modern roads, farms and residences. Some areas have not been directly disturbed in recent times but still have been heavily influenced by 20th century agriculture and later invasion by alien species. In general, the project site retains little of the cultural character that it may have possessed in earlier times. As discussed in the preceding section, no significant archaeological remains reflecting cultural history or supporting cultural values appear to be present. Furthermore, no caves, springs, pu'u, native forest groves, gathering resources or other natural features are present on or near the project site. The vegetation is highly disturbed and does not contain the quality and quantity or resources that would be important for native gathering.

As part of the current study, an effort was made to obtain information about any potential traditional cultural properties and associated practices that might be present, or have taken place in Kealakehe and Keahuolū ahupua'a. Given the linear nature of the proposed project, consultation for the current study was designed to gather both general regional information and specific local knowledge. To this end, the following organizations and individuals were consulted by the cultural specialist: Queen Lili'uokalani Trust, the Office of Hawaiian Affairs-West Hawai'i, Kulana Huli Honua, and Lavern Muller Morikami. All consultations were informal in that they were not tape-recorded. Consultants were asked questions about both the general cultural significance of the area and their knowledge of any specific resources within the project area. Below is a summary of the participants and the information they shared.

Queen Lili'uokalani Trust

The Queen Lili'uokalani Trust owns Tax Map Parcel 3-7-4-008:001, a large property that contains the *makai* portion of the current project area. On December 2, 1909, Queen Lili'uokalani executed a Deed of Trust, which established the legal and financial foundation of an institution dedicated to the welfare of orphaned Hawaiian children. She amended her Deed of Trust in 1911 to include destitute children. It states "all the property of the Trust Estate, both principal and income...shall be used by the Trustees for the benefit of orphan and other destitute children in the Hawaiian Islands, the preference given to Hawaiian children of pure or part-aboriginal blood." The Trust was contacted by telephone and in writing in an effort to identify any culturally significant places or practices, ancient or modern, associated with their property. While the Trust did provide both archaeological and cultural background information, no culturally significant places or practices were identified within the current project area.

Office of Hawaiian Affairs-West Hawai'i

The Office of Hawaiian Affairs (OHA) is a state agency with the purpose to *mālama* (care for and perpetuate) Hawai'i's people and environmental resources in order to enhance the lifestyle of Native Hawaiians, protect their entitlements, and build a strong and healthy Hawaiian people and nation. Ms. Ruby McDonald, Community Resource Coordinator for West Hawai'i, assisted in attempts to contact Alice Benjamin Kihe, a *kupuna* that potentially grew up in the area.

Kulana Huli Honua

Kulana Huli Honua is a non-profit organization initially organized in association with the 1975 restoration of Ahu'ena Heiau, at the Kamakahonu National Historic Landmark in Kailua-Kona, by individuals who wished to practice their Hawaiian culture and to serve the community in connection with the care of Ahu'ena Heiau. It has have expanded its mission to include the protection of all sacred sites in and around the Kona area.

Mikihala Roy, the organization's executive director, met with Robert B. Rechtman, Ph.D., to discuss the current project and project area. While Ms. Roy did not identify any specific resources or practices within the project area, she expressed the view that any project that alters the landscape has a cumulative effect on the Hawaiian environment and thereby on the indigenous culture. Ms. Roy also suggested further contacts, who, to this point, have not indicated any specific concerns or knowledge of any significant cultural resources or associated cultural practices.

Laverne Lokelani Muller Morikami

Laverne Lokelani Muller Morikami (Auntie Laverne) was born on O'ahu in 1930, and is the granddaughter (through her father Richard) of Waldemar Muller and Mereana (Mary Ann) Kekaula Palaualelo. Waldemar and Mary Ann were married in 1885 and they resided on their grant property (Grant 4061) in Kealakehe, just *mauka* of the current project area, from the 1890s until Waldemar's death in 1924. Waldemar and Mary Ann had ten children; one of their middle children, Richard (born 1893) along with his second wife (Mary Kawailau Pohaku Hook), returned to reside in the family home in 1936. They had eight children; Auntie Laverne was their third.

Auntie Laverne was about six years old when she moved (in 1936) to the Kealakehe house on Grant Parcel 4061 and she resided on the parcel continuously through the 1940s. She is familiar with the *mauka* portion of the current project area, having regularly walked between her property and the Benjamin property (Grant 3970). Auntie Laverne's eldest uncle Emil Maximilian Muller married Rose Kawehiwehi Benjamin in 1908. A footpath once existed between the homestead lots of these families. By 1936 the *makai* portion (below Māmalahoa Highway) of this path was no longer in use, and Auntie Laverne could follow the path only as far as the highway, then walk north along the highway to the road just before the "Japanese School," then head *makai* to the Benjamin property along an established roadway. Auntie Laverne said that the homestead road (Kuni Road) directly *makai* of her property was overgrown and not used during her tenure (post-1936) on Grant 4061.

Impacts and Mitigation Measures

In summary, archival research and the consultation discussed above did not identify any specific natural or cultural resources with associated cultural beliefs and practices identified within the proposed development area. Moreover, none of the archaeological sites identified in Section 3.2.1 above are considered traditional cultural properties. As significant historic sites are being preserved, and no other resources or practices of a potential traditional cultural nature (i.e., landform, vegetation, etc.) appear to be present on or near the project site, and there is no evidence of any traditional gathering uses or other cultural practices, the proposed project would not appear to impact any culturally valued resources or cultural practices.

3.3 Infrastructure

3.3.1 Utilities

Existing Facilities and Services

Electrical power to DWS facilities is supplied by Hawai'i Electric Light Company (HELCO), a privately owned utility company regulated by the State Public Utilities Commission, via its island-wide distribution network. Electrical service would be installed at the new reservoirs site via an overhead line.

Telephone service is available from Hawaiian Telcom at the project site but is not required for the project. No wastewater system is available or necessary for the project.

Impacts and Mitigation Measures

The proposed action would not have any substantial impact on existing electrical facilities or HELCO's ability to provide electricity. Appropriate coordination with HELCO and Hawaiian Telcom will be conducted during the design and construction of the improvements so that disruption to utility services is minimized during construction.

3.3.2 Roadways

Existing Facilities

The project would involve construction on the Mamalahoa Highway (a County facility), and on Tomitomi Road, Kuni Road, and driveways adjacent to the paper "homestead road" that connects Kuni Road to Mamalahoa Highway. The latter are government homestead roads, none of which are currently maintained by the State or County.

Impacts and Mitigation Measures

Construction in the right-of-way of roads will disrupt traffic flow and induce short delays for motorists. In general, these impacts will be minor, because work on Mamalahoa Highway will occur only at one point and the other roads involved have very low traffic volumes.

Although the County does not currently maintain Kuni or Tomitomi Roads, construction within the rights-of-way and driveways to the new pressure breaker reservoir and to the existing Palani Tank 3/Kealakehe Tank and the Palani Tank 2 sites will require coordination with the Hawai'i County Department of Public Works. The proposed action would require construction vehicles to access the site during a period of several months for grading, excavation of the trench for the transmission line, hauling fill and materials, paving the new road, and building the new reservoirs.

The DWS will require the contractor to develop a Traffic Control Plan and coordinate with the State Department of Transportation, Highways Division (if necessary), and the Hawai'i County Department of Public Works. The Traffic Control Plan will involve measures such as restricting work hours, providing traffic control personnel, ensuring access to driveways, warning signage and cones, and other appropriate measures. Construction will be coordinated with agencies to prevent conflicts in activities.

3.3.3 Water Service

The general benefit of the project to the North Kona Area I service area is discussed in Section 1, above. This section discusses impacts to water service customers in the immediate project area.

Existing Facilities

Existing customers of Kuni Road and Tomitomi Road have water meters on Mamalahoa Highway, from which individual PVC water lines extend to their properties and homes along the road.

Impacts and Mitigation Measures

Construction of the transmission line may involve disturbance of the area that contains homeowners' lines and temporary service disruption. If such disturbance occurs, DWS will attempt to minimize the duration of disturbance and lines will be replaced.

3.4 Secondary and Cumulative Impacts

The proposed project will not involve any secondary or cumulative impacts, such as population changes or effects on public facilities, because it simply fulfills the mandate of the Department of Water Supply to provide high-quality service to its customers in *existing* service areas. Although the project would provide some short-term construction jobs, these would almost certainly be filled by local residents and would not induce in-migration.

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 adverse effects of the project – very minor and temporary disturbance to air quality, noise, visual resources, water service and traffic flow during construction – are very limited in severity, nature and geographic scale. At the current time, according to files at the Planning Department, there do not appear to be any roadway, utility or development projects being undertaken in the Tomitomi Road or Kuni Road that would combine in such a way as to produce adverse cumulative effects or involve a commitment for larger actions.

3.5 Required Permits and Approvals

The following permits and approvals would be required:

- Hawai'i County Building Division Approval and Building Permit
- Hawai'i County Planning Department Approval
- Hawai'i County Public Works Department Grading Permit, Driveway Permit, and Permit to Construct Within Right of Way
- Hawai'i State Department of Transportation ROW work approval
- National Pollutant Discharge Elimination System Permit (NPDES)

3.6 Consistency With Government Plans and Policies

3.6.1 Hawai'i State Plan and Land Use District

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 modernizing and improving water service for the North Kona district.

The project site is within the State Land Use Agricultural and Urban districts. Water system improvements are permitted uses within these districts.

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 latest version of the plan was adopted by ordinance in 2005. 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 is the following Goal and Standards:

J. Public Facilities (1) Water Policies:

- Water system improvements shall correlate with the County's desired land use pattern.
- Improve and replace inadequate systems.

Courses of Action: North Kona: Public Facilities: Water

- Continue to evaluate growth conditions to coordinate improvements as required to the existing water system in accordance with the North Kona Water System Master Plan.

Discussion: The proposed project satisfies relevant goals, objectives, and courses of action related to water systems in the North Kona District.

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. The linear project site traverses Low Density Urban, Urban Expansion and Important Agricultural Lands in the LUPAG (see Hawai'i County Planning Department letter of 10/21/05, App. 2). The proposed project is consistent with the LUPAG.

Hawai'i County Zoning. The county zoning designations for the reservoir properties and the properties traversed by the transmission line include A-1a and A-5a (Agricultural, 1- and 5-acre minimum, respectively) and RCX-2 (Residential-Commercial Mixed Use) (see Hawai'i County Planning Department letter of 10/21/05, Appendix 2). The proposed project is a permitted use within these zonings and no land use permits are required. The property is not situated within the County's Special Management Area (SMA).

PART 4: DETERMINATION

The Hawai'i County Department of Water Supply (DWS) has considered information contained within the Draft EA, and comments received in response to it. The agency has determined that the proposed project will not have significant environmental impacts, and therefore an environmental impact statement need not be prepared.. As such, DWS has issued a Finding of No Significant Impact (FONSI).

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.* As vegetation is largely non-native, with only a few common native species, and any impact to archaeological sites can be mitigated through data recovery, no valuable natural or cultural resources would be committed or lost.
2. *The proposed project will not curtail the range of beneficial uses of the environment.* No restriction of beneficial uses of the easement areas would occur, as they can be used for roadways as well. The transmission line and reservoir sites do not occupy land that would otherwise provide a beneficial environmental or social service.

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, environmentally beneficial, and fulfills aspects of these policies calling for an improved social environment with better and safer water supply. 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 would not have any adverse effect on the economic or social welfare of the County or State, and would improve the water system infrastructure to the North Kona area.
5. *The proposed project does not substantially affect public health in any detrimental way.* The facility would promote public health and safety by improving water transmission and storage capacity for North Kona and would thereby enhance the quality of water service.
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 would simply improve water system facilities for an existing service area and would not induce in-migration or affect public facilities.
7. *The proposed project will not involve a substantial degradation of environmental quality.* The project is minor and environmentally benign, and would thus not contribute to environmental degradation.
8. *The proposed project will not substantially affect any rare, threatened or endangered species of flora or fauna or habitat.* The project site supports mostly alien vegetation. Impacts to rare, threatened or endangered species of flora or fauna will not occur.
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 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.* No adverse effects on these resources would occur. Mitigation of construction-phase impacts will preserve water quality. Ambient noise impacts due to construction will be temporary and restricted to daytime hours.
11. *The project does not affect nor would it likely to be damaged as a result of being located in 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 volcanic and seismic risk, the entire Island of Hawai'i shares this risk, and the project is not imprudent to construct, and employs design and construction standards appropriate to the seismic zone.
12. *The project will not substantially affect scenic vistas and viewplanes identified in county or state plans or studies.* No scenic vistas and viewplanes will be adversely affected.
13. *The project will not require substantial energy consumption.* The construction and operation of the facility would require minimal consumption of energy. No adverse effects would be expected.

For the reasons above, the proposed Action will not have any significant effect in the context of Chapter 343, Hawai'i Revised Statues and section 11-200-12 of the State Administrative Rules.

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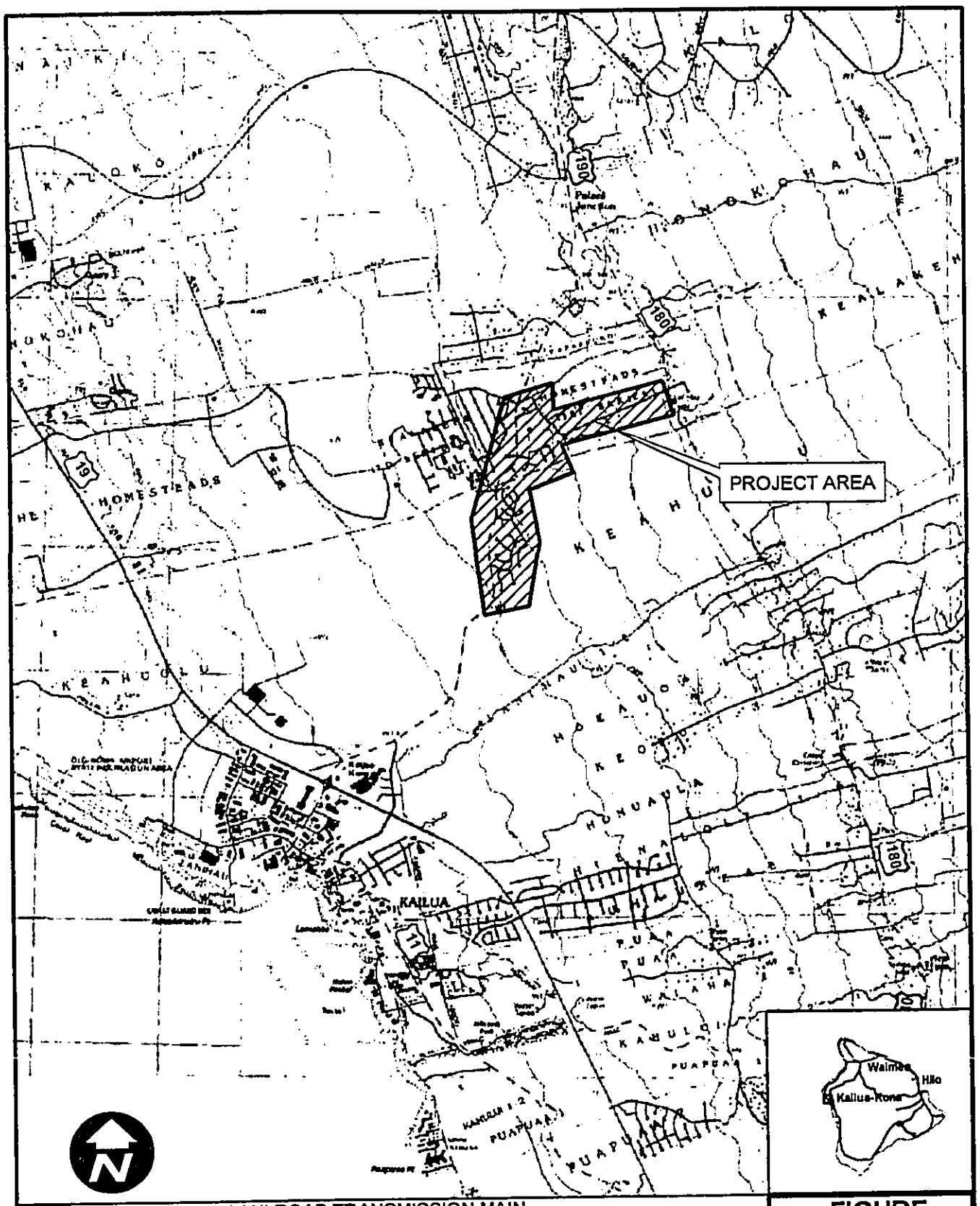
APPENDIX 1

FIGURES

Index to Figures



PALANI ROAD TRANSMISSION MAIN

KAILUA-KONA REGION

Prepared by: Akinaka & Associates, Ltd. - Consulting Engineers

FIGURE

1

Date: January 9, 2006

File: G:\doth95019\gis\EIS\Exhibit\4-2.mxd
Date: 02/07/2004

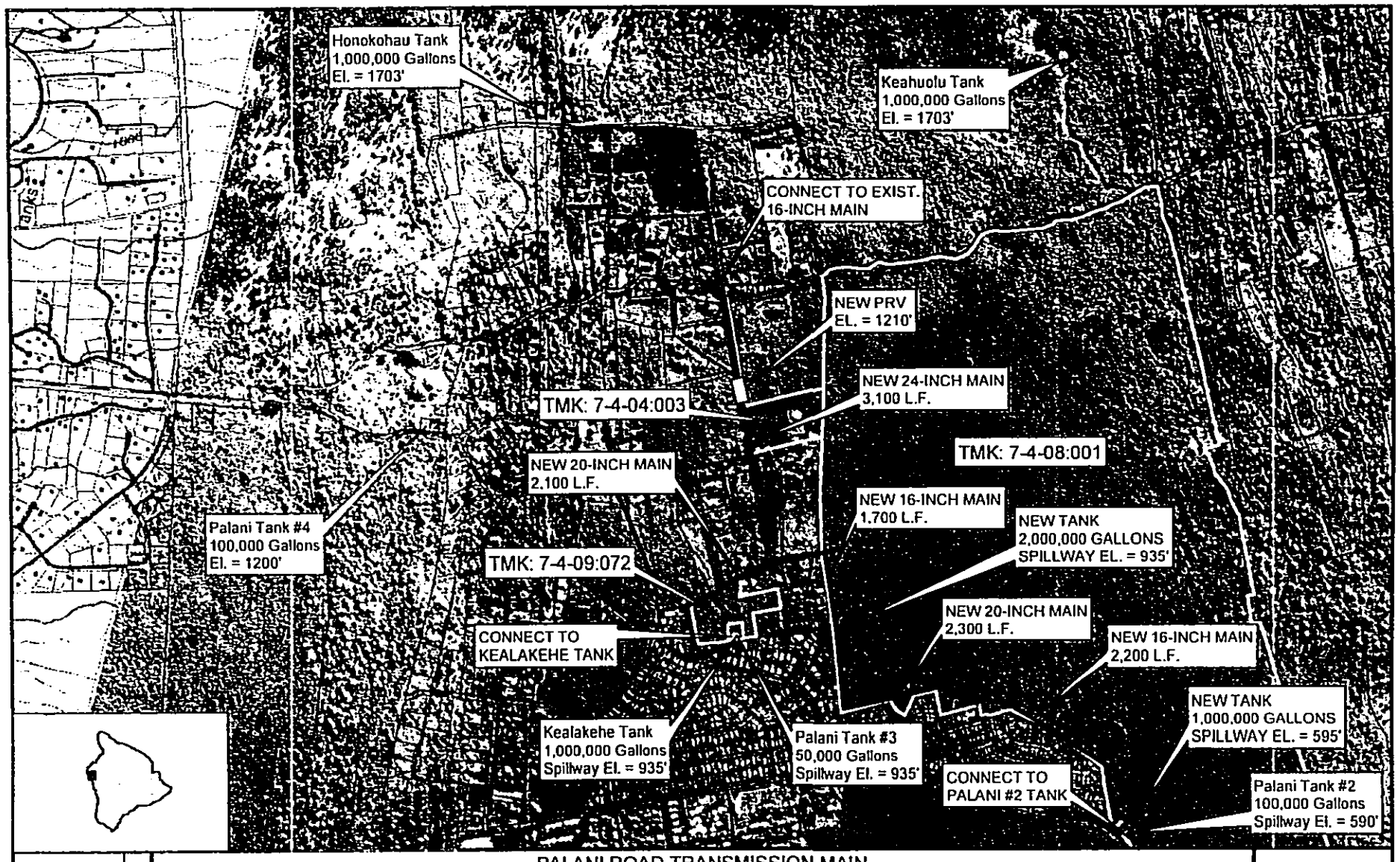

Honokohau Tank
1,000,000 Gallons
El. = 1703'
Keahuolu Tank
1,000,000 Gallons
El. = 1703'
CONNECT TO EXIST.
16-INCH MAIN
NEW PRV
EL. = 1210'
NEW 24-INCH MAIN
3,100 L.F.
TMK: 7-4-04:003
TMK: 7-4-08:001
NEW 20-INCH MAIN
2,100 L.F.
NEW 16-INCH MAIN
1,700 L.F.
NEW TANK
2,000,000 GALLONS
SPILLWAY EL. = 935'
Palani Tank #4
100,000 Gallons
El. = 1200'
TMK: 7-4-09:072
NEW 20-INCH MAIN
2,300 L.F.
NEW 16-INCH MAIN
2,200 L.F.
CONNECT TO
KEALAKEHE TANK
NEW TANK
1,000,000 GALLONS
SPILLWAY EL. = 595'
Kealakehe Tank
1,000,000 Gallons
Spillway El. = 935'
Palani Tank #3
50,000 Gallons
Spillway El. = 935'
CONNECT TO
PALANI #2 TANK
Palani Tank #2
100,000 Gallons
Spillway El. = 590'
PALANI ROAD TRANSMISSION MAIN
PROJECT AREA
0 500 1,000 2,000
Feet
FIGURE
2

FIGURE 3A VIEW FROM MAUKA END OF PROJECT MAKAI

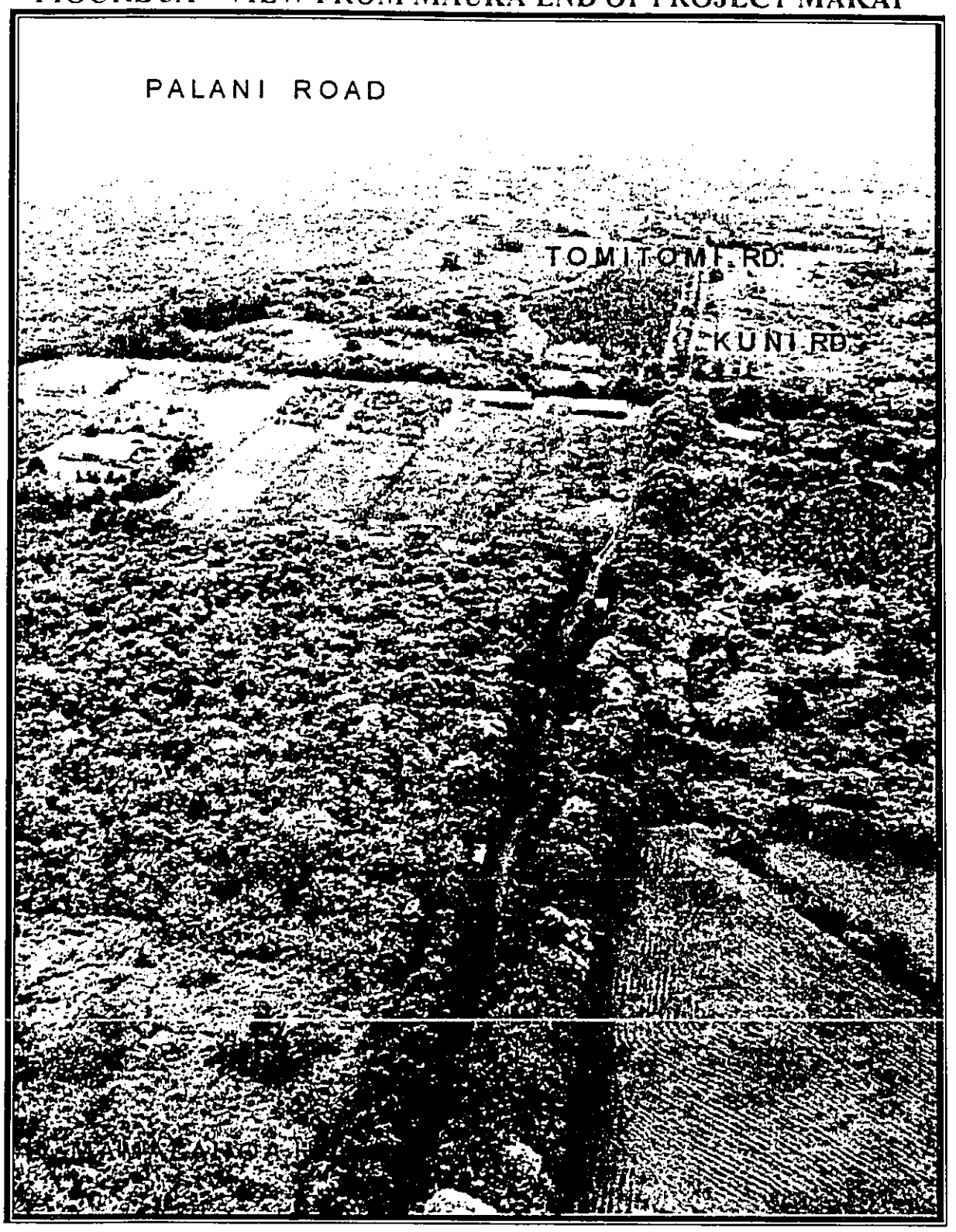


FIGURE 3B VIEW UP KUNI ROAD

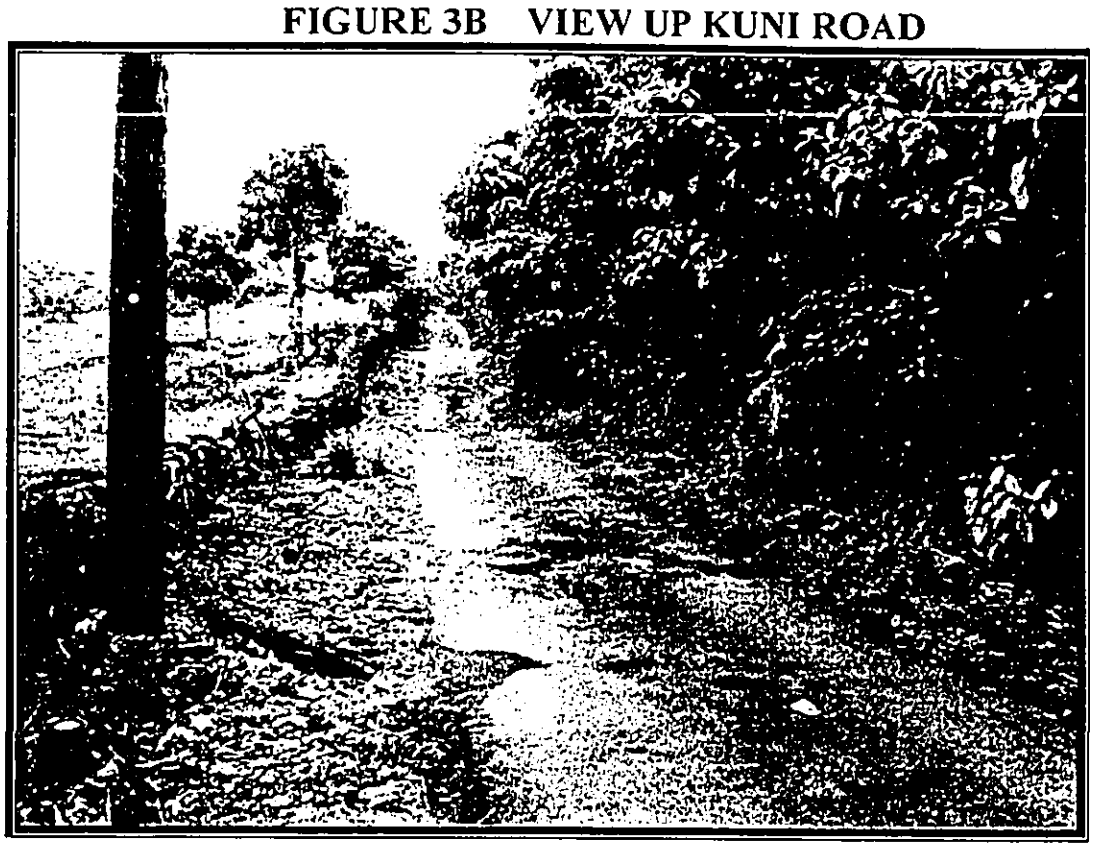


FIGURE 3C SOUTH END OF TOMITOMI ROAD

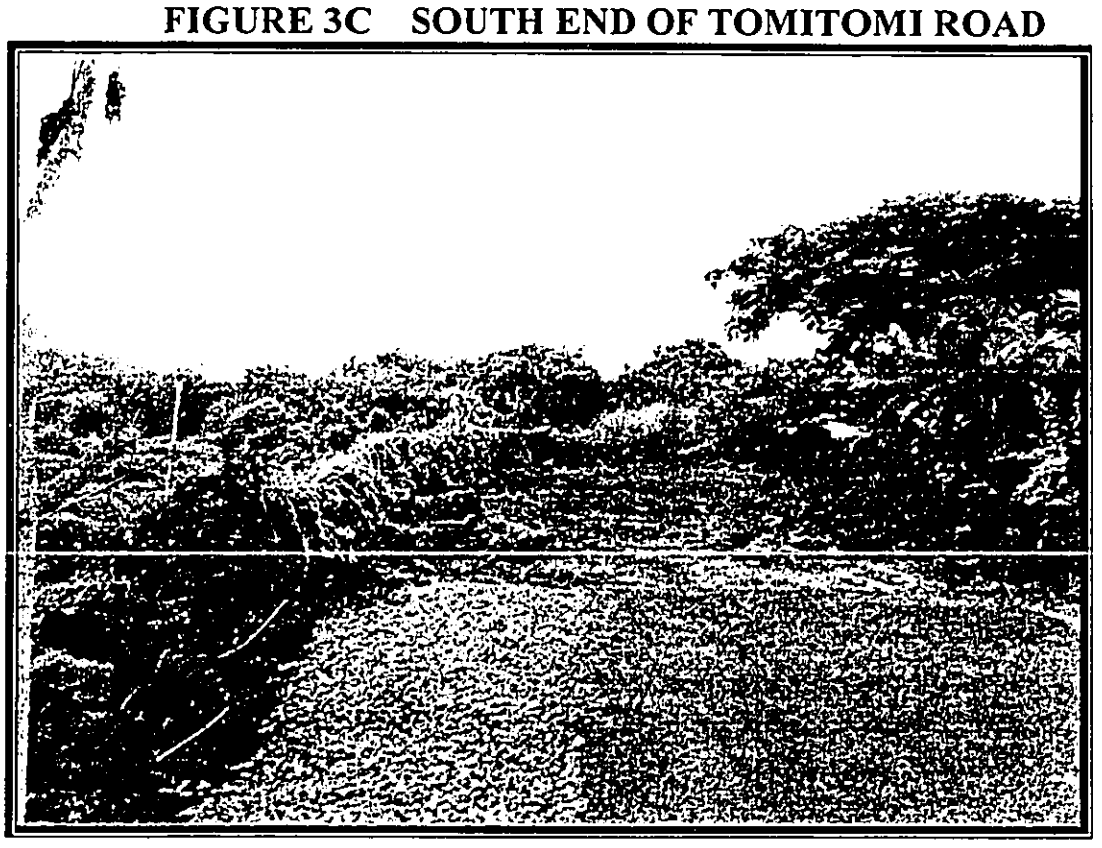
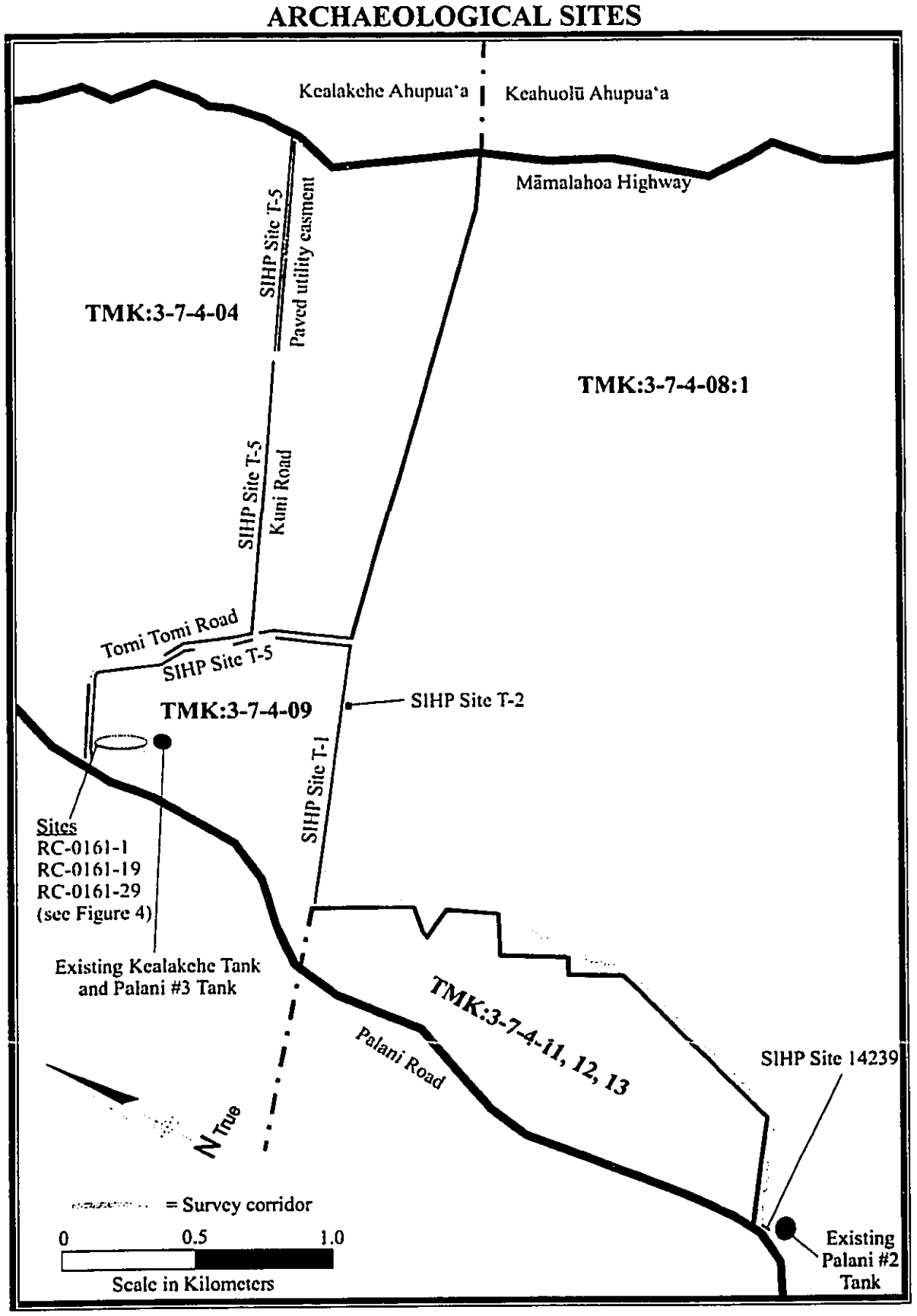


FIGURE 4
ARCHAEOLOGICAL SITES



APPENDIX 2A

PUBLIC INVOLVEMENT

LETTERS IN RESPONSE TO PRECONSULTATION

Harry Kim
Mayor

Christopher J. Yuen
Director

Roy R. Takemoto
Deputy Director

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

October 21, 2004

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

Dear Mr. Terry:

Subject: Draft Environmental Assessment Consultation
Applicant: Hawaii County Department of Water Supply
Project: Palani Road Transmission Main and Reservoir
TMK: 7-4-4:3, 7-4-9:72 and 7-4-8:1, North Kona, Hawai'i

This is in response to your request for comments on the above-referenced project.

According to your submittal, the Department of Water Supply plans to construct water transmission mains and systems improvements to its Palani Road System in order to supply the community with potable water from the high-level well sources. The project would install about 11,500 linear feet of transmission mains connecting the existing 16-inch water main in Mamalahoa Highway with three existing reservoirs and the construction of a new 1.0 million gallon (mg) concrete reservoir.

The water transmission mains would be installed underground with a 10-foot wide paved access road over them. The new reservoir would have an asphalt concrete pavement driveway, perimeter fencing and appurtenances, and associated water mains to connect the reservoir to the water distribution system.

We note the following for the proposed project sites:

TMK NUMBER	AREA	STATE LAND USE	COUNTY ZONING	GENERAL PLAN	SMA
7-4-4:3	6.277 acres	Agricultural	Agricultural (A-5a)	Important Ag. Lands	No
7-4-9:72	9.138 acre	Urban	Agricultural (A-1a)	Low Density Urban	No
7-4-8:1	663.079 acres	Urban & Agricultural	*RCX-2 & Agricultural (A-5a)	Urban Expansion, Low Density Urban & Important Ag. Lands	No

*RCX: Residential-Commercial Mixed Use

Further, the Hawaii County Zoning Code, Section 25-4-11 states that public and private utilities are permitted in any district. Therefore, no land use permits are required for the proposed project.

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

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

Sincerely,

CHRISTOPHER J. YUEN
Planning Department

ETI:cd
P:\WPWIN60\ETI\EAdraft\Pre-consul\TerryDWSPalaniRdTransMain&Reservoir.doc

cc: Planning Department – Kona

Harry Kim
Mayor

Bruce C. McClure
Director

Jiro A. Sumada
Deputy Director

County of Hawai'i

DEPARTMENT OF PUBLIC WORKS
Aupuni Center
101 Pauahi Street, Suite 7 • Hilo, Hawai'i 96720-4224
(808) 961-8321 • Fax (808) 961-8630

October 17, 2005

Mr. Ron Terry
Geometrician Associates, LLC
HC2 Box 9575
Kea'au, HI 96749

Subject: Environmental Assessment Consultation
Palani Road Transmission Main and Reservoir Project
North Kona, Hawaii

We received your request dated October 6, 2005 and have the following comments:

We very much appreciate the consideration for the traveling public in Kona, for keeping the project out of Palani Road as much as possible and minimizing any traffic disruptions.

1. Longitudinal trench patching of County road traveled lanes shall be allowed only if the pavement outside the trench has not been damaged and was in need of resurfacing prior to the project. The entire lane shall otherwise be re-paved after removing the old pavement by cold planing.

2. All development generated runoff shall be disposed of on site and shall not be directed to adjacent properties.

3. All earthwork and grading shall conform to Chapter 10, Erosion and Sediment Control, of Hawaii County Code.

4. The applicant shall comply with chapter 11-55, Water Pollution Control, Hawaii Administrative Rules, Department of Health, which requires an NPDES permit for certain construction activity.

Thank you for the opportunity to comment. If you have any questions, please contact Kiran Emler of our Kona office at 327-3530.

Galen M. Kuba, Division Chief
Engineering Division

KE

c: ENG-HILO/KONA

LINDA LINGLE
GOVERNOR

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

RODNEY K. HARAGA
DIRECTOR

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BRUCE Y. MATSUI
BARRY FUKUNAGA
BRENNON T. MORIOKA
BRIAN H. SEKIGUCHI

IN REPLY REFER TO:

STP 8.1923

October 25, 2005

Mr. Ron Terry
Geometrician Associates, LLC
HC 2 Box 9575
Kea'au, Hawaii 96749

Dear Mr. Terry:

Subject: Early Consultation, Environmental Assessment
Palani Road Transmission and Reservoir Project
County of Hawaii, Department of Water Supply

Thank you for notifying us of the planned water project. This is to advise you that if any water service facilities cross or adjoin our highway right-of-way or affect any intersections with Mamalahoa Highway, these impacts need to be properly assessed and evaluated.

As part of your forthcoming environmental assessment work, please provide the necessary information and clarification to our Highways Division, Hawaii District Office and coordinate any impact assessment with them. We look forward to a coordinated effort on this project with the County of Hawaii Department of Water Supply.

We appreciate your advance notification on the water project.

Very truly yours,

RODNEY K. HARAGA
Director of Transportation

DALANI

Dear Mr. Terry:

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

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

Thank you.

Jiacai Liu
Land Use Review Coordinator
Environmental Planning Office /DOH
(808) 586-4346

APPENDIX 2B

PUBLIC INVOLVEMENT

COMMENTS TO DRAFT EA AND RESPONSES

NOTICE AND NOTES OF PUBLIC MEETING, 7/20/06

OEQC NOTICE OF PUBLICATION OF DRAFT EA

Harry Kim
Mayor

Lawrence K. Mahuna
Police Chief

Harry S. Kubojiri
Deputy Police Chief

County of Hawaii
POLICE DEPARTMENT
349 Kapiolani Street • Hilo, Hawaii 96720-3998
(808) 935-3311 • Fax (808) 961-2389

July 11, 2006

Mr. Ron Terry
Geometrician Associates, LLC
HC2 Box 9575
Keaau, Hawaii 96749

Dear Mr. Terry:

SUBJECT: PALANI ROAD TRANSMISSION MAIN AND RESERVOIR PROJECT
DRAFT ENVIRONMENTAL ASSESSMENT

This is in response to your request for comments received on July 5, 2006, regarding the Draft Environmental Assessment (DEA) for the Palani Road Transmission Main and Reservoir Project.

Staff has reviewed the draft and has the following comments:

1. Staff supports the plan to take the water main off Palani Road and run it in the corridor proposed in the DEA.

2. During construction, there should be no obstruction to traffic along Mamalahoa Highway between 6:00 a.m. to 8:00 a.m. and 3:30 p.m. to 6:00 p.m. During all other hours, one lane should be open at all times.

3. Any work causing a traffic obstruction of any kind on Palani Road should be conducted between 7:00 p.m. and 5:30 a.m.

4. Staff notes that this project will require the acquisition of a utility right-of-way and that this right-of-way will be paved. Given the shortages of connector roads within the Kona District, staff recommends that the Hawaii County Department of Water Supply consider communicating with both the County Planning Department and Department of Public Works to study the viability of creating a useable County roadway over this utility right-of-way.

If you have any questions, please call Captain Paul Kealoha, Commander of the Kona District, or Major John Dawrs, Area II Operations, at 326-4646, Extensions 249 and 299, respectively.

Sincerely,

LAWRENCE K. MAHUNA
POLICE CHIEF

JED:dmv

cc: Larry Beck, Department of Water Supply
Director, Office of Environmental Quality Control

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

September 25, 2006

TO: Mr. Lawrence Mahuna, Chief
County of Hawai'i, Police Department

FROM: Milton D. Pavao, Manager

**SUBJECT: DRAFT ENVIRONMENTAL ASSESSMENT (EA) FOR PALANI ROAD TRANSMISSION AND RESERVOIR PROJECT
TAX MAP KEY 7-4-004:003; 7-4-009:072, AND 094; AND 7-4-008:001 AND 028
NORTH KONA, ISLAND OF HAWAI'I**

Thank you for your comment letter dated July 11, 2006, on the Draft EA. The following are in answer to your specific comments:

1. *Support for decision to take water main off Palani Road.* Thank you for evaluating and supporting the Department of Water Supply's decision.

2-3. *Traffic control hours.* Your comments will be carefully taken into account in developing detailed traffic control plans.

4. *Converting utility right-of-way to a through road.* We agree that there is a shortage of mauka-makai roadways in this area. However, this particular route would not have been selected if the intent of the project had been to provide both a roadway and a water transmission line, because: a) Kuni Road, which is flanked by historic walls, has inadequate width to accommodate a County collector road, and b) the route uses easements over driveways for a significant part of its length below Mamalahoa Highway. It is expected that development of adjacent Queen Liliuokani Trust land will eventually provide a reasonable connector in this area.

Again, thank you for your careful review of the document and your comments. Please contact Mr. Lawrence Beck of our Water Resources and Planning Branch at (808) 961-8070, extension 260, should you have any questions.

Sincerely yours,

Milton D. Pavao, P.E.
Manager

LEB:sco

copy - Mr. Ron Terry, Geometrician Associates
Mr. Sheldon Yamasato, Akinaka & Associates, Ltd.

... Water brings progress...

Harry Kim
Mayor

Christopher J. Yuen
Director

Brad Kurokawa, ASLA
LEED® AP
Deputy Director

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

July 24, 2006

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

Dear Mr. Terry:

SUBJECT: **Draft Environmental Assessment (DEA)**
Applicant: **Hawaii County Department of Water Supply**
Project: **Palani Road Transmission Main and Reservoir**
Location: **Kealakehe & Keahuolu, North Kona, Island of Hawaii**
Tax Map Key: **(3) 7-4-004:003, 7-4-009:072 & 7-4-008:001**

We are in receipt of the subject Draft Environmental Assessment and after careful review we have only the following comments to offer in addition to those provided in our pre-consultation letter dated October 24, 2004.

The agencies and organizations consulted in development of the DEA listed in Section 1.4 (pg. 3) should be amended to include the State of Hawaii Department of Transportation, which by its letter dated October 25, 2005 provided comments on the subject project. We also recommend that the State of Hawaii Department of Health, Environmental Management Division should be included among the consulted agencies.

Thank you for the opportunity to review a comment on this DEA. Should you have questions, please feel welcome to contact Larry Brown or Esther Imamura of my staff at 961-8288.

Sincerely,

CHRISTOPHER J. YUEN
Planning Director

LMB:ld
P:\Wpwin60\Larry\EA-EIS Comments\Geometrician-DWS PalaniRd DEAcmnts.doc

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

September 25, 2006

TO: Mr. Christopher J. Yuen, Director
Hawai'i County Planning Department

FROM: Milton D. Pavao, Manager

**SUBJECT: DRAFT ENVIRONMENTAL ASSESSMENT (EA) FOR PALANI ROAD TRANSMISSION AND RESERVOIR PROJECT
TAX MAP KEY 7-4-004:003; 7-4-009:072, AND 094; AND 7-4-008:001, AND 028
NORTH KONA, ISLAND OF HAWAI'I**

Thank you for your comment letter on the Draft EA dated July 24, 2006, in which you stated that the State of Hawai'i, Department of Transportation, be added to the list of consulted agencies to reflect the fact that they were indeed consulted, and that the Department of Water Supply also consult with the State of Hawai'i, Department of Health, Environmental Management Division, (which received a Draft EA and issued a comment letter). We have added both agencies to this list in the Final EA. Thank you for your review of the document.

Please contact Mr. Lawrence Beck of our Water Resources and Planning Branch at (808) 961-8070, extension 260, should you have any questions.

Sincerely yours,

Milton D. Pavao, P.E.
Manager

LEB:sco

copy - Mr. Ron Terry, Geometrician Associates
Mr. Sheldon Yamasato, Akinaka & Associates, Ltd.

... Water brings progress...

Mr. Lawrence Beck
Dept of Water Supply
345 Kekuanaoa Street, Suite 20
Hilo, Hawaii 96720

August 8, 2006

Re: Dept of Water Supply Palani Road Transmission Project

Dear Mr. Beck,

We are writing this letter to comment on the proposed Palani Road Transmission Waterline Project. We have reviewed the Draft Environmental Assessment and attended the July 20 informational meeting at Kealakehe High school.

We were very disappointed that only 3 of our Tomi Tomi Drive neighbors were able to attend the July 20 meeting. None of our neighbors received any notice of the meeting. We only found out about the meeting from an e-mail from Ron Terry of Geometrician Associates. Contrary to what the Meeting Notice says, there still is no posting of the Meeting Notice on the Dept of Water Supply web site.

The following is a list of concerns expressed by ourselves and our neighbors: We would very much appreciate your responses to these issues.

1. The proposed route for the transmission line via Kuni and Tomi Tomi Drive will have significant impact on the quality of life of local residents for the next two years during construction. At the July 20 meeting, we asked why this route was chosen as compared to routing the line down the northern boundary of the undeveloped Lili oukalani Trust Land.
The answer given was the Lili oukalani route would be steeper, requiring more engineering and cost. The second reason was the possibility of encountering archeological artifacts.

Our question is how thorough was the evaluation of the route through the Lili oukalani land? Was a preliminary survey for archeological artifacts conducted? Was a cost estimate for this route prepared? What information is available to support the reasons given for not using the Lili oukalani corridor?

2. The stated purpose in the Draft Environmental Assessment for the new Palani Transmission Line is to "promote public health and safety by improving water service for this community". However, improving the water service for local residents is being totally neglected.
All of the Tomi Tomi Drive residents mauka of Tomi Tomi Drive receive County water from meters located on the Mamalahoa Highway. Residents have to maintain their own water lines from the meters to their property with some lines over one half mile in length. It has been our experience that water pressures on these lines vary considerably. It is our opinion that this type of service is sub-standard as compared to current water service available.

We believe that, to resolve these problems and provide satisfactory water service to local residents, it is only reasonable to request that the Dept of Water Supply provide water service to all local residents from the new transmission line.

3. Residents along Palani Road have fire protection via fire hydrants installed on the existing Palani Road transmission main. There are no fire hydrants within one half mile of the upper Tomi Tomi Drive area. This is a serious safety hazard as there is only one way in and out of Tomi Tomi Drive.

As the new transmission line is being routed through this area with significant impact to local residents for the next two years, we believe it is only reasonable to request that the Dept of Water Supply install fire hydrants at appropriate locations along the transmission line.

4. The Draft EA and responses at the July 20 meeting were non-specific as to the length of delays in and out of the Tomi Tomi Drive area by local residents during construction of the transmission line. Also, other than stating dust control and noise will be managed, there is no specific language in the Draft EA as to how ingress and egress will be managed and how dust and noise will be managed.

We *feel it is only reasonable to request* specific details and plans for traffic and delay management and dust and noise control. We would very much appreciate specific details from the Dept of Water Supply regarding how these issues will be controlled.

5. Kuni Street and Tomi Tomi Drive are listed by the County as "Roads In Limbo" and have never been maintained by the State or County. Subsequently, these roads are in states of major disrepair. The construction of the transmission line will surely damage the roads substantially.

We therefore request that Dept. of Water Supply commit to completely re-pave the full surfaces of Kuni Street and Tomi Tomi Drive upon completion of the transmission line. This is fully appropriate after two years of disruption and significant impact to the quality of life of all the local Tomi Tomi Drive area residents during the transmission line construction.

Our impression, after speaking with the DWS representatives, was that this plan was prepared with very little concern for the impact on residents in the construction area.
As the notice of the public meeting was inadequate, we strongly suggest the Dept of Water Supply schedule another public meeting for comment on this project and notify all affected residents by mail to give them an opportunity to provide their comments on this project.

Best Regards,

Fred & Barbara Housel
331-8602

74-5063 Tomi Tomi Drive
Kailua Kona, Hi 96740

Bud & Betty Patton
74-5070 Tomi Tomi Drive

Richard & Lilia Akiona
74-5011 Kuni Street

Roy & Dotty Jardine
Malia Street

James DeGuair
74-5065 Tomi Tomi Drive

cc: K. Angel Pilago, Hawaii County Council, North Kona
George Wilkins, Board Member, Dept of Water Supply
Barbara J. Kossow, Deputy Managing Director, Office of The Mayor

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

September 25, 2006

Mr. Fred and Ms. Barbara Housel
74-5063 Tomi Tomi Drive
Kailua-Kona, HI 96740

DRAFT ENVIRONMENTAL ASSESSMENT (EA) FOR PALANI ROAD TRANSMISSION AND RESERVOIR PROJECT
TAX MAP KEY 7-4-004:003; 7-4-009:072, AND 094; AND 7-4-008:001 AND 028
NORTH KONA, ISLAND OF HAWAI'I

Thank you for your comment letter dated August 8, 2006, on the Draft EA, as well as your input at the public meeting on July 20, 2006, and the Water Board meeting held on August 22, 2006. In answer to the specific comments in your letter, and considering the comments you made at the meetings the following is submitted:

1. *Evaluation of the alternate routes, including Queen Liliuokalani Trust lands route.* The Department of Water Supply (DWS) and its consultant, Akinaka & Associates, Ltd., carefully considered the impact of construction on the public; and that is exactly why we chose the intended route rather than coming down Palani Road. A route coming down Palani Road would not only have impacted those trying to get out onto Palani Road from Tomi Tomi Drive and Kuni Road, but also thousands of other members of the local community who must use Palani Road on a regular basis. In addition, the impacts would have lasted several months or more rather than a few weeks. Using the Queen Liliuokalani Trust (QLT) route instead of Kuni Road and driveway easements, as proposed, would require additional grading of many more acres of undisturbed land, which would cause more expense to produce a road that had no other function than to access the pipeline, instead of improving Kuni Road. Using QLT property for the route from Mamalahoa Highway down to Tomi Tomi Road would have added a 50-foot-wide corridor over 3,000 feet long to the area required to be surveyed for archaeology. A route that had a greater proportion of its length on QLT land would have a correspondingly greater chance of encountering archaeological sites, some of which would require the expense of data recovery by a professional archaeologist before the area could be cleared for construction. Some sites might even require preservation in place, which could lead to a requirement to survey a substitute line. Indeed, the areas on QLT property that were surveyed for the lower part of the transmission line did contain archaeological sites, some of which will require data recovery. Although each of these factors–extra grading, paving of an extra road, drainage and water quality function of undisturbed land, and archaeological investigations–can be quantified as to cost, it would not be a simple or precise task. It is clear, however, that the QLT route would be more expensive and involve more uncertainties. Furthermore, the QLT route would not eliminate the need to install the pipeline within Tomi Tomi Drive over the exact same route as now planned. DWS still needs to connect the new pipeline to its existing Palani Reservoir

No. 3 site and that would be through Tomi Tomi Drive. It may have eliminated the installation in Kuni Road, but the much greater concern seems to be about Tomi Tomi Drive access rather than Kuni Road.

2. *Improving Water Service for the Community.* The purpose of the project is to improve service to a very large number of our customers in North Kona. The pipeline to be installed is a transmission line and; therefore, no individual services will be allowed off the new line. Many services throughout the county are similar to those serving the Tomi Tomi Drive and Kuni Road area, and they are not considered sub-standard services for lots within *preexisting* subdivisions. Alternate service connections could be installed along Palani Road, which would decrease the amount of private line to be maintained by the property owners, if the individual property owners wish to pursue a relocation of their existing meters.

3. *Fire hydrants.* DWS will ask the project consultant to determine the feasibility of installing a fire hydrant somewhere in the vicinity of Tomi Tomi Drive and Kuni Road to provide potential fire protection. Easements from private landowners may need to be granted to DWS to allow for the installation of the hydrant along the narrow corridors. One concern to be noted is that any fire fighting equipment driven in to the location of the hydrant may block residents from being able to flee from the hazard area in the event of an emergency. The hydrant is being considered at the request of the property owners and not at the recommendation of the DWS.

4. *Construction time; length of time of delays on Tomi Tomi Road; dust and noise.* Although the overall project, which includes the construction of some water storage reservoirs, will take approximately two years to complete, the duration of the pipeline installation in the area of Tomi Tomi Drive and Kuni Road should be just a matter of weeks. It will be in the best interest of the contractor to get in and get out of that area as quickly as possible. There may continue to be some construction traffic through the area over the duration of the project but nothing that would close the road or affect reasonable access to properties along the route. The contractor will need to coordinate the work to accommodate reasonable access by the surrounding property owners. Typical time delays on water transmission construction projects are less than five minutes. DWS will hold a meeting prior to construction. The meeting with the community will include the contractor to provide more specific information that will be available when design is final and the contractor develops a detailed plan of construction. DWS appreciates the fact that residents will be required to sacrifice some convenience and quiet in order to improve the water system for the entire community. Officials at DWS will endeavor to minimize any such inconvenience and look forward to working with residents to produce a project that is environmentally sound and beneficial. For discussion of noise and dust impacts, please refer to Section 3.1.4 of the EA, which describes the basic elements of the dust control plan and the Community Noise Control permit consultation with State of Hawai'i, Department of Health (DOH), that will be required of the contractor. These actions will ensure that dust is minimized and that noise from the site is minimized and meets DOH regulations. It is not possible, at this time, to specify which of the noise control measures listed will be required by DOH.

5. *Paving of Kuni Street and Tomi Tomi Road.* After construction, the affected roads will be restored to equal or better conditions than the existing conditions so any damage caused by equipment or trenching will be properly repaired and repaved. Both roads will be significantly improved as a result of the project.

We would also like to address the point regarding the adequacy of notice for the July 20, 2006, meeting that you mentioned at both that meeting and later at the August Water Board Meeting. The newspaper advertising done for the public meeting in July met the standard requirements for notification. We advertised on Sunday for two consecutive weekends in both the Tribune Herald and West Hawaii Today. Mr. Ron Terry of Geometrician Associates, who is working on the Environmental Assessment for the project, provided additional notification to any property owners along the route who had responded to an earlier mailing. We do apologize that, in this case, notice was not posted on the DWS website as would normally be done. We will do a better job of following up on the website posting for future public meetings. If you can provide us a contact list of affected property owners, DWS will make an effort to notify them directly of future public meetings for this project. For greatest efficiency, email addresses would be the preferred method of contact. Contact information can be emailed to Mr. Lawrence Beck at lbeck@hawaiidws.org.

We appreciate your attendance and dialogue at the Board meeting as well as at the public meeting we held on July 20, 2006, for the project. We hope we have addressed your concerns. Please contact Mr. Lawrence Beck of our Water Resources and Planning Branch at (808) 961-8070, extension 260, should you have further questions, and be assured that we will continue to closely coordinate with you and your neighbors, whose cooperation in this important project we greatly appreciate.

Sincerely yours,

Milton D. Pavao, P.E.
Manager

LEB:sco

copy - Mr. Ron Terry, Geometrician Associates
Mr. Sheldon Yamasato, Akinaka & Associates, Ltd.

LINDA LINGLE
GOVERNOR OF HAWAII

GENEVIEVE SALMONSON
DIRECTOR

STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
235 SOUTH BERETANIA STREET
SUITE 702
HONOLULU, HAWAII 96813
TELEPHONE (808) 586-4185
FACSIMILE (808) 586-4186
E-mail: oeqc@health.state.hi.us

August 4, 2006

Mr. Milton D. Pavao, Manager
Department of Water Supply
345 Kekuanaoa Street, Suite 20
Hilo, Hawai'i 96720

Dear Mr. Pavao:

Subject: Draft EA for the Palani Road Transmission Main and Reservoir, Hawai'i

Thank you for the opportunity to review and comment on the subject project. We have the following comments.

1. Please consult with the State Department of Transportation.

Should you have any questions, please call Jeyan Thirugnanam at 586-4185.

Sincerely,

Genevieve Salmonson

Genevieve Salmonson
Director

c: Ron Terry

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

September 25, 2006

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

DRAFT ENVIRONMENTAL ASSESSMENT (EA) FOR PALANI ROAD TRANSMISSION AND RESERVOIR PROJECT
TAX MAP KEY 7-4-004:003; 7-4-009:072 AND 094; AND 7-4-008:001 AND 028
NORTH KONA, ISLAND OF HAWAI'I

Thank you for your comment letter on the Draft EA dated August 4, 2006, in which you advised that Department of Water Supply consult with the State of Hawai'i, Department of Transportation. We provided this agency a copy of the EA and allowed them an opportunity to provide comment. They stated that as the proposed improvements would not impact a State facility, they did not have any concerns. Thank you for your review of the document.

Please contact Mr. Lawrence Beck of our Water Resources and Planning Branch at (808) 961-8070, extension 260, should you have any questions.

Sincerely yours,

Milton D. Pavao, P.E.
Manager

LEB:sco

copy – Mr. Ron Terry, Geometrician Associates
Mr. Sheldon Yamasato, Akinaka & Associates, Ltd.

... Water brings progress...

LINDA LINGLE
GOVERNOR OF HAWAII

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

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

In reply, please refer to:
EPO-06-116

August 3, 2006

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

Dear Mr. Terry:

SUBJECT: Draft Environmental Assessment for Palani Road Transmission Main and Reservoir Project, North Kona District, Island of Hawaii, Hawaii
TMK: (3) 7-4-04:03; 7-4-09:72 and 94; 7-4-08: 01 and 28

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

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

Sincerely,

KELVIN H. SUNADA, MANAGER
Environmental Planning Office

c: EPO

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

September 25, 2006

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

DRAFT ENVIRONMENTAL ASSESSMENT (EA) FOR PALANI ROAD TRANSMISSION AND RESERVOIR PROJECT
TAX MAP KEY 7-4-004:003; 7-4-009:072 AND 094; AND 7-4-008: 001 AND 028
NORTH KONA, ISLAND OF HAWAI'I

Thank you for your comment letter on the Draft EA dated August 3, 2006, in which you advised reviewing State of Hawai'i, Department of Health, Environmental Planning Office's standard comments on the State of Hawai'i, Department of Health website. We reviewed these comments in the preparation of the EA and included relevant discussion in various sections, including water quality and need for permits. Thank you for your review of the document.

Please contact Mr. Lawrence Beck of our Water Resources and Planning Branch at (808) 961-8070, extension 260, should you have any questions.

Sincerely yours,

Milton D. Pavao, P.E.
Manager

LEB:sco

copy - Mr. Ron Terry, Geometrician Associates
Mr. Sheldon Yamasato, Akinaka & Associates, Ltd.

... Water brings progress...

PHONE (808) 594-1888

FAX (808) 594-1865

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

HRD06/2554

October 4, 2006

Ron Terry
Geometrician Associates
HC 2 Box 9575
Kea'au, HI 96749

RE: Draft Environmental Assessment (DEA), Palani Road Transmission Main and Reservoir Project, North Kona, Hawai'i, TMKs: 7-4-004:003, 7-4-009:072 & 094, 7-4-008:001 & 028.

Dear Mr. Terry,

The Office of Hawaiian Affairs (OHA) is in receipt of your request for comments on the above-referenced project. We apologize for the delayed response and offer the following comments.

According to the DEA, two historic properties within the project area have been recommended for preservation, and one has been recommended for data recovery, in accordance with pertinent Hawai'i Revised Statue and Administrative Rules. We recommend that the Final Environmental Assessment include acceptance letters from the Department of Land and Natural Resources-State Historic Preservation Division (DLNR-SHPD) regarding mitigation commitments for these three historic properties.

We also recommend, given the fact that several historic properties were identified in the project area, and given its location within the Kona Field System—perhaps the largest, traditional agricultural-habitation complex in all of Polynesia, that you omit or qualify the following conclusion (p.23): "...the proposed project would not appear to impact any culturally valued resources or cultural practices."

OHA further requests your assurances that if this project goes forward, should iwi or Native Hawaiian cultural or traditional deposits be found during ground disturbance, work will cease, and the appropriate agencies will be contacted pursuant to applicable law.

Thank you for the opportunity to comment. If you have further questions or concerns, please contact Kai Markell, Lead Advocate – Culture, at (808) 594-1945 or kaim@oha.org.

Sincerely,

Clyde W. Nāmu'o
Administrator

cc: Director
OEQC
235 South Beretania Street, Suite 702
Honolulu, HI 96813

Larry Beck
Hawaii County Department of Water Supply
345 Kekuanaoa Street, Suite 20
Hilo, HI 96720

Ruby McDonald
Community Resource Coordinator
OHA – Kona Office
75-5706 Hanama Place, Suite 107
Kailua-Kona, HI 96740

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

November 9, 2006

Mr. Clyde W. Nāmu'o
State of Hawai'i
Office of Hawaiian Affairs
711 Kapiolani Boulevard, Suite 1250
Honolulu, HI 96813

DRAFT ENVIRONMENTAL ASSESSMENT (EA) FOR PALANI ROAD TRANSMISSION AND RESERVOIR PROJECT
TAX MAP KEY 7-4-004:003; 7-4-009:072 AND 094; AND 7-4-008:001 AND 028
NORTH KONA, ISLAND OF HAWAI'I

Thank you for your comment letter dated October 4, 2006, on the Draft Environmental Assessment. In answer to your specific comments:

1. *Approval and implementation of mitigation commitments for historic sites.* Please see the beginning of Appendix 3, which includes a letter dated February 3, 2006, approving the recommendations of data recovery for Site 23845 and preservation of Sites 24853 and 24955. DWS will ensure that the data recovery and preservation plans will soon be under development and will be submitted to State Historic Preservation Division when completed. We appreciate the State of Hawai'i, Office of Hawaiian Affairs (OHA), vigilance concerning implementing these mitigation measures, and assure you that we share your concern regarding this matter.

2. *Qualification related to cultural resources.* The Final Environmental Assessment (EA) has restated the conclusion regarding cultural resources to clarify that the fact that the significant historic sites are being preserved helps avoid impacts to culturally valued resources.

3. *Additional discovery contingency.* The statement in the Final (EA) regarding additional findings has been expanded to include iwi and Native Hawaiian cultural or traditional deposits. Thank you for identifying this.

Again, thank you for your careful review of the document and your comments. Please contact Mr. Lawrence Beck of our Water Resources and Planning Branch at (808) 961-8070, extension 260, should you have any questions.

Sincerely yours,

Milton D. Pavao, P.E.
Manager

LEB:sco

copy - Mr. Ron Terry, Geometrician Associates
Mr. Sheldon Yamasato, Akinaka & Associates, Ltd.

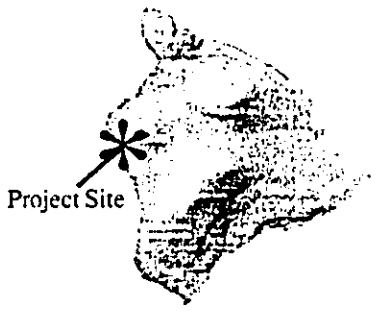
... Water brings progress...

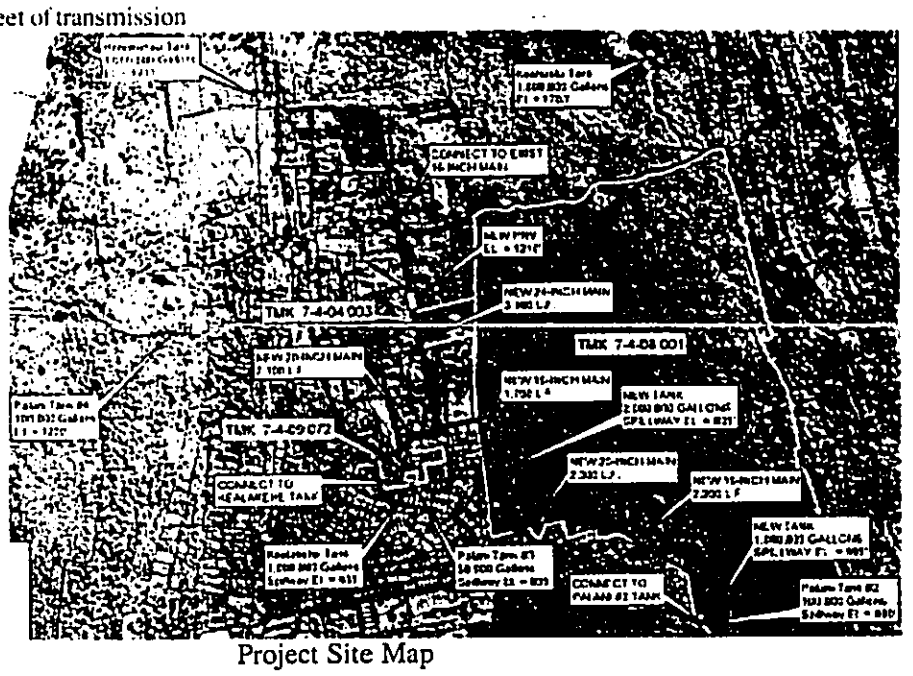
Palani Road Transmission Main and Reservoir (HRS 343 DEA)

District:	North Kona
TMK:	(3) 7-4-04:03; 7-4-09:72 & 94; & 7-4-08:01 & 28
Proposing Agency:	Hawaii County, Department of Water Supply 345 Kehuanaoa St., Ste. 20, Hilo, HI 96720 Contact: Larry Beck (961-8070 ext. 256)
Determination Agency:	Same as above.
Consultant:	Geometrician Associates HC 2 Box 9575, Keaau, HI 96749 Contact: Ron Terry (982-5831)
Public Comment Deadline:	August 7, 2006
Status:	Draft environmental assessment (DEA) notice pending 30-day public comment. Address comments to the proposing agency with copies to the consultant and OEQC.
Permits Required:	County: Planning: Plan Approval, Subdivision; County Public Works: Building, Driveway, Work in ROW Permits; State DOT: Work in ROW Permit; State Health: NPDES

The County of Hawai'i, Department of Water Supply (DWS), plans to construct water transmission mains and system improvements for its Palani Road System in order to supply the community with potable water from the high-level well sources. The project would install about 11,500 linear feet of transmission mains connecting the existing 16-inch water main in Mamalahoa Highway with three existing reservoirs: the 1.0 million gallon (mg) Kealakehe reservoir, the 50,000-gallon Palani Tank 3, and the 100,000-gallon Palani Tank 2. A new 2.0 mg and a new 1.0 mg concrete reservoir would also be built. These improvements will be needed to accomplish a reduction in the pumping demand on the Kahalu'u Shaft Wells by improved transmission of water from the DWS high-level wells situated mauka of Mamalahoa Highway. The project is part of DWS' master long-range plan for improvements in North Kona. The facility would promote public health and safety by improving water service for this community. The proposed alignment traverses private properties and existing government road easements and minimizes the impact to traffic on Palani Road.

The contractor will be required to develop a traffic control plan during the design phase to minimize congestion and maintain access to adjacent properties during construction. The contractor will perform all earthwork and grading in conformance with Chapter 10, Erosion and Sediment Control, Hawai'i County Code. Because the site is greater than one acre in extent, the contractor will obtain an NPDES permit and develop and implement a Storm Water Pollution Prevention Plan (SWPPP) to contain sediment and storm water runoff during construction. DWS plans to build berms to partially conceal the reservoirs and ensure the visual compatibility of the facility with its residential surroundings. Archeological and cultural survey have determined that no significant cultural resources are present and that impact to historic-era archaeological sites can be mitigated through data recovery; if resources are encountered during construction activities, work in the immediate area of the discovery will be halted and the State Historic Preservation Division will be contacted.





Project Site Map

July 9, 2006

NOTICE OF AN INFORMATIONAL MEETING FOR
THE COUNTY OF HAWAI'I DEPARTMENT OF WATER SUPPLY'S
PALANI ROAD TRANSMISSION WATERLINE PROJECT

NOTICE IS HEREBY GIVEN that the Department of Water Supply (DWS) and its consulting engineering firm, Akinaka & Associates, will be holding a public meeting in North Kona at the Kealakehe High School's Cafeteria Dining Room on Thursday, July 20th, 2006 from 6:00 PM until 7:00 PM. The meeting is being held to inform and accept comments from the public concerning DWS' effort to install a transmission main and additional water storage to bring water down, from the well water sources above Mamalahoa Highway, into the Kealakehe, Laiopua and lower Palani areas and beyond.

The Kealakehe High School is located mauka of Queen Ka'ahumanu Highway at 74-5000 Puohulihuli Street. Puohulihuli can be accessed via Ane Keohokalolo, or via Keanalehu Dr., from Kealakehe Parkway. Kealakehe Parkway can be reached from Queen Ka'ahumanu Highway near the Honokohau Harbor.

Should there be any questions, the public may contact Mr. Lawrence Beck of the Department of Water Supply's Water Resources and Planning Branch at (808) 961-8070, extension 256.

DEPARTMENT OF WATER SUPPLY
COUNTY OF HAWAI'I

The Department of Water Supply is an Equal Opportunity Provider and Employer.

The meeting places are accessible to persons with disabilities. If you require use of an auxiliary aid or other access accommodation, please contact the Department of Water Supply at 961-8050 as soon as possible or at least 5 days prior to the meeting.

Posted on the Internet at:
http://www.hawaiidws.org

Hawaii Tribune Herald
July 9 and 16, 2006

West Hawaii Today
July 9 and 16, 2006

MEETING SIGN-IN SHEET

Project: Palani Road Transmission Main
Date of Meeting: July 20, 2006
Place of Meeting: Kealakehe High School Cafeteria

Purpose of Meeting: Public Infomation Meeting

Name (Please print)	Organization	Address	E-mail	Phone #	FAX #
Sheldon Yamasato	Akinaka & Associates, Ltd.	3049 Ualena St., Suite 500, Honolulu, HI 96819	sty@akinaka.com	836-1900	836-8852
Salvador Quitoriano	Akinaka & Associates, Ltd.	3049 Ualena St., Suite 500, Honolulu, HI 96819	smq@akinaka.com	836-1900	836-8852
Matt Fujioka	Akinaka & Associates, Ltd.	3049 Ualena St., Suite 500, Honolulu, HI 96819	mkf@akinaka.com	836-1900	836-8852
Ron Terry	Geometrician Associates LLC	HC 2 Box 9575, Keaau, HI 96749	ronterry@hawaiiantel.net	982-5831	966-7593
Larry Beck	Dept. of Water Supply	345 Kekuanaoa Street, Hilo, HI 96720	lbeck@hawaiidws.org	961[redacted] 8070 EXT 260	961 8980
JOHN FLOREK	HONOLULU	P.O BOX 5006 K-KHI 96745	JOHN.KONA@HAWAIIANTEL.NET	329-7277	
[redacted]					
Fredd Barbara Hasel		74-5063 Tomi Tomi Dr. KK-96740	fredeKiel@kona.com	331-800 none	
STEPHEN TORIK		Tomi Tomi Dr North fork		329 2365	
Betty Meyerson QLVCA		74-5196 Kanai Pl. KK96746		936-0513	
Angela Gannon & James		74-5000 Mamalahoa Hwy	jimeold hawaiirealty.com	331-1196	
Betty Barnett CPLVCA		74-5198 Kanai Pl KK N fork		331-8253	
C. Gedeon		74-5408(A) Tomi Tomi DR		331-1818	
R. Gedeon		" (A) " "			
K Gedeon		74 5411 A " "		331 1819	
T Ambert		" " "		331 1818	

MEETING NOTES
JULY 20, 2006
PALANI WATER TRANSMISSION MAIN AND RESERVOIR PROJECT

The meeting was held in the Kealakehe High School cafeteria on July 20, 2006, at 6 PM

A newspaper notice announcing the meeting was published in both the *West Hawaii Today* and the *Hawaii Tribune Herald* (announcement will be attached). Draft EA recipients were also informed of the meeting through including the meeting announcement as a flyer in the EA mailing; also, five residents who had called during early consultation were invited by phone and/or e-mail.

Eleven members of the public attended (sign-in sheet attached)

Project personnel attending included Milton Pavao and Larry Beck from DWS, Sheldon Yamasato, Sal Quitoriano and Matt Fujioka from Akinaka and Associates; and Ron Terry from Geometrician Associates.

Larry Beck began the meeting by welcoming attendees and then introduced Sheldon Yamasato, who gave an informal power point presentation during which questions and comments were welcome. Sheldon emphasized the high importance of the project in the overall DWS system, which requires a means of distributing water from high-level wells to the main users in the makai areas.

The following is a summary of questions and comments, along with responses from DWS or consultants.

(Q) Why doesn't the route use the southern boundary of QLT lands? Did you consider it?
(A) QLT has identified the southern boundary of their lands extending down from Mamalahoa Highway as a "utility corridor", but this corridor was not well suited for the purpose of connecting the Mamalahoa Highway transmission main to the Palani Road reservoirs, which is the purpose of this project, as it is too far south. In addition, the entire area is undeveloped and no clear route exists. Archaeological and other environmental surveys would still need to be conducted, and any route would have to take their findings into account. The proposed route down to Tomitomi Road is short, free of significant environmental resources, and already paved.

(Q) How about the northern boundary of QLT lands?
(A) This route is shorter, but, like southern area, is mostly undisturbed and has not been surveyed for environmental resources.

(Q) But wouldn't QLT welcome you making water improvements, in contrast to residents on Tomitomi Road, who have a lot of concerns about construction impacts?
(A) The project is a transmission rather than distribution line, and QLT would not be able to tap into it for services. Although there were some possibilities for collaboration,

the project is critical to start now and it made more sense for the County to control the location and timing of the project, rather than depend upon a developer's plans.

(Q) How about the Old Government (Homestead) Road? Why not use that instead of easements over driveways?
(A) In addition to stone walls and trees that might require removal, there are severe topographic drop-off problems.

(Q) Couldn't you just put the line on piers?
(A) Although this is feasible, the line is very heavy and under high pressure. The piers would have to very large, anchored firmly, and would be much more difficult to engineer and more costly than trenching.

(Q) Can we get service laterals off the line? And fire hydrants?
(A) This is a transmission line and is not suitable for service laterals. It is used to fill up reservoirs and does not flow when it is not filling the reservoir. This causes pressure within the line to fluctuate greatly, which would provide unsatisfactory service pressures..

(Q) Can you make a distribution line parallel to the transmission line in the same trench?
(A) That is not safe, so we can't do that. It is also important to recognize that the project is not meant to provide distribution lines for additional or improved individual services, but to improve the regional water infrastructure and serve the entire community.

(Q) We are concerned about access for our farm – for ourselves, employees, equipment, etc. The road is as narrow as 14' in places. Will we still have access? How long will construction last?
(A) DWS will require the contractor to provide access to all properties. There may be short waits at times. We will try to minimize inconvenience. We recognize that the road is narrow and will plan for that. When the contract is awarded, we will hold another public meeting to gather input and share information on construction and access issues. Although the entire project may take as much as a year to build, we will try to minimize the actual amount of time any given stretch of road is affected, and we expect disruptions of Tomitomi Road to be limited to much shorter periods.

(Q) Will we be able to get out onto Palani Road?
(A) For construction that affects traffic near the intersection, there will be professional traffic control at the intersection to allow vehicles in and out.

(Q) Will Tomitomi be completely repaved, or will you just pave over the trench after you are done?
(A) The project will leave the road much improved from its current condition. We are working with Public Works on this. It is not possible to bring it up to County standards, but the road will be improved.

(Q) Are you aware of USGS work on sustainable aquifers? How much water will this project draw out of wells? Will this threaten our aquifers?

(A) The project will take water from existing wells and does not involve new wells. It is about distributing water better rather than obtaining more water. That said, effective distribution may lead to the ability to afford slightly more well pumping over time, but each well is monitored for the effects of its pumping on the water head at the well and at adjacent wells. Before a well is approved, pump tests from exploratory wells are analyzed in a very rigorous process by the State Commission on Water Resources Management to ensure that wells are placed and sized in a way that the sustainable yield is not affected. The DWS is very aware of and committed to sustainable use of this and other aquifers, and we work with other government agencies to utilize the best available information to help us do this.

APPENDIX 3

ARCHAEOLOGICAL AND CULTURAL ASSESSMENT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

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

February 3, 2006

Bob Rechtman, PhD
Rechtman Consulting LLC
HC 1 Box 4149
Keauu, Hawai'i 96749

LOG NO: 2006.0205
DOC NO: 0601NM35
Archaeology

Dear Dr. Rechtman:

SUBJECT: **Chapter 6E-42 Historic Preservation Review –**
An Archaeological Inventory Survey of Alternative 3 of the Palani Road Transmission Main Water Supply Route
Kealakehe and Keahuolu Ahupua'a, North Kona District, Island of Hawai'i
TMK: (3) 7-4-004:001; 7-4-008:001; 7-4-009:072

We are in receipt of the aforementioned archaeological inventory survey (AIS) report for our review (RC, Clark and Rechtman 2005). We received the plan on December 21, 2005, and we apologize for the delay in our response. This archaeological inventory survey report is approved.

The AIS covered a 20 to 50-foot corridor that stretched for 10,800 feet. Seven historic properties were identified during this survey. One site (14239) is a previously recorded core filled wall. Three sites were previously recorded but not reported (RC-0161-1, RC-0161-19, RC-0161-29). These sites are all pre-Contact and historic agricultural sites. No further archaeological work is recommended for these sites.

Three new sites were recorded: Site 24853 is a boundary wall along the Kealakehe/Keahuolu Ahupua'a. Site 24854 is a historic habitation site. Site 24855 is a series of historic wall segments relating to the homesteading era. These sites were documented as being significant under criteria D, with Site 24855 also recommended as eligible under criteria A. We concur with these determinations.

You recommend data recovery for site 24854, and preservation for sites 24853 and 24855. We concur with these recommendations. Therefore, we anticipate a data recovery plan and a preservation plan to be submitted for our approval.

If you have any questions please call Nancy McMahon, our Kaua'i Archaeologist, at 808-742-7033.

Aloha,

Melanie A. Chinen, Administrator
State Historic Preservation Division

NM:jen

RC-0314

An Archaeological Inventory Survey of Alternative 3 of the Palani Road Transmission Main Water Supply Route (TMKs:3-7-4-04:1 por., 3-7-4-08:1 por., and 3-7-4-09:72 por.)

Kealakehe and Keahuolū *ahupua'a*
North Kona District
Island of Hawai'i

PREPARED BY:

Matthew R. Clark, B.A.
and
Robert B. Rechtman, Ph.D.

PREPARED FOR:

Ron Terry, Ph.D.
Geometrician Associates, LLC
HC 2 Box 9575
Kea'au, HI 96749

December 2005

RECHTMAN CONSULTING, LLC
HC 1 Box 4149 Kea'au, Hawai'i 96749-9710
phone: (808) 966-7636 fax: (808) 443-0065
e-mail: bob@rechtmanconsulting.com
ARCHAEOLOGICAL, CULTURAL, AND HISTORICAL STUDIES

An Archaeological Inventory Survey of Alternative 3 of the Palani Road Transmission Main Water Supply Route
(TMKs:3-7-4-04:1 por., 3-7-4-08:1 por., and 3-7-4-09:72por.)

Kealakehe and Keahuolū *ahupua'a*
North Kona District
Island of Hawai'i

EXECUTIVE SUMMARY

At the request of Ron Terry, Ph. D. of Geometrician Associates, LLC, on behalf of Akinaka & Associates, Inc. and the County of Hawai'i Department of Water Supply, Rechtman Consulting, LLC conducted an Archaeological Inventory Survey of a corridor for the proposed construction of a transmission main water line known as Alternative 3 and a new water tank within Kealakehe and Keahuolū *ahupua'a*, North Kona District, Island of Hawai'i. The project area consists of a twenty to fifty-foot wide corridor that stretches for a total distance of 10,800 feet from Māmalahoa Highway to two existing water tanks along Palani Road. Fieldwork for the current inventory survey was conducted in September 2005. As a result of the current inventory survey seven archaeological sites were recorded within the current project area. One of the sites (Site 14239) is a continuation of a core-filled wall previously recorded by Jensen (1990) paralleling Palani Road. Three of the sites (Sites RC-0161-1, RC-0161-19, and RC-0161-29), all related to Precontact/Historic agriculture, were previously recorded (but not formerly reported on) during inventory fieldwork conducted by Rechtman Consulting, LLC at TMK:3-7-4-09:72. Three other sites were newly recorded during the current study. These sites include a Historic boundary wall (Site 24853), a Historic residence (Site 24854), and a series of Historic wall segments (Site 24855). All of the recorded sites provide evidence for the Historic Period use of the general project area, which matches the project expectations. The intensive residential/agricultural use of this area following the late nineteenth and early twentieth century granting programs obliterated or obscured much of evidence of the earlier Precontact land use. The resources previously documented on TMK :3-7-4-009:72, however potentially do retain elements of earlier sites. Given the size and orientation of the waterline corridor through this parcel, the impact to these sites will be minimal. SIHP Site 24854 is recommended for data recovery, SIHP Sites 24853 and 24855 are recommended for preservation, and no further work is the recommended treatment for the remaining resources.

Contents

Figures

Tables

INTRODUCTION

At the request of Ron Terry, Ph. D. of Geometrician Associates, LLC, on behalf of Akinaka & Associates, Inc. and the County of Hawai'i Department of Water Supply, Rechtman Consulting, LLC conducted an Archaeological Inventory Survey of a corridor for the proposed construction of a transmission main water line known as Alternative 3 and a new water tank within Kealakehe and Keahuolū *ahupua'a*, North Kona District, Island of Hawai'i (Figure 1). The water line runs from Māmalahoa Highway at its *mauka* end to two existing water tank locations along Palani Drive at its *makai* ends (Figure 2). The survey corridor stretches for a total distance of 10,800 linear feet. The portion of the survey area within Kealakehe Ahupua'a, for the most part, runs within existing paved road alignments, crossing TMKs:3-7-4-004 and 3-7-4-09 and a portion of TMK:3-7-4-09:72 (Figure 3). The portion of the survey corridor within Keahuolū Ahupua'a runs along the edges of existing residential subdivisions, following the northern and western boundaries of an undeveloped parcel (TMK:3-7-4-08:1; see Figure 3). The development of a paved road following the route of the waterline is also planned for the Keahuolū portion of the survey corridor.

This report contains summary background information concerning the project area's physical setting, cultural contexts, previous archaeological work, and current survey expectations based on the previous work. Also presented is an explanation of the project's methods, descriptions of the archaeological features encountered, interpretation and evaluation of those resources, and treatment recommendations for sites documented within the proposed development area. The current project was undertaken in compliance with both the historic preservation review process requirements (HAR 13§13-275-5) of the Department of Land and Natural Resources-State Historic Preservation Division (DLNR-SHPD) and the County of Hawai'i Planning Department.

Project Area Description

The current project area consists of a twenty to fifty-foot wide corridor that stretches for a total distance of 10,800 feet from Māmalahoa Highway to two existing water tanks along Palani Road within Kealakehe and Keahuolū *ahupua'a*, North Kona District, Island of Hawai'i (see Figure 1). Beginning at Māmalahoa Highway, at an elevation of approximately 1,400 feet above sea level, the survey corridor runs in a straight-line *makai* for 3,100 feet following two existing paved roadways. The *mauka* section of the corridor follows a paved utility easement along the northern boundary of a privately owned parcel (TMK:3-7-4-04:1) to a gate at Kuni Road. Beyond the gate the corridor continues *makai* following the paved public right-of-way (Kuni Road) to its intersection with Tomi Tomi Road. At the intersection the survey corridor continues in two directions, following Tomi Tomi Road (a paved public right-of-way) to both the north and the south. Within this portion of the survey area the width of the corridor is the same as the paved roadways (roughly 20 feet wide). To the north, the corridor meanders north and west for 2,100 linear feet following Tomi Tomi Road nearly to Palani Drive. Just before the intersection with Palani Drive the survey corridor veers south and runs along the *makai* boundary of a privately owned parcel (TMK:3-7-4-04:72) to an existing water tank located at an elevation of 936 feet above sea level. To the south of the intersection at the *makai* end of Kuni Road the survey corridor follows Tomi Tomi Road south for a short distance to its termination at the Kealakehe/Keahuolū *ahupua'a* boundary. The corridor then turns *makai* (west) and follows the northern and western boundaries of TMK:3-7-4-08:1 (owned by Liliuokalani Trust Estate) along the southern and eastern boundary of the Queen Liliuokalani Village residential subdivision for 5,600 linear feet to an existing water tank along Palani Road at an elevation of 575 feet above sea level. The width of the survey corridor on the two undeveloped parcels is fifty feet.

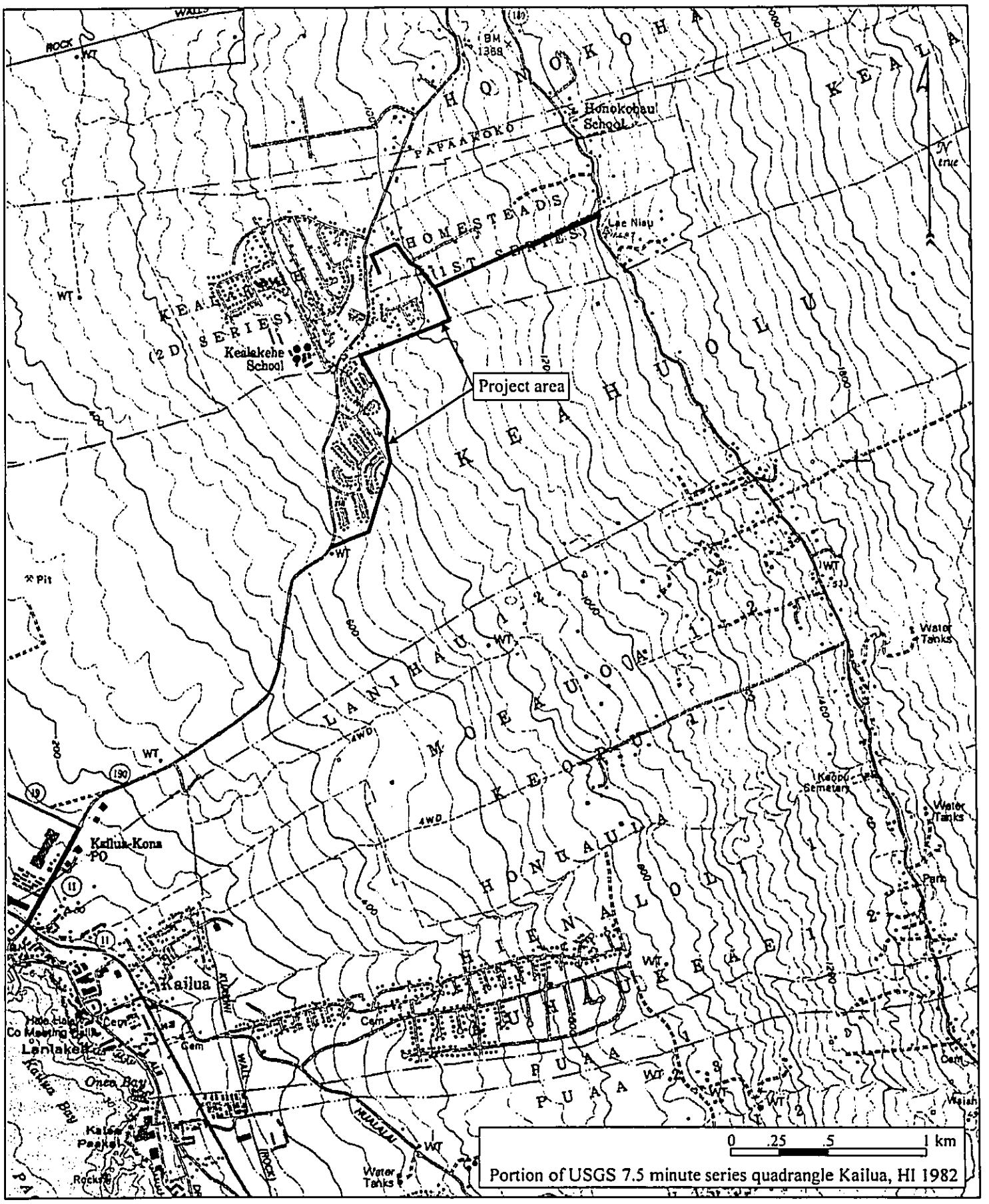


Figure 1. Project area location.

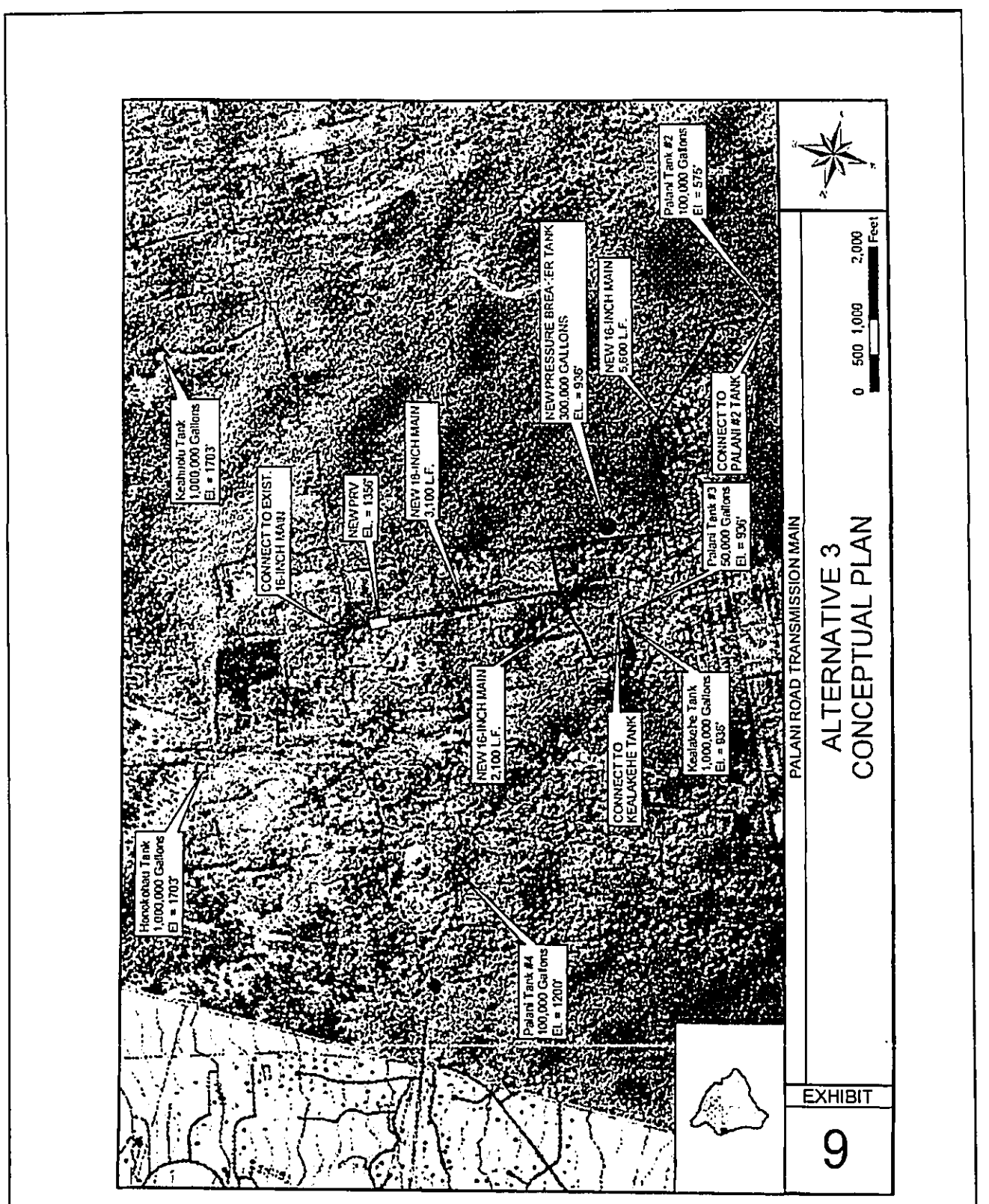


Figure 2. Palani Road Transmission Main Alternative 3 conceptual plan.

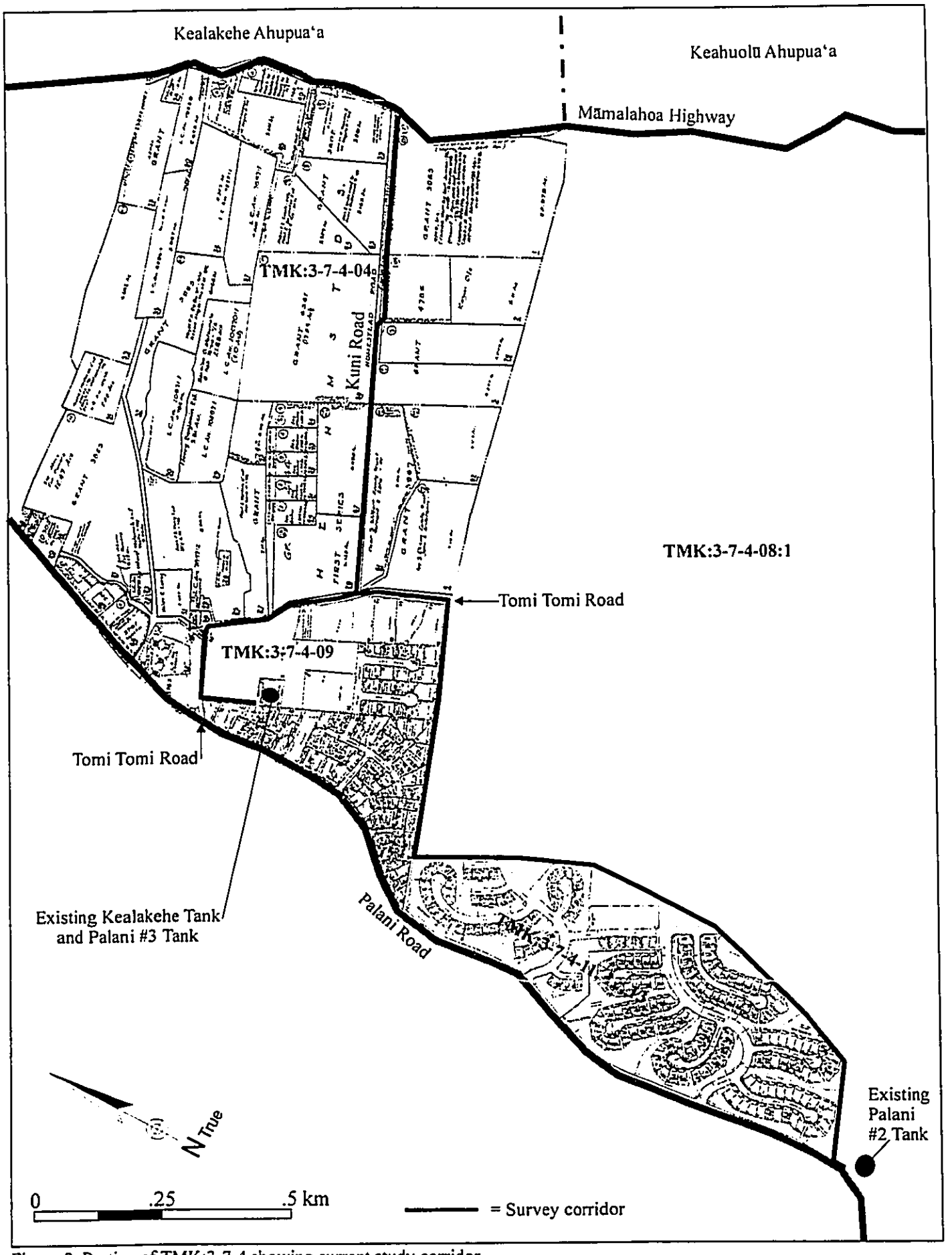


Figure 3. Portion of TMK:3-7-4 showing current study corridor.

Only sparse vegetation consisting of various grasses and weeds is present within the portion of the project area that follows the existing paved roads. Vegetation at TMKs:3-7-4-04:72 and 3-7-4-08:1, where the survey corridor does not follow paved roads, is considerably more dense. Predominant floral species on these two parcels consisted of Christmas-berry (*Schinus terebinthifolius*), *koa haole* (*Leucaena leucocephala*), guava (*Psidium guajava*), autograph trees (*Clusia rosea*), ti (*Cordyline fruticosa*), fountain grass (*Pennisetum setaceum*), California grass (*Brachiaria mutica*), *kukui* (*Aleurites moluccana*), airplant (*Bryophyllum pinnatum*), and sisal (*Agave sisalina*), along with various other unidentified non-native grasses, vines, ferns, and weeds.

BACKGROUND

To generate set of expectations regarding the nature of archaeological resources that might be encountered on the study parcel, and to establish an environment within which to assess the significance of any such resources, previous archaeological studies relative to the project area and a general historical context for the region are summarized.

Previous Archaeological Research

Numerous archaeological studies have been completed within Kealakehe and Keahuolū *ahupua'a* (Table 1). These studies have included large portions of both *ahupua'a,* mostly *makai* of the current project area.

Table 1. Previous archaeological studies in Kealakehe and Keahuolū *ahupua'a*.

Study	*Type of Project*	*Elevation**
Stokes (1919)	Reconnaissance Survey	<40
Reinecke (1930)	Reconnaissance Survey	<40
Ladd (1968)	Site Testing	<40
Sekido (1968)	Site Testing	<40
Emory and Soehren (1971)	Reconnaissance Survey	<40
Sinoto (1975)	Reconnaissance Survey	<40
Cluff (1971)	Reconnaissance Survey	<40
Ching (1978)	Reconnaissance Survey	0-80
Soehren (1980)	Reconnaissance Survey	20-80
Soehren (1983)	Field Inspection	800-1000
Rosendahl (1983)	Reconnaissance Survey	30-200
Hammatt et al. (1987)	Inventory Survey	700-760
Walker and Haun (1987)	Reconnaissance Survey	900
Donham (1990a and b)	Inventory Survey	600-800
Donham (1990c)	Inventory Survey	30-600
Jensen (1990)	Inventory Survey	180-580
Burgett and Rosendahl (1992)	Inventory Survey	70-700
Borthwick and Hammatt (1992)	Inventory Survey	10-75
Borthwick et al. (1993)	Reconnaissance Survey	50-90
O'Hare and Goodfellow (1994)	Data Recovery	70-700
Walsh and Hammatt (1995)	Inventory Survey	50-90
Rechtman et al. (2000)	Inventory Survey	1500-1600
Haun and Henry (2001)	Inventory Survey	30-85
Rechtman and Dougherty (2002)	Inventory Survey	1500-1600
Rechtman and Escott (2002)	Inventory Survey	30-80
2003 Rechtman Consulting, LLC	Fieldwork	930-1000

*feet above sea level.

The earliest archaeological surveys conducted in the region generated brief descriptions of major coastal sites (Stokes 1919, Reinecke 1930). In 1906 Stokes documented Laupauwila Heiau (Bishop Museum Catalogue: 50-Ha-D11-28) in Kealakehe Ahupua'a and provided the following description: "Heiau of Laupauwila, land of Kealakehe, North Kona. Said to be on the 'elemakule homestead. Grant No. 3756, 3.5 miles from the sea" (Stokes and Dye 1991:40). In the late 1920s Reinecke conducted an

archaeological inventory of the coastal areas from Kona to Kohala. He documented twelve sites each in the coastal portions of Kealakehe and Keahuolū *ahupua'a*. The Kealakehe sites included residential platforms and house yards, Hale o Lono Heiau (Site 33), and an unidentified *heiau* (Site 35). The Keahuolū sites included 41 platforms and 12 enclosures mostly interpreted as house sites, several petroglyphs (Site 20), two modified pools (Sites 12 and 17), three burials (Sites 12, 13, and 19), and a canoe landing (Site 14).

During the 1960s and 1970s increased coastal development within the Kailua area created a need for further archaeological study at the sites previously recorded by Reinecke (1930). As a result of the continuing development of Honokōhau Harbor, excavations were carried out at three of the Kealakehe sites recorded by Reinecke (Ladd 1968; Sekido 1968). These sites included a house platform, a habitation cave, and a burial site. Also, Sinoto (1975) conducted an additional reconnaissance on 100 acres located just inland of Honokōhau Bay, identified three previously recorded sites, but recommended no further archaeological work in the area.

In the early 1960s Emory (Emory and Soehren 1971) conducted an archaeological reconnaissance of the coastal areas of Honokōhau I and II, Kealakehe, and Kaloko *ahupua'a*. A total of 27 sites were recorded in Kealakehe Ahupua'a. The documented sites included ten house sites, ten burial sites, three enclosures, two *heiau* (both previously identified by Reinecke), and two indeterminate sites. In addition, a "modern" graveyard was documented that reflected both traditional Hawaiian and European burial practices. The report suggests that the Honokōhau Bay area, including its fishponds, ceremonial *heiau*, *holua*, and residential complexes, was a primary locus of political and ceremonial activity along the northern Kona coast. A study by Cluff (1971) supplemented the reconnaissance by Emory and Soehren by expanding the survey area coverage, and provided significance evaluations and treatment recommendations for the identified sites.

Ching (1978) conducted a reconnaissance survey of coastal Keahuolū Ahupua'a between the shore and Queen Ka'ahumanu Highway (987 acres). As a result of the survey Ching identified fifty-nine sites containing 140 distinct features that included twenty-nine salt pans, twenty-one pavements, and twenty-one cairns. Nine of these sites had been previously identified by Bevacqua (1972) and seven had been previously identified by Sinoto (1975).

All of these early archaeological studies suggest a pattern of coastal settlements near fishponds and rich marine resources with a decrease in permanent habitation sites and an increase in agricultural features further inland. Beginning in the late 1970s numerous studies were conducted in *mauka* portions of Kealakehe and Keahuolū *ahupua'a*. These studies documented the presence of numerous agricultural features associated with the upland field systems in the two *ahupua'a* and documented the formal feature types that occur in the Middle Zone (roughly 15 to 800 or 900 feet above sea level) of between the coastal zone and the upland agricultural zone.

Soehren (1980) surveyed a 40-acre parcel and an access corridor for a proposed wastewater treatment plant in coastal Kealakehe at an elevation between 35 and 240 feet above sea level. One trail, SIHP 7704, was documented during the survey. Soehren believed this trail connected Aimakapa Pond, in Honokōhau, with a small settlement at Pawai Bay, in northern Keahuolū (Soehren 1980).

Soehren (1983) surveyed a 10-acre parcel in upper Keahuolū Ahupua'a at elevations ranging from 800 to 1,000 feet above sea level to the east of the Queen Liliuokalani Village subdivision. Soehren did not locate any sites or features. He noted that, "Such land appears suited only for arboreal crops, such as paper mulberry, if any", and that "no evidence was found of traditional agricultural structures such as kuaiwi, clearing mounds or terraces, nor were there any other features attributed to prehistoric Hawaiian culture seen on the parcel" (Soehren 1983).

Rosendahl (1983) conducted a reconnaissance survey of three separate areas within Keahuolū Ahupua'a. The areas included 100 acres west of Queen Ka'ahumanu Highway along the southern boundary of the *ahupua'a*, 100 acres east of the highway along the southern edge of Palani Road, and 12 acres along the northern edge of Palani Road and the southern edge of the *ahupua'a*. Rosendahl (1983) identified two large site complexes and five additional sites, but did not record them in detail. He recommended that intensive survey of all three areas be conducted.

Walker and Haun (1987) conducted a reconnaissance survey of a roughly half-acre parcel at an elevation of 900 feet above sea level. They recorded a single agricultural/habitation complex with eight features. Hammatt and Folk (1984) surveyed a 24-acre parcel along the south boundary of Kealakehe Ahupua'a at about 700 feet above sea level and found no archaeological sites, but they did note heavy mechanical disturbance had occurred on the property.

In 1987 Hammatt et al. (1987) conducted an inventory survey on a 15-acre parcel located between 700-760 feet above sea level in Kealakehe Ahupua'a. The project identified thirty-two features, seventeen of which were subjected to test excavations. Twenty-five of the features were interpreted as agricultural; the remaining fifteen were considered habitation features. The habitation features were further interpreted as "field hale" and were assigned to the late Precontact Period based on the results of a single radiocarbon date (A.D. 1645-1950). The report described the agricultural features as being part of the Kona Field System, but distinct from the typical dryland fields originally described (Soehren and Newman 1968) for the complex. The features they recorded are less formally arranged and exhibit adaptation to the particular environmental conditions of the area. Prior to testing, these features were considered possible burials. No human remains were discovered during testing and the features were interpreted as agricultural clearing mounds.

Between 1989 and 1992, PHRI conducted an archaeological inventory survey and mitigation program on a 950-acre area for the Kealakehe Planned Community (Burgett and Rosendahl 1992; O'Hare and Goodfellow 1994). The project area spanned the width of the *ahupua'a* and extended from 70 to 700 feet above sea level. Roughly 100 sites were recorded with numerous features, including agricultural features (the predominate feature type), habitation features, possible ceremonial and burial features, trails, storage and marker features, and boundary walls. The recording and excavation of sites within all elevational zones enabled the investigators to prepare a synthesis of settlement and land use patterns for the *ahupua'a* below 800 feet above sea level. Above approximately 600 feet above sea level the density and formal nature of the agricultural features increased, suggesting that this elevation marked "the lower boundary of a distinct agricultural zone" (O'Hare and Goodfellow 1994:87). They also noted an increase in permanent habitation sites beginning at about 740 feet above sea level, which was further reinforced by the *Māhele* data for Kealakehe Ahupua'a.

Donham (1990a and 1990b) conducted an inventory survey of a 150-acre parcel for the proposed Kealakehe Planned Development Site located at elevations ranging from 800 to 600 feet above sea level along the northern edge of Keahuolū Ahupua'a and the northwestern edge of Palani Road. As a result of the survey Donham recorded fifty-three sites including eighteen agricultural complexes containing 3 to 120 features each. Identified feature types included numerous mounds (n=278) and *pāhoehoe* excavations (n=173), along with a single platform and six terraces.

Donham (1990c) also conducted an inventory survey of 1,100 acres located east of the Old Kona Airport and along the northern edge of Palani Road in the southern portion of Keahuolū Ahupua'a. As a result of that survey Donham identified 239 sites containing 1,810 features. The predominant feature types (90% of the recorded features) consisted of *pāhoehoe* excavations, mounds, modified blisters, modified outcrops, terraces, low platforms, C-shapes, enclosures, and rubble walls representative of Precontact Hawaiian agriculture. Other functional categories assigned to the sites included quarry and habitation.

In 1990 PHRI conducted an inventory survey for improvements to Palani Road within Keahuolū Ahupua'a (Jensen 1990). The project area consisted of a 50-foot wide corridor that stretched along the southeastern edge of Palani Road from elevations of 180 to 580 feet above sea level. The Jensen (1990) project area terminated at the water tank along Palani Drive that marks the *makai* most boundary of the current project area. As a result of the survey Jensen recorded thirty-two sites containing forty-four features. The majority of the features (n=30) including mounds, walls, terraces, enclosures, and modified outcrops were determined to be related to agriculture/boundary. One of these boundary features was the Kuakini Wall. Thirteen of the remaining features including one small cave, five modified outcrops, and seven enclosures were determined to have been used for Precontact temporary habitation purposes. In addition to these features, one sealed lava tube contained a drilled conch shell. Jensen (1990:14) concluded that the cave had been sealed for the sole purpose of caching this artifact and was not used for any other purpose.

Cultural Surveys Hawaii (Borthwick and Hammatt 1992) conducted an inventory survey of a 22-acre corridor in Keahuolū and Kealakehe *ahupua'a* at elevations ranging between 10 and 75 feet above sea level. The project covered an area that stretched across Keahuolū Ahupua'a in its entirety and continued into a small portion of southern Kealakehe Ahupua'a. Fourteen archaeological sites or complexes were recorded. All but one was located within the lower elevation range of the project area. Identified sites included temporary habitations in lava blisters and sinks, *pāhoehoe* excavations, two caves, and one Historic Period clearing mound.

In 1993 Cultural Surveys Hawaii (Borthwick et al. 1993) completed a reconnaissance survey of an area along both sides of Queen Ka'ahumanu Highway in Kealakehe Ahupua'a. During that survey a single site was recorded. This site was situated near the intersection of the Highway and the road to Honokōhau Harbor. During a more recent Haun and Associates survey (Haun and Henry 2001) this site could not be relocated.

In 1995 Cultural Surveys Hawaii (Walsh and Hammatt 1995) conducted an inventory survey for the new Queen Ka'ahumanu Highway between Palani Road and Keahole Airport that crossed several *ahupua'a*. This area had been previously subject to a reconnaissance survey conducted by Borthwick et al. (1993). As a result of these surveys two sites were recorded within the current study *ahupua'a* a stepping stone trail running in a *mauka/makai* direction within Kealakehe Ahupua'a, and the Old Māmalahoa Trail that crosses both *ahupua'a* as it parallels the highway alignment.

In 2000 Rechtman Consulting, LLC conducted an inventory survey in the *mauka* portion of Kealakehe Ahupua'a above Māmalahoa Highway at elevations ranging between 1,480 and 1,600 feet above sea level (Rechtman et al. 2000). They recorded six sites: four Historic Period walls and two Precontact agricultural complexes. Combined these two sites contained 41 features typical of Kona Field System sites in the *'apa'a* or Upland Zone.

In 2001 Haun and Associates conducted an inventory survey of approximately 200 acres in Kealakehe Ahupua'a at elevations ranging from 30 to 85 feet above sea level for PBR Hawaii and the Department of Hawaiian Homelands (Haun and Henry 2001). A total of 123 archaeological features separated into fifty-six sites were recorded on the parcel. The sites consisted of ten formal feature types including *pāhoehoe* excavations, stone alignments, cairns, mounds, petroglyphs, trails, enclosures, caves, overhangs, and platforms. Two previously recorded sites extended into their survey area, including a trail route (SIHP 7704) recorded by Soehren in 1980, and a second trail route (SIHP 13194) recorded by Borthwick et al. (1993).

In 2002 Rechtman Consulting, LLC conducted an inventory survey (Rechtman and Dougherty 2002) on a property adjacent to the Rechtman et al. (2000) study area. One archaeological site (SIHP 23274) was identified, consisting of 79 features, all related to a single residential property that existed from the 19th to 20th century. Features recorded include walls, agricultural modifications, trail and road alignments, a corral, a concrete mausoleum, and features associated with both landowner and laborer residential activities.

Also in 2002 Rechtman Consulting, LLC (Rechtman and Escott 2002) conducted an inventory survey of a roughly 40-acre area located at elevations raging from 30 to 80 feet above sea level in Kealakehe Ahupua'a along the *makai* edge of Queen Ka'ahumanu Highway. As a result of that study five sites were recorded with features including a C-shaped enclosure, three *pāhoehoe* excavations, a collapsed lava blister used for temporary habitation purposes, three trail segments, two cairns (one modern), and a habitation area within a lava tube.

In 2003, Rechtman Consulting, LLC conducted fieldwork for an inventory survey of TMK:3-7-4-09:72, a roughly 9-acre parcel located in Kealakehe Ahupua'a at elevations ranging from approximately 930 to 1,000 feet above sea level. Unfortunately, the parcel owners terminated all work on the project upon completion of the fieldwork and a report of the findings was never prepared. The work conducted on the parcel is important to the present inventory survey, however, as the current survey corridor crosses a portion of this parcel along its *makai* edge (from Tomi Tomi Road to an existing water tank located at 936 feet above sea level). During the 2003 fieldwork Rechtman Consulting, LLC recorded ninety distinct features on the parcel described as twenty-nine temporary sites (Figure 4; Sites T-1 to T-29). The temporary sites included six agricultural complexes, six modified outcrops, five mounds, three enclosures, one *kuaiwi*, a lava tube containing burials, six Historic walls, and a Historic roadway. Six test units were excavated at the recorded sites. Seven of the recorded features, all related to agriculture, fall within the boundaries of the current project area.

As is related above, large portions of both Kealakehe and Keahuolū *ahupua'a* have been archaeologically examined; these previous studies provide sufficient data to develop a predictive model for the current study area.

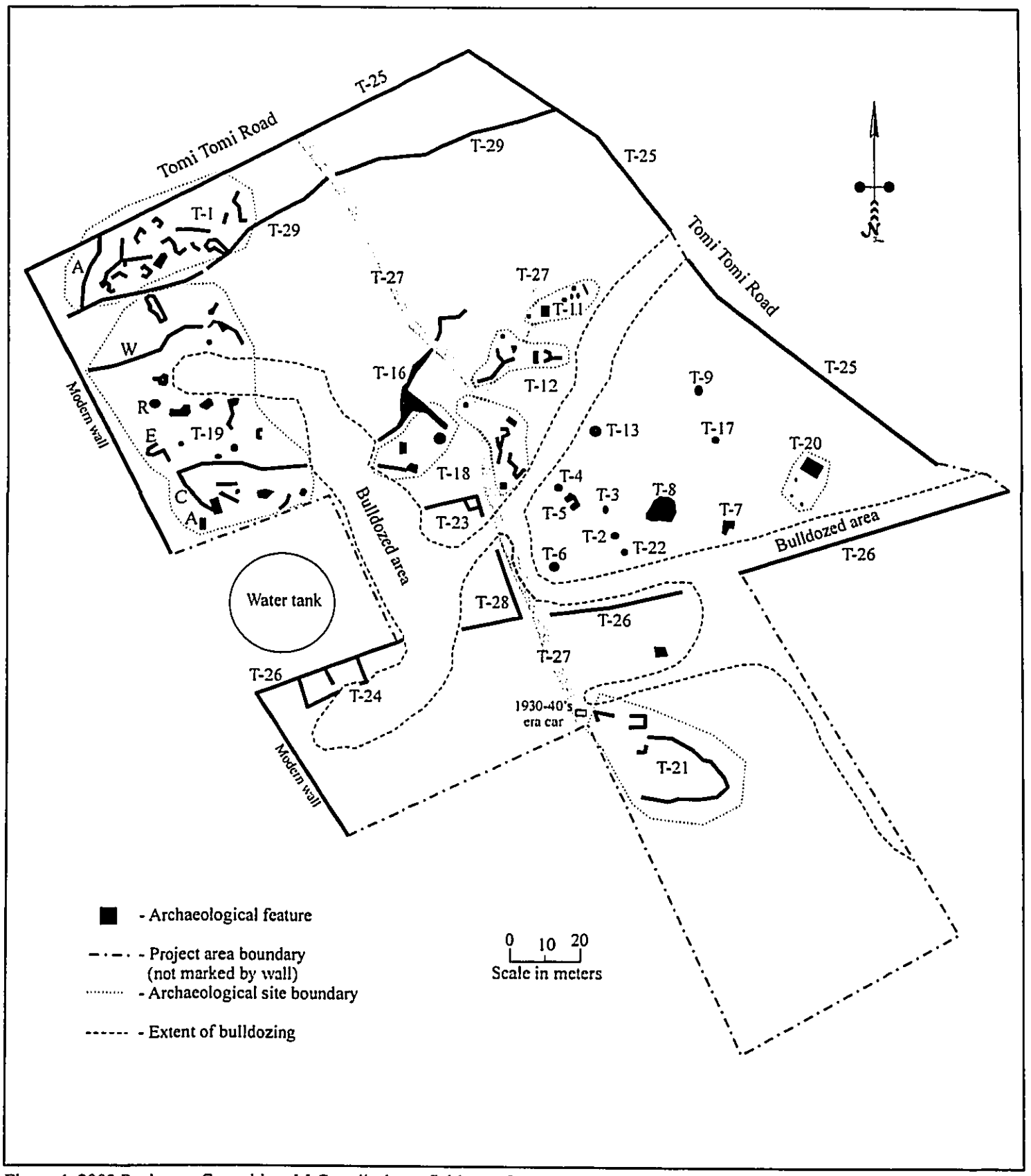


Figure 4. 2003 Rechtman Consulting, LLC preliminary field map for TMK:3-7-4-09:72.

Cultural-Historical Context and Ahupua'a Settlement Patterns

The current project area is located in the *ahupua'a* of Kealakehe and Keahuolū within the area of formal agricultural fields commonly referred to as the Kona Field System (Cordy 1995; Haun and Henry 2001; Newman 1970; Schilt 1984). A land use and settlement pattern model applicable to the current study area was presented by Cordy et al. (1991) for nearby Kaloko Ahupua'a. This model delineates four environmental zones within the *ahupua'a*: the Coastal Zone from shoreline to 15 feet elevation, the Middle Zone from 15 to 800-900 feet elevation, the Lower Upland Zone from 900 to 1,500 feet, and the Upland-Forest Zone between 1,500 and 6,000feet elevation. The current project area is within the Middle Zone and Lower Upland Zone. According to Cordy et al. (1991) these zones represent a transitional area between the coastal habitation zone and the upland agricultural zone.

The Kona Field System and its development are significant to understanding the cultural contexts of the project area because agricultural elements characteristic to the Kona Field System did exist in the *mauka* portion of Kealakehe (Hammatt et al. 1987; Haun and Henry 2001; Rechtman and Dougherty 2002; Rechtman et al. 2000). *Māhele* documents and previous archaeological studies identify Kona Field System agriculture sites in the *kalu'ulu* zone (500 to 1,000 feet elevation) beginning at an elevation of 900 feet and in the *apa'a zone* (1,000 to 2,500 feet elevation).

While the archaeological record contributes to an understanding of how the Kona Field System developed over time, precisely how the record is interpreted is reflected in the various chronologies proposed for the system (Burtchard 1995; Cordy 1995; Haun et al. 1998; Hommon 1986; Kirch 1985; Schilt 1984). The chronology and terminology outlined by Haun et al. (1998) is used in the present discussion, and the chronological summary below is abstracted from Rechtman et al. (1999).

There is little archaeological evidence for permanent settlements in the Kona region throughout the first half of the Early Expansion Period of Hawaiian history (A.D. 600 to 1100) (Burtchard 1995; Hommon 1986; Kirch 1985). Although permanent habitation was still concentrated on the windward side, it is likely that windward residents may have traveled to the Kona coast to obtain needed resources (Cordy 1995). By the latter half of the Early Expansion Period, permanent settlements were established in Kona along the coast and on lowland slopes, and informal fields were likely established at higher elevations (Cordy 1981; Cordy 1995; Schilt 1984).

An archaeological study by Cordy et al. (1991) along a coastal portion of nearby Kaloko Ahupua'a suggests this area was settled between A.D. 900 and 1200. Radiocarbon data from archaeological studies within the *ahupua'a* of Kealakehe indicate initial human activity in this region in the 1200s to 1300s, a gradual increase between the 1400s and 1500s, followed by more intensive activity from the 1600s to early historic period (Haun and Henry 2001).

Agricultural fields and habitation areas expanded across the slopes and coastal area of Hualālai during the Late Expansion Period (A.D. 1100 to 1400) (Burtchard 1995; Cordy 1995). Walled agricultural fields, planting mounds, and temporary habitations were established at the higher elevations that received greater amounts of rainfall.

The development of the extensive formal walled fields sometime during the initial stages of the Intensification Period (A.D. 1400 to 1600) marks the initiation of the Kona Field System (Schilt 1984). The development of these fields may have been, in part, a by-product of the need to extract more subsistence resources from an increasingly limited agricultural base. Radiocarbon data indicates that the population in Kona increased dramatically during this period (Burtchard 1995; Haun et al. 1998; Schilt 1984).

By the time of the Competition Period (A.D. 1600 to 1800), the environment may have reached its maximum carrying capacity, resulting in social stress between neighboring groups. The resulting hostility is reflected archaeologically by the frequent occurrence of refuge caves dating to this period (Schilt 1984). This volatile period was probably accompanied by internal rebellion and territorial annexation (Hommon 1986; Kirch 1985).

During the first of the defined historic periods (Haun et al. 1998), Last of the Ruling Chiefs (A.D. 1778-1819), Kalaniopu'u was chief of the Island of Hawai'i and often resided in the Kona District. This period covers Kamehameha's consolidation of control over the island to his death at Kailua in 1819. The period ends with the overthrow of the old religion, which took place when Liholiho, Kamehameha's heir, broke

the traditional *kapu* laws and won a battle against the supporters of the old religion at Kuamo'o, along the southern coastline of Keauhou. Early historical accounts emphasize that modern day Kailua Town during this period was a significant political seat and population center. The Kona Field settlement and subsistence system continued to operate in the area through the first few decades of the historic era (Handy and Handy 1972).

William Ellis, one of the first missionaries to arrive on the Island of Hawai'i, visited the area above Kailua (likely in the vicinity of the current project area) on a tour around the island in 1825. Ellis' description of what the upland fields looked like at this time:

> After traveling over the lava for about a mile, the hollows in rocks began to be filled with a light brown soil; and about half a mile further, the surface was entirely covered with a rich mould, formed by decayed vegetation and decomposed lava. Here through a beautiful part of the country, quite a garden compared with that through which they had passed, on first leaving town. It was generally divided into small fields, about fifteen rods square, fenced with low stone walls, made of fragments of lava which had been gathered from the surface of the enclosures. These fields were planted with bananas, sweet potatoes, mountain taro, tapa trees, melons, and sugar cane, flourishing luxuriantly in every direction. Having traveled about three or four miles through this delightful region, and passed several pools of fresh water, they arrived at the thick woods, which extends several miles up the sides of the lofty mountain that rises immediately behind Kairua. (1963:27-28)

The second quarter of the 19th century, the Merchants and Missionaries Period (A.D. 1820-1847), was a time of profound social change in Hawai'i. Kamehameha I died in mid-1819, and a council of chiefs supported Kamehameha's son Liholiho as successor (Kelly 1983). Liholiho gained the council's support in exchange for the distribution of the profits from the sandalwood trade and the bounty of the land that moved up the hierarchy from the various *ahupua'a* under his control; privileges previously retained solely for the ruler. Within six months after Kamehameha's death, Liholiho, Ka'ahumanu, and Queen Keopuolani broke the *kapu* prohibiting men and women eating together. This act of "free eating" symbolized the end of the traditional *kapu* system. The changes in social and economic patterns began to affect the lives of the common people. Liholiho moved his court to O'ahu, so the burden of resource procurement for the chiefly class lessened considerably. However, some of the work of the commoners shifted from subsistence agriculture to the production of foods and goods for trade to the early Western visitors. Introduced crops, such as yams, coffee, melons, Irish potatoes, Indian corn, beans, figs, oranges, guavas, and grapes (Wilkes 1845) were grown specifically for trade with Westerners. Other commodities, especially sandalwood, were collected to purchase Western goods, often to the detriment of agricultural pursuits. The arrival of the missionaries to Hawai'i in the 1820s brought further changes to the social and religious systems of the islands.

The socioeconomic and demographic changes that took place in the period between 1790 and the 1840s, promoted the establishment of a Euroamerican style of land ownership, and the *Māhele* was the vehicle for determining ownership of the native land. During this Legacy of the Great *Māhele* Period (1848-1899) (Haun et al. 1998), the *Māhele* defined the land interests of the King (Kamehameha III), the high-ranking chiefs, and the low-ranking chiefs, the *konohiki*. 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 and speeded the transfers (Chinen 1961:13). During this process 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. In 1862, the Commission of Boundaries (Boundary Commission) was established in the Kingdom of Hawai'i 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 was 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*. The information was collected primarily between A.D. 1873 and 1885. The testimonies were generally given in Hawaiian and simultaneously transcribed in English.

As a result of the *Māhele*, the *ahupua'a* of Keahuolū was awarded in its entirety to Ane Keohokālole as part of LCAw. 8452. Ane Keohokālole was the great granddaughter of Kame'eiamoku, one of the most important chiefs who supported Kamehameha I (Kelly 1983:31). Keohokālole was married to Kapa'akea and they were the parents of King (David) Kalākaua and Queen (Lydia Kamaka'eha) Lili'uokalani. Also, their youngest son, William Pitt Leleiohoku, was adopted at birth by Ruth Ke'elikōlani, the governess of Hawai'i Island from 1855 to 1874, and named for her first husband, and their youngest daughter, Miriam Likelike, was the mother of Ka'iulani, who was proclaimed heir apparent in 1891 after Queen Lili'uokalani took the throne following the death of her brother King Kalākaua (Kelly 1983:31). The *ahupua'a* of Kealakehe was reserved as Government land and sold as grants.

Eleven *kuleana* claims were awarded in the uplands of Kealakehe Ahupua'a, most at similar elevations to, but north of, the current project area. Twelve additional claims in Kealakehe were not awarded. Six *kuleana* claims were awarded in Keahuolū Ahupua'a, five in the uplands (all *mauka* of the current project area) and one at the coast. Four of the claims in Keahuolū describe the cultivation of taro, one mentions sweet potato, and one mentions coffee; no house lots are mentioned in the claims. The awardee at the coast claimed seven fan palms and a coconut grove, and described the land as salt land that is still yielding salt (Jensen 1990:A-4). Haun and Henry (2001:5-7) contains a complete listing of the twenty-three *kuleana* claims in Kealakehe Ahupua'a. They summarize the land use recorded in these claims as follows:

> The awarded parcels are situated are all situated inland between approximately 900 ft and 1,900 ft elevation. Land use described in the LCA claim testimony consists of house lots and cultivated plots. Twenty claims included house lots with at least 20 houses. Enclosing walls are described for two of the house lots. The testimonies refer to 128 *kihapai* and cultivated parcels. Six *kihapai* are described as partially cultivated and one was uncultivated. Four taro and four sweet potato *kihapai* are the only crops referenced. LCA 7483 describes the inland boundary of one claimed parcel as being a mountain banana patch. The northern and southern boundaries of a second parcel are described as being *kua'iwi*. (Haun and Henry 2001:8)

In a letter dated July 8, 1869, David Kalākaua describes the land of Keahuolū and its possible uses to his sister Lydia Kamaka'eha (Lili'uokalani):

> This land is situated in the District of North Kona. Bounded by the ahupuaa of Lanihau (in Kailua) belonging to Prince Lunalilo on the Ka'u side, and on the Kohala side, by Kealakehe, a government land and Honokoniki belonging to Keelilkolani. Keahuolu runs clear up the mountains and includes a portion of nearly one half of Hualalai mountains. On the mountains the koa, kukui and ohia abounds in vast quantities. The upper land or inland is arable, and suitable for growing coffee, oranges, taro, potatoes, banana & c. Breadfruit trees grow wild as well as Koli oil seed. The lower land is adopted for grazing cattle, sheep, goat, &c. The fishery is very extensive and a fine grove of cocoanut trees of about 200 to 300 grows on the beach. The flat land near the sea beach is composed chiefly of lava, but herbs and shrubbery grows on it and [it is] suitable for feed of sheep and goats. It is estimated at 15,000 to 20,000 acres or more. (Jensen 1990:A-4)

Following the *Māhele* the upper portions of Kealakehe Ahupua'a between approximately 500 and 1,400 feet above sea level were sold as grants (Figure 5). It was the Homestead Act of 1884 that directed the Minister of the Interior to make the land available for homesteads. The lots were to be no more than 20 acres in size and the grantees had five years to comply with all conditions necessary for obtaining the homesteads. In 1886, King Kalākaua executed a 20-year lease for various lands in North Kona, including lands in the upper portion of Kealakehe, which were to be sold in two blocks (first and second series) (Haun and Henry 2001:9). Grant increment roads were established to allow the homesteaders access to their parcels. The current project area crosses portions of two of the first series of homestead grants in Kealakehe; Grant 3965 to W. H. Kalaiwaa in 1896 and Grant 3970 to Beniamina in 1896. The project area also follows the grant increment roads between several other homestead parcels including Grant 3742 to Kailiuaua in 1895, Grant 3967 to J. Kahookiekie in 1896, Grant 4144 to J. Peahi Jr. in 1898, Grant 4786 to Keaweualani in 1903, and Grant 6361 to J. S. Barros in 1915. Historic land use of these parcels likely included residential, diversified agriculture, and cattle ranching.

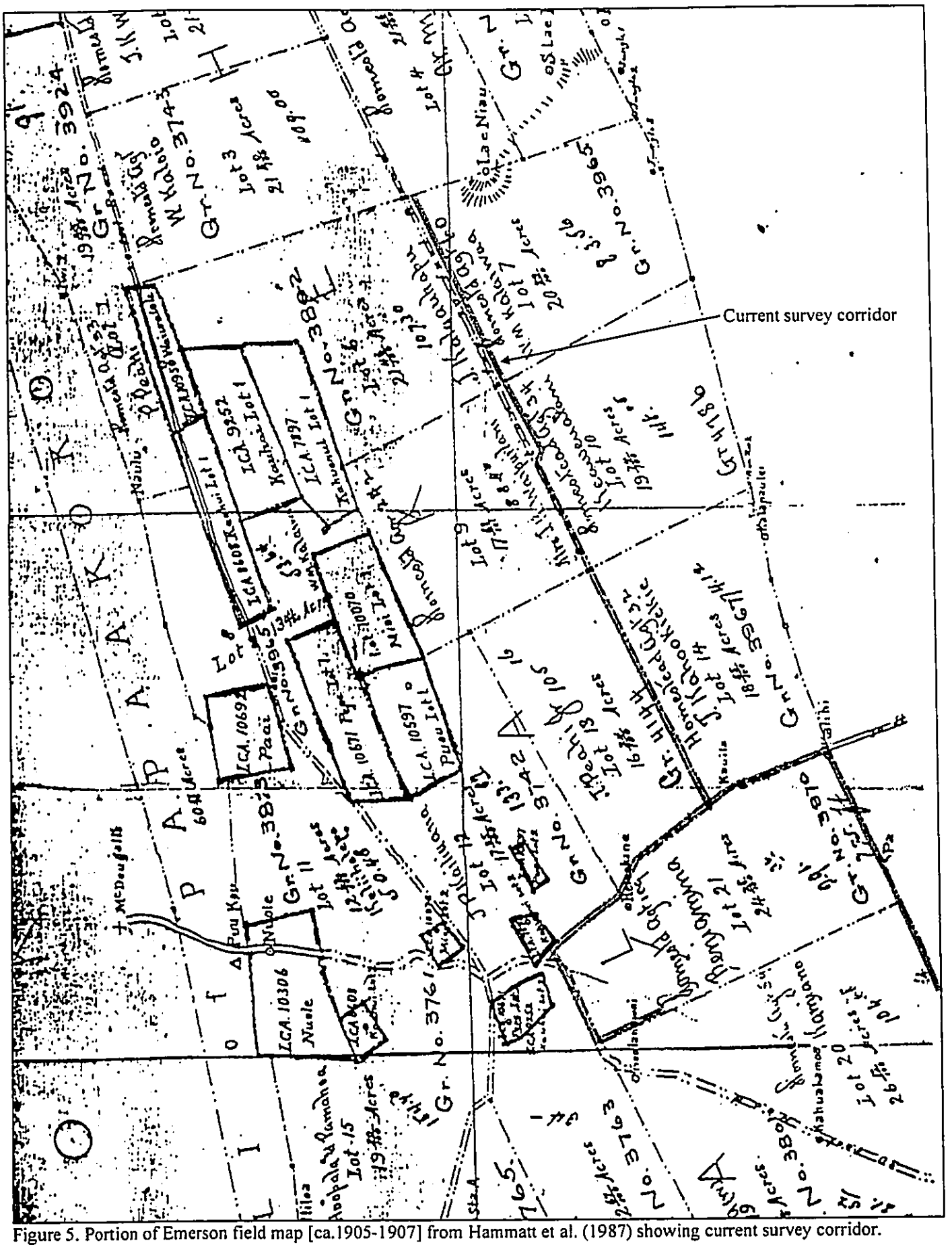


Figure 5. Portion of Emerson field map [ca.1905-1907] from Hammatt et al. (1987) showing current survey corridor.

A short lived, but interesting agricultural pursuit began in Hawai'i in 1893. It was in this year that the Hawaiian Commissioner of Agriculture and Forestry ordered 20,000 sisal plants from Florida (Conter 1903:11). It appears that at some later point, likely in the early 20th century, a sisal mill, used to process the raw sisal into fibers, was constructed by McWayne in Keahuolū Ahupua'a along Palani Road *makai* of the current project area. Kelly (1983:89) relates that Kona was naturally adapted to the cultivation of sisal, and that depending on the terrain anywhere between 500 to 1,000 plants could be grown on an acre. Thrum (1905:181) reported that the "McWayne sisal tract consisted of about 500 acres at or near Kailua". Jensen 1990:A-5), reports that the first crop from the McWayne Estate did not reach Honolulu until 1918. Also, Mr. Minoru Inaba, who worked at the mill from 1920-21, stated that it was owned by Luther S. Aungst from 1917 until its closing in 1924 (in Jensen 1990:A-5). Mr. Inaba recalled that over a thousand acres were in cultivation in Kealakehe and Keahuolū *ahupua'a* surrounding the mill along Palani Road. Workers would harvest the plants in the field and then bundle and transport them to mill by donkey where they were thrashed, dried, and, baled and sent to San Francisco on steamers (Jensen 1990:A-5). It is evident, based on the proximity of the mill to the current project area (Figure 6) and the amount of sisal growing within the survey corridor, that the sisal fields likely encompassed at least a portion of the current project area.

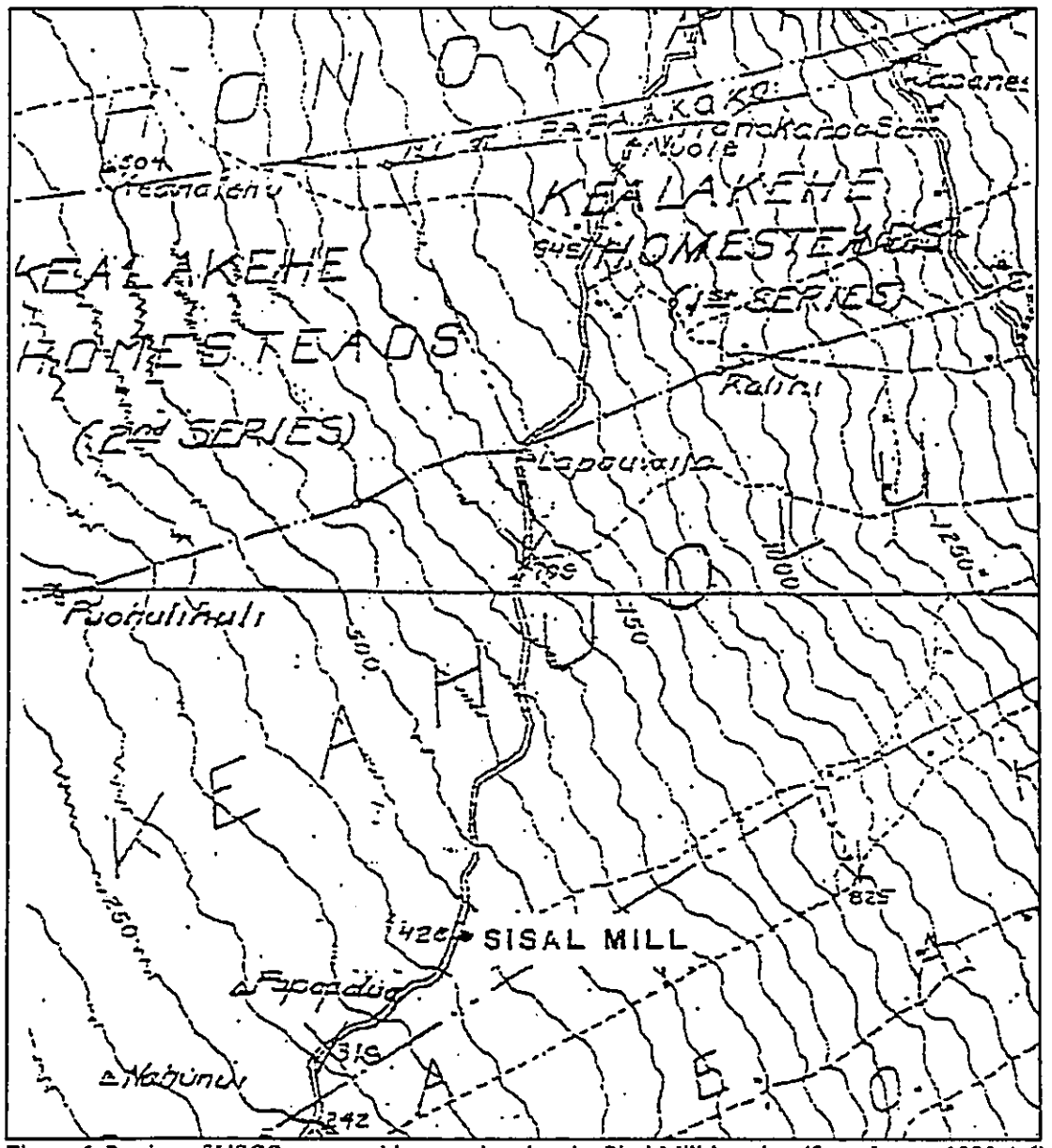


Figure 6. Portion of USGS topographic map showing the Sisal Mill location (from Jensen 1990:A-6).

PROJECT AREA EXPECTATIONS

Based on the background information presented above, a set of field expectations can be generated. According to Cordy et al. (1991) settlement pattern model for Kaloko Ahupua'a the current project area is located within the Middle Zone and Lower Upland Zone, which represent a transitional area between the coastal habitation zone and the upland agricultural zone. The Middle Zone is characterized by widely scattered sites consisting of *mauka/makai* trails, cairns, temporary habitations represented by crude enclosures and platforms, or found in lava tubes and blisters, and various Historic sites primarily related to ranching. The Lower Upland Zone is characterized by informal agricultural plots marked by low-walls, terraces, modified outcrops, and mounds, temporary habitations similar to those found in the Middle Zone, and various Historic sites related to habitation, ranching, and agriculture. The findings of previous archaeological studies conducted in Kealakehe and Keahuolū Ahupua'a at elevations similar to the current project area (c.f. Donham 1990a, b, and c; Hammatt et al. 1987; Jensen 1990, Rechtman et al. 2000; Rechtman and Dougherty 2002) have generally confirmed the Cordy et al. (1991) model.

Based on this information, Precontact feature types that may be encountered within the current survey corridor include mounds, modified outcrops, terraces, and low rock walls (*kuaiwi*) related to agricultural use of the area, enclosures, platforms, or lava tubes used for habitation purposes, and perhaps *mauka/makai* trails that connected coastal areas with inland areas. If any burials are present, they may be found within lava tubes or neatly constructed platforms. Historic feature types that may be encountered within the current survey corridor include core-filled walls used ranching and boundary purposes, roads, habitation features (i.e. enclosures, platforms, cisterns, etc.) related to the homestead use of the area (especially in Kealakehe), and possibly agricultural features similar to those described above (but perhaps related to the commercial cultivation of sisal that briefly occurred in Keahuolū Ahupua'a). If any Historic Period burials are encountered they may be located in above ground mausoleums.

It should be noted that the current survey corridor, for much of its length, follows existing paved roads and the boundaries of residential subdivisions developed during modern times. Development activities related to the paving of these roads and the bulldozing of the subdivisions has likely impacted any archaeological features that were present prior to these activities.

FIELDWORK

Fieldwork for the current inventory survey was conducted by Matthew R. Clark, B.A., Mark J. Winburn, B.A., and Robert B. Rechtman, Ph.D. on September 22 and 23, 2005.

Methods

During the intensive inventory survey of the current study area, the entire survey corridor was subjected to pedestrian transects with the fieldworkers spaced at a 10-meter interval oriented around the corridor centerline, which had been located by land surveyors. When archaeological resources were encountered, they were plotted on a map of the study parcel using Garmin 76s handheld GPS technology (with sub five-meter accuracy), and then (when appropriate) cleared of vegetation, mapped in detail, photographed, and described using standardized site record forms.

Findings

As a result of the current inventory survey seven archaeological sites were recorded within the current project area (Figure 7). One of the sites (Site 14239) is a continuation of a core-filled wall previously recorded by Jensen (1990) paralleling Palani Road. Three of the sites (Sites RC-0161-1, RC-0161-19, and RC-0161-29), all related to Precontact/Historic agriculture, were previously recorded (but not formerly reported on) during inventory fieldwork conducted by Rechtman Consulting, LLC at TMK:3-7-4-09:72. Seven features of these three sites are present within the boundaries of the current survey corridor. The temporary site numbers were retained for these sites, however, as the bulk of these site's features are located outside the boundaries of the current study area on a privately owned parcel. Three other sites (Sites 24853, 24854, and 24855) were newly recorded during the current study. These sites include a Historic

boundary wall (Site 24853), a Historic residence (Site 24854), and a series of Historic wall segments following portions of two former Kealakehe grant increment roads (Site 24855). The grant increment roads included within the project area were constructed during Historic times, but are currently paved public right-of-ways known as Tomi Tomi Road and Kuni Road. In addition to the recorded sites, several agricultural features (likely Precontact in age) were noted to the east of the present survey corridor were it crosses the western edge of TMK:3-7-4-08:1 along the eastern edge of the Queen Liliuokalani Village Subdivision. Agricultural features were likely present within the present survey corridor prior to the development of the subdivision, as bulldozing for that development encroaches into the current project area. Detailed descriptions of all the recorded sites and features follow below and their locations are shown in Figure 7.

SIHP Site 14239

Site 14239 is a section of core-filled wall that runs along the southeastern edge of Palani Drive at the *makai* termination of the current survey corridor in Keahuolū Ahupua'a (see Figure 7). The wall runs northeast/southwest for approximately ten meters paralleling Palani Road roughly three meters from the edge of the right-of-way. Site 14239 terminates to the northeast at an overgrown bulldozed road that has been gated at Palani Road and to the southwest at bulldozing surrounding the existing water tank at 575 feet above sea level along Palani Road that marks the *makai* termination of the current project area (Figure 8). This site was recorded by Jensen as a "boundary wall of apparent modern age" (1990:20). It is likely that this wall dates to the construction of Palani Road (ca. 1890-1900).

Figure 8. Bulldozed southwestern termination of Site 14239 along Palani Road, view to southwest.

RC-0314

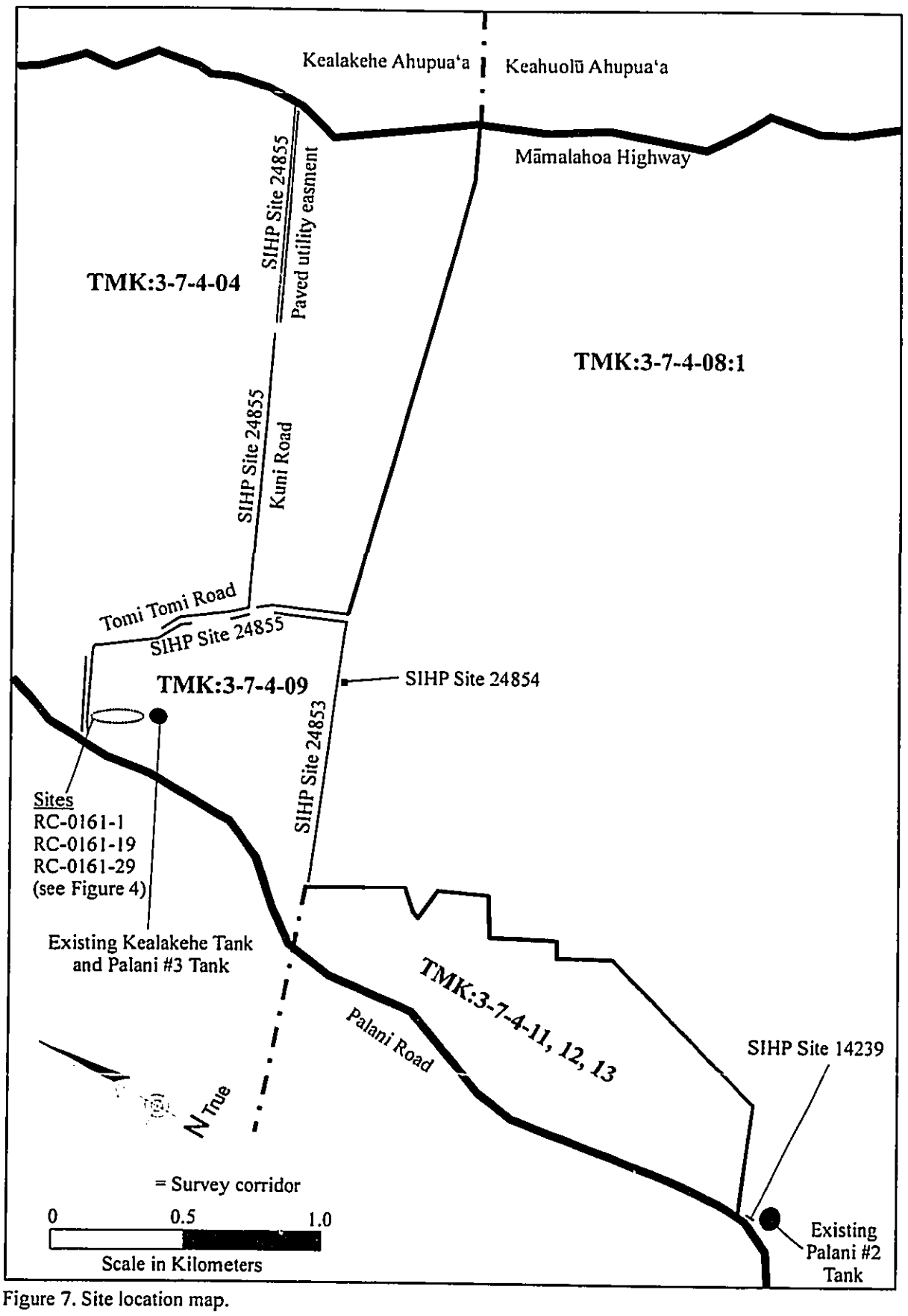


Figure 7. Site location map.

SIHP Site 24853

Site 24853 is a Historic boundary wall that follows the border between the *ahupua'a* of Kealakehe (to the north) and Keahuolū (to the south) (see Figure 7). The section of the wall present within the boundaries of the current project area runs east/west along the northern boundary of the survey corridor and the northern boundary of TMK:3-7-4-08:1 for approximately 500 meters from the southern termination of the paved portion of Tomi Tomi Road to the northwestern corner of TMK:3-7-4-08:1 where it joins TMK:3-7-4-11. The wall is core-filled with neatly stacked cobble edges and an interior fill of smaller cobbles (Figure 9). Intact sections of Site 24853 stand up to 1.2 meters tall by approximately 0.6 meters wide across the top. The *mauka* portion of the wall is more intact than the *makai* portion, owing to less residential development on parcels to the north of the wall near its *mauka* end. The *makai* portion of Site 24853 has been destroyed in several long sections by bulldozing. Site 24853 follows the southern edge of two former Kealakehe homestead lots (Grant 6274 to Elena Kaomi in 1914 and Grant 3970 to Beniamina in 1896) and may have been built during separate construction episodes by the former owners of those two lots.

Figure 9. Intact section of Site 24853's southern edge near its *mauka* end, view to north.

SIHP Site 24854

Site 24854 is a historic house site located on TMK:3-7-4-08:1 in Keahuolū Ahupua'a near the eastern termination of Site 24853 along the southern boundary of the current survey corridor (see Figure 7). Site 24854 consists of two features (Figure 10); a small rectangular enclosure with neatly stacked core-filled walls (Feature A) that is located in the northeastern corner of a larger, less formal terraced enclosure (Feature B). Most of the debris observed at Site 24854 was modern, including a collapsed tree house, discarded tar paper roofing shingles, and various other trash. Two ceramic fragments and two water worn cobbles found within the confines of Feature B appear to be older and may date to the original use of the site. The ceramic fragments were from a single polychrome hand painted bowl or cup with a red, blue, and green floral sponge pattern on it (Figure 11). Initial dating of these fragments seems to indicate that they are from the mid to late 19th century, which may be approximately when this house site was in use. Detailed feature descriptions follow below for Features A and B of Site 24854.

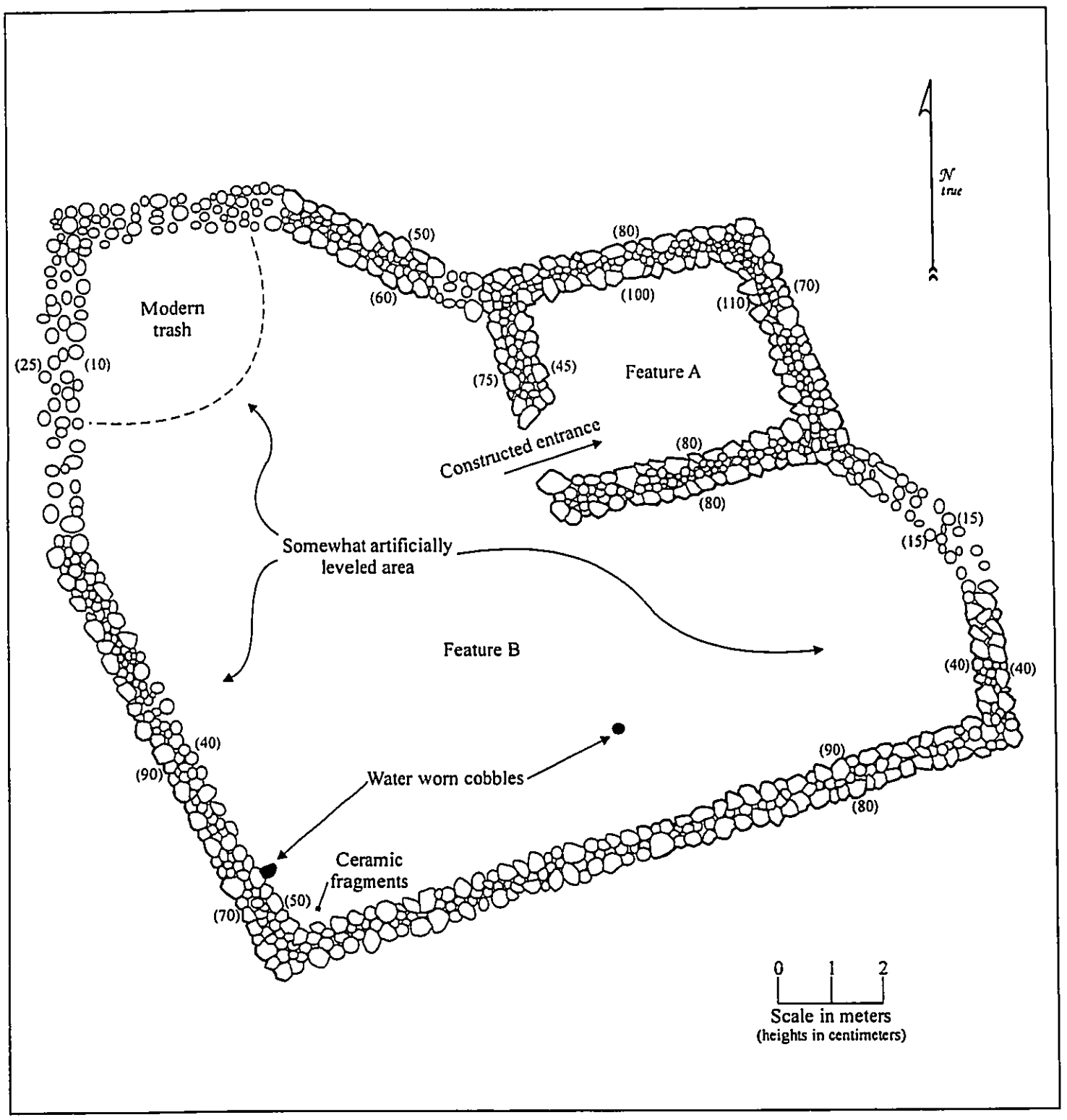


Figure 10. SIHP Site 24854 plan view.

Feature A

Feature A is a neatly constructed rectangular enclosure with core-filled walls located in the northeastern corner of Feature B (see Figure 10). The enclosure measures 5.5 meters east/west by 5.0 meters north/south. The walls exhibit very little collapse and stand up to 1.0 meter tall by 0.6 meters wide (Figure 12). A constructed, 1.5-meter wide opening is present in the western wall of Feature A near its southwestern corner. The interior of the enclosure appears artificially leveled with small cobbles. Feature A may have supported a roofed, wooden structure at some point in the past.

Feature B

Feature B is a larger, irregularly-shaped enclosure that runs from the northwestern corner of Feature A back to the southeastern corner of that feature (see Figure 10). Feature B surrounds a roughly 16.0 meter (east/west) by 14.0 meter (north/south) area to the south and west of Feature A. The walls of Feature B, although core-filled, are more crudely constructed than those of Feature A. The most intact section (along the southern wall) stands up to 0.9 meters tall by 0.6 meters wide (Figure 13). The western wall of Feature B is slightly terraced into the natural slope of the terrain. The cobbles forming the northwestern corner of the enclosure are largely collapsed and scattered. The ground surface within Feature B appears somewhat artificially leveled as compared to the ground surface outside of the enclosure. Feature B may have defined a yard area that was present in front of the roofed structure marked by Feature A.

Figure 11. Ceramic fragments found at Site 24854, overview.

Figure 12. SIHP Site 24854 Feature A, view to northeast of enclosure's interior north wall.

Figure 13. SIHP Site 24854 Feature B, view to southeast of enclosure's interior southeastern corner.

SIHP Site 24855

Site 24855 consists of several sections of Historic core-filled walls located in Kealakehe Ahupua'a that line the edges of the former grant increment roads (see Figure 7). These walls were likely built in the later part of the 19th century and early 20th century by individual homestead owners as portions of boundary walls that surrounded their lots. Currently the walls line two paved, public right-of-ways: Tomi Tomi Road and Kuni Road. In several sections the walls have been bulldozed away by current parcel owners for driveways or land clearing. In other sections the older walls have been replaced by modern rock walls. In general the remaining Historic walls lining these grant increment roads are all core-filled with neatly stacked edges. They stand 0.6 to 1.0 meter tall and 0.6 to 0.8 meters wide. All of these remnant Historic walls exhibit some collapse along their lengths.

Figure 14. View to north from the southern termination of Tomi Tomi Road.

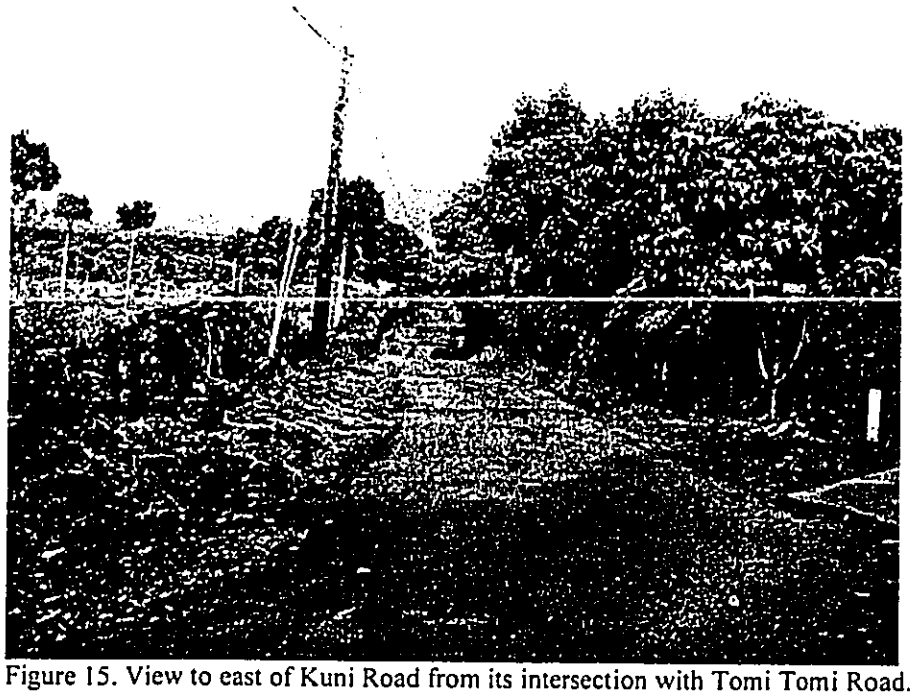


Figure 15. View to east of Kuni Road from its intersection with Tomi Tomi Road.

Figure 16. Detail of wall along the eastern edge of Tomi Tomi Road north of the intersection with Kuni Road, view to east.

Site RC-0161-1

Site RC-0161-1 is a seemingly Historic Period agricultural complex that was recorded during the 2003 Rechtman Consulting, LLC fieldwork conducted at TMK:3-7-4-09:72 (see Figure 4). One feature (Feature A) of this site is present within the current survey corridor.

Feature A

Feature A is a terrace wall located in the northwestern corner of TMK:3-7-4-09:72 (see Figure 7) along the eastern boundary of the current survey corridor as it crosses that parcel. The terrace edge is defined by a stacked alignment of cobbles that measures approximately 22.0 meters long (north/south). It is raised up to 0.9 meters above ground surface to the east and is level with the cobble rubble ground surface to the west. Another terrace wall of Site RC-0161-1 that is raised along its western edge is present 5.5 meters to the east of Feature A outside of the current project area. The area between the two features could have been used for planting. Feature A terminates at Site RC-0161-29 (a *kuaiwi*) to the south and at Site 24855 (a Historic boundary wall along Tomi Tomi Road) to the north.

Site RC-0161-29

Site RC-0161-29 is a *kuaiwi* that runs east/west for approximately 155 meters across the northern portion of TMK:3-7-4-09:72 (see Figure 4). This feature runs along the southern edge of Site RC-0161-1 (an agricultural complex) that was recorded during the 2003 Rechtman Consulting, LLC fieldwork conducted at the aforementioned parcel. Site RC-0161-29 averages 85 centimeters tall by 80 centimeters wide. The extreme eastern portion of the wall consists of piled cobbles, but the remainder of the wall is constructed with stacked cobbles along both edges and a level top fill. This wall likely functioned as a field boundary during Precontact times and was later modified during Historic times. Only the westernmost portion of this site is present within the current project area (see Figure 7).

Site RC- 0161-19

Site RC-0161-19 is a seemingly Historic Period agricultural complex that was recorded during the 2003 Rechtman Consulting, LLC fieldwork conducted at TMK:3-7-4-09:72 (see Figure 4). Five features (Features A, C, E, R, and W) of this site are present within the current survey corridor.

Feature A

Feature A is a short wall segment oriented roughly north/south located near the southern termination of the current survey corridor as it approaches the existing water tank and 936 feet above sea level (see Figure 7). The wall measures 3.0 meters long by approximately 90 centimeters wide and stands up to 80 centimeters tall.

Feature C

Feature C is a core-filled wall that runs along the eastern boundary of the current survey corridor it crosses TMK:3-7-4-09:72 (see Figure 7). The wall measures 11.8 meters long with an average width of 80 centimeters and a maximum height of 90 centimeters. It is constructed of stacked cobbles. Feature C terminates at Feature B (a mound) at its southern end and at Feature F (a terrace) at its northern end. Both of these features are located outside of the current project area.

Feature E

Feature E is an east/west trending linear mound that is located near the eastern boundary of the current survey corridor it crosses TMK:3-7-4-09:72 (see Figure 7). The mound is constructed of cobbles and boulders. The southern periphery of the mound is stacked three to four courses (up to 65 centimeters) high. The eastern edge is level with the natural ground surface. Feature E has overall dimensions of 3.5 meters long by 2.5 meters wide.

Feature R

Feature R is a small circular mound located near the eastern boundary of the current survey corridor as it crosses TMK:3-7-4-09:72 (see Figure 7). The mound is constructed of piled cobbles. It measures 1.5 meters in diameter and achieves a maximum height of 60 centimeters above the surrounding ground surface.

Feature W

Feature W is a *kuaiwi* that runs east/west for approximately 46 meters across the northern portion of TMK:3-7-4-09:72 (see Figure 7). This feature is situated in the northern portion of Site RC-0161-19. Feature W averages 0.6 meters tall by 1.0 meter wide. It is constructed of both piled and stacked pebbles, cobbles, and boulders. This wall likely functioned as a field boundary during Precontact times and was modified during Historic times. Only the western most portion of Feature W is present within the current project area.

Summary

As a result of the current inventory survey project four previously documented sites and three newly recorded sites are described. All provide evidence for the Historic Period use of the general project area, which matches the project expectations. The intensive residential/agricultural use of this area following the late nineteenth and early twentieth century granting programs obliterated or obscured much of evidence of the earlier Precontact land use. The resources previously documented on TMK :3-7-4-009:72, however potentially do retain elements of earlier sites. Given the size and orientation of the waterline corridor through this parcel, the impact to these sites will be minimal.

SIGNIFICANCE EVALUATION AND TREATMENT RECOMMENDATIONS

The sites recorded during the current study are assessed for their significance based on criteria established and promoted by the DLNR-SHPD and contained in the Hawai'i Administrative Rules 13§13-284-6. These significance evaluations should be considered as preliminary until DLNR-SHPD provides concurrence. For resources to be considered significant they 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.

The significance and recommended treatments for the eight sites are discussed below and are presented in Table 2.

Table 2. Site significance and treatment recommendations.

Site No.	*Site Type*	*Temporal Assignment*	*Significance*	*Treatment*
14239*	Wall	Historic/Modern	D	No further work
24853	Wall	Historic Period	D	Preservation
24854	Habitation	Historic Period	D	Data Recovery
24855	Wall	Historic Period	A, D	Preservation
RC-0161-1	Agricultural	Historic Period	D	No further work
RC-0161-19	Agricultural	Historic/Precontact	D	No further work
RC-0161-29	Agricultural	Historic Period	D	No further work

*The significance and treatment of this site has been previously approved by DLNR-SHPD as a result of the Jensen (1990) study.

SIHP Site 14239 is a dry stacked rock wall that was previously assessed (Jensen 1990) as significant under Criterion D. The earlier study concluded that the site was of relatively recent construction and no further work was the approved recommendation.

SIHP Site 24853 is a wall running along the Kealakehe/Keahuolū boundary. This core-filled wall is assessed as significant under Criterion D, and as it can be protected and avoided during construction activities it is recommended that this site be preserved.

SIHP Site 24854 is a Historic Period habitation site in Keahuolū Ahupua'a. This site is assessed as significant under Criterion D for information it has the potential to yield relative to late nineteenth and early twentieth century residential land use. Data recovery is the recommended treatment.

SIHP Site 24855 is a series of wall segments associated with the era of homesteading (1870-1920) within the Kealakehe area. These core-filled walls are assessed as significant under both Criterion A and Criterion D. Given the nature of the proposed project, these walls can be protected and avoided during construction activities; therefore, it is recommended that this site be preserved.

Sites RC-0161-1, RC-0161-19, and RC-0161-29 fall mostly outside of the current study area. The few features or portions of features that fall within the study corridor have been extensively documented during earlier fieldwork. The few resources within the current study area are considered significant under Criterion D, and no further work is recommended. If and when TMK: 3-7-4-009:72 gets developed (apart from the current waterline project) these sites will likely undergo further data collection.

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RC-0314

A Cultural Impact Assessment of the Palani Road Transmission Main Water Supply Route (TMKs:3-7-4-04:1 por., 3-7-4-08:1 por., and 3-7-4-09:72 por.)

Kealakehe and Keahuolū *ahupua'a*
North Kona District
Island of Hawai'i

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ARCHAEOLOGICAL, CULTURAL, AND HISTORICAL STUDIES

A Cultural Impact Assessment of the Palani Road Transmission Main Water Supply Route (TMKs:3-7-4-04:1 por., 3-7-4-08:1 por., and 3-7-4-09:72por.)

Kealakehe and Keahuolū *ahupua'a*
North Kona District
Island of Hawai'i

RECHTMAN CONSULTING

CONTENTS

FIGURES

TABLE

INTRODUCTION

At the request of Ron Terry, Ph. D. of Geometrician Associates, LLC, on behalf of Akinaka & Associates, Inc. and the County of Hawai'i Department of Water Supply, Rechtman Consulting, LLC conducted a cultural impact assessment associated with the proposed construction of a transmission main water supply route within Kealakehe and Keahuolū *ahupua'a*, North Kona District, Island of Hawai'i (Figure 1). This report is a companion document to an archaeological inventory survey (Clark and Rechtman 2005) conducted for this project, and is intended to accompany an Environmental Assessment (EA) compliant with Chapter 343 HRS, as well as fulfilling the requirements of the County of Hawai'i Planning Department with respect to permit approvals for land-altering and development activities. This study 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 Hawai'i, on November 19, 1997.

Below is a description of the project area and the proposed development activities. This is followed by both archaeological and culture-historical background sections (liberally excerpted from Clark and Rechtman 2005 and Rechtman and Maly 2003) providing setting and context to facilitate a more complete understanding of the potential significance of the cultural landscape and the historic and cultural properties within that landscape. Next, the limited consultation process is described, which is followed by a discussion of potential cultural impacts and the appropriate actions and strategies that mitigate any potential impacts.

PROJECT AREA DESCRIPTION AND PROPOSED DEVELOPMENT ACTIVITIES

The current project area consists of a twenty to fifty-foot wide corridor that stretches for a total distance of 10,800 feet from Māmalahoa Highway to two existing water tanks along Palani Road within Kealakehe and Keahuolū *ahupua'a*, North Kona District, Island of Hawai'i (Figures 2 and 3). A new water line and a pressure release tank and valves will be placed within the corridor. Beginning at Māmalahoa Highway, at an elevation of approximately 1,400 feet above sea level, the corridor runs in a straight-line *makai* for 3,100 feet following two existing paved roadways. The *mauka* section of the corridor follows a paved utility easement along the northern boundary of a privately owned parcel (TMK:3-7-4-04:1) to a gate at Kuni Road. Beyond the gate the corridor continues *makai* following the paved public right-of-way (Kuni Road) to its intersection with Tomi Tomi Road (Figure 4). At the intersection the corridor continues in two directions, following Tomi Tomi Road (a paved public right-of-way) to both the north and the south. To the north (Figure 5), the corridor meanders north and west for 2,100 linear feet following Tomi Tomi Road nearly to Palani Drive. Just before the intersection with Palani Drive the survey corridor veers south and runs along the *makai* boundary of a privately owned parcel (TMK:3-7-4-04:72) to an existing water tank located at an elevation of 936 feet above sea level. To the south of the intersection at the *makai* end of Kuni Road the project corridor follows Tomi Tomi Road south for a short distance to its termination at the Kealakehe/Keahuolū *ahupua'a* boundary (Figure 6). The corridor then turns *makai* (west) and follows the northern and western boundaries of TMK:3-7-4-08:1 (owned by Lili'uokalani Trust Estate) along the southern and eastern boundary of the Queen Lili'uokalani Village residential subdivision for 5,600 linear feet to an existing water tank along Palani Road at an elevation of 575 feet above sea level. The construction of a paved service road following the route of the water line is also planned for the currently undeveloped portion of the project area within Keahuolū Ahupua'a.

Only sparse vegetation consisting of various grasses and weeds is present within the portion of the project area that follows the existing paved roads. Vegetation at TMKs:3-7-4-04:72 and 3-7-4-08:1, where the survey corridor does not follow paved roads, is considerably more dense. The predominant floral species on these two parcels are considered invasive and non-native indicative of both Historic and recent alterations of the landscape. These species include Christmas-berry (*Schinus terebinthfolius*), *koa haole* (*Leucaena leucocephala*), guava (*Psidium guajava*), autograph trees (*Clusia rosea*), ti (*Cordyline fruticosa*), fountain grass (*Pennisetum setaceum*), California grass (*Brachiaria mutica*), airplant (*Bryophyllum pinnatum*), and sisal (*Agave sisalina*).

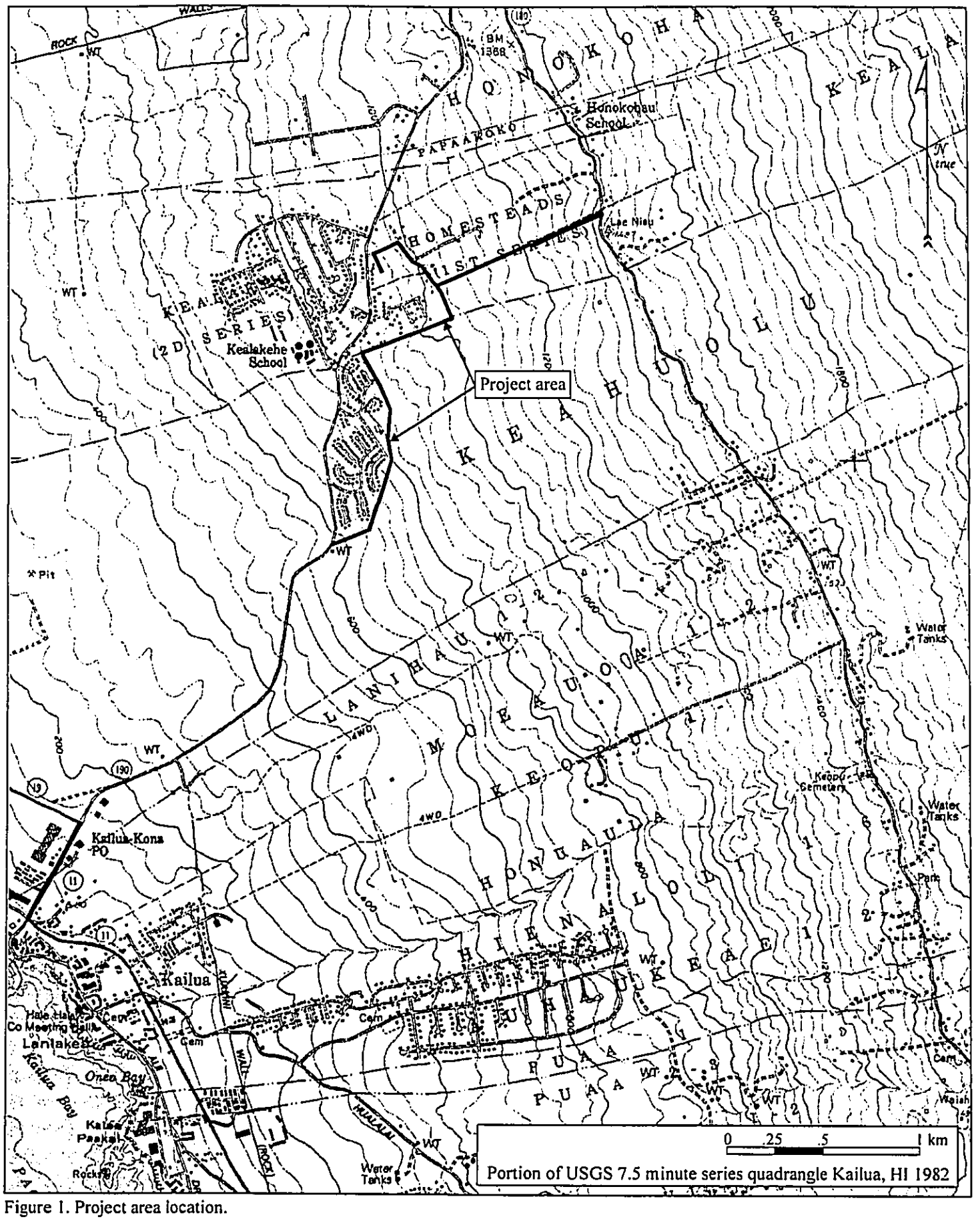

Figure 1. Project area location.

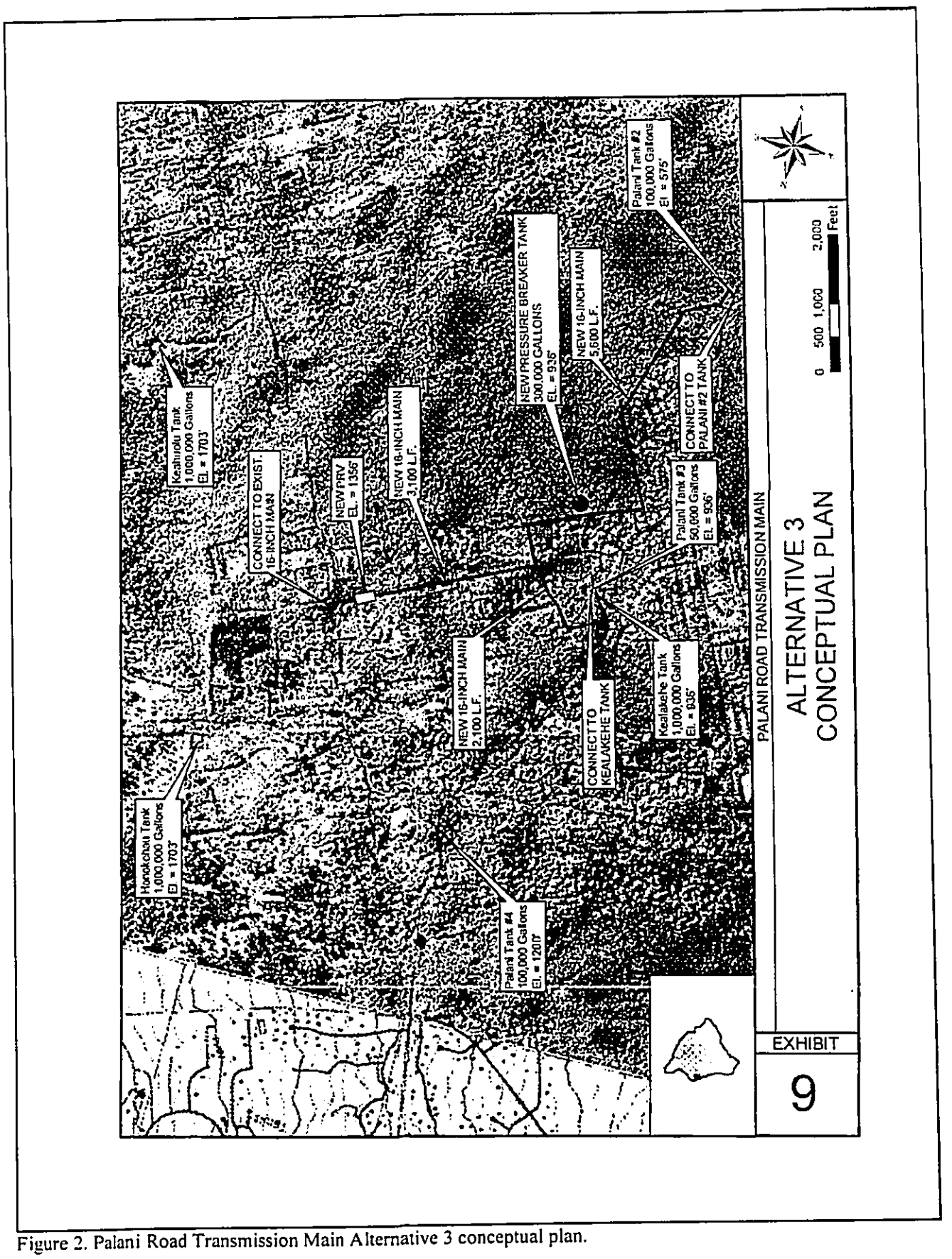

Figure 2. Palani Road Transmission Main Alternative 3 conceptual plan.

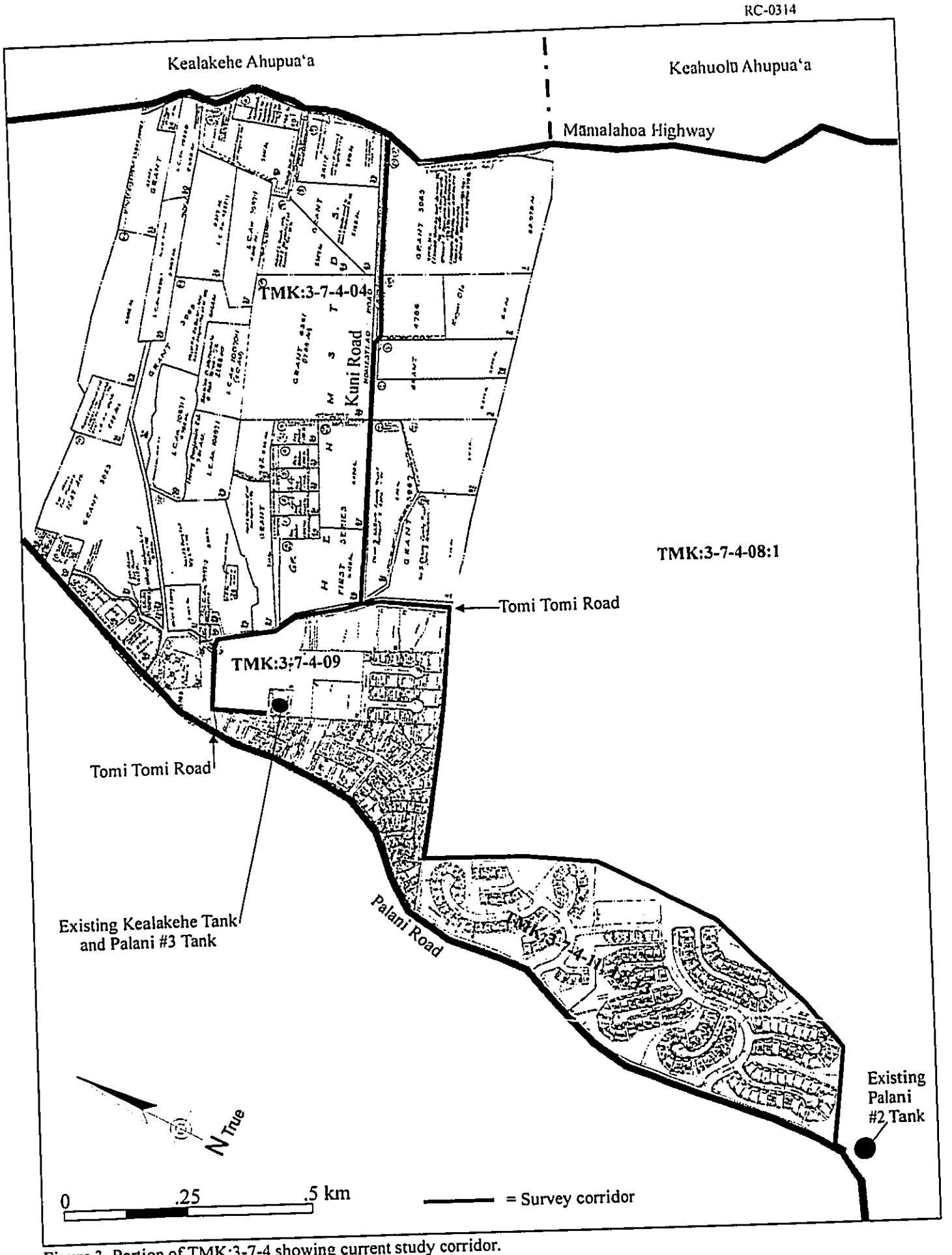

Figure 3. Portion of TMK:3-7-4 showing current study corridor.

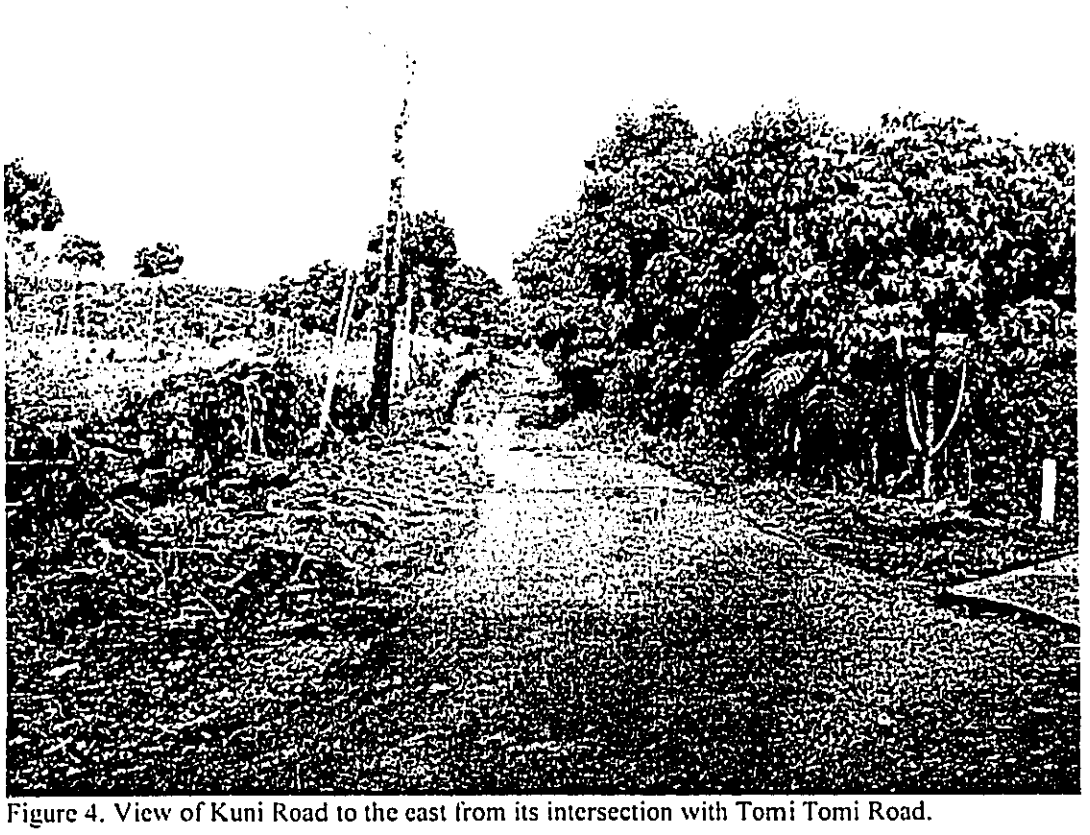

Figure 4. View of Kuni Road to the east from its intersection with Tomi Tomi Road.

Figure 5. View of Tomi Tomi Road to the north from its intersection with Kuni Road.

Figure 6. View of Tomi Tomi Road to north from its southern terminus.

ARCHAEOLOGICAL BACKGROUND

Numerous archaeological studies have been completed within Kealakehe and Keahuolū *ahupua'a* (Table 1). These studies have included large portions of both *ahupua'a,* mostly *makai* of the current project area.

Table 1. Previous archaeological studies in Kealakehe and Keahuolū *ahupua'a*.

Study	*Type of Project*	*Elevation(above sea level)*
Stokes (1919)	Reconnaissance Survey	<40
Reinecke (1930)	Reconnaissance Survey	<40
Ladd (1968)	Site Testing	<40
Sekido (1968)	Site Testing	<40
Emory and Soehren (1971)	Reconnaissance Survey	<40
Sinoto (1975)	Reconnaissance Survey	<40
Cluff (1971)	Reconnaissance Survey	<40
Ching (1978)	Reconnaissance Survey	0-80
Soehren (1980)	Reconnaissance Survey	20-80
Soehren (1983)	Field Inspection	800-1000
Rosendahl (1983)	Reconnaissance Survey	30-200
Hammatt et al. (1987)	Inventory Survey	700-760
Walker and Haun (1987)	Reconnaissance Survey	900
Donham (1990a and b)	Inventory Survey	600-800
Donham (1990c)	Inventory Survey	30-600
Jensen (1990)	Inventory Survey	180-580
Burgett and Rosendahl (1992)	Inventory Survey	70-700
Borthwick and Hammatt (1992)	Inventory Survey	10-75
Borthwick et al. (1993)	Reconnaissance Survey	50-90
O'Hare and Goodfellow (1994)	Data Recovery	70-700
Walsh and Hammatt (1995)	Inventory Survey	50-90
Rechtman et al. (2000)	Inventory Survey	1500-1600
Haun and Henry (2001)	Inventory Survey	30-85
Rechtman and Dougherty (2002)	Inventory Survey	1500-1600
Rechtman and Escott (2002)	Inventory Survey	30-80
2003 Rechtman Consulting, LLC	Fieldwork	930-1000

The earliest archaeological surveys conducted in the region generated brief descriptions of major coastal sites (Stokes 1919, Reinecke 1930). In 1906 Stokes documented Laupauwila Heiau (Bishop Museum Catalogue: 50-Ha-D11-28) in Kealakehe Ahupua'a and provided the following description: "Heiau of Laupauwila, land of Kealakehe, North Kona. Said to be on the 'elemakule homestead. Grant No. 3756, 3.5 miles from the sea" (Stokes and Dye 1991:40). In the late 1920s Reinecke conducted an archaeological inventory of the coastal areas from Kona to Kohala. He documented twelve sites each in the coastal portions of Kealakehe and Keahuolū *ahupua'a*. The Kealakehe sites included residential platforms and house yards, Hale o Lono Heiau (Site 33), and an unidentified *heiau* (Site 35). The Keahuolū sites included 41 platforms and 12 enclosures mostly interpreted as house sites, several petroglyphs (Site 20), two modified pools (Sites 12 and 17), three burials (Sites 12, 13, and 19), and a canoe landing (Site 14).

During the 1960s and 1970s increased coastal development within the Kailua area created a need for further archaeological study at the sites previously recorded by Reinecke (1930). As a result of the continuing development of Honokōhau Harbor, excavations were carried out at three of the Kealakehe sites recorded by Reinecke (Ladd 1968; Sekido 1968). These sites included a house platform, a habitation cave, and a burial site. Also, Sinoto (1975) conducted an additional reconnaissance on 100 acres located just inland of Honokōhau Bay, identified three previously recorded sites, but recommended no further archaeological work in the area.

In the early 1960s Emory (Emory and Soehren 1971) conducted an archaeological reconnaissance of the coastal areas of Honokōhau I and II, Kealakehe, and Kaloko *ahupua'a*. A total of 27 sites were recorded in Kealakehe Ahupua'a. The documented sites included ten house sites, ten burial sites, three enclosures, two *heiau* (both previously identified by Reinecke), and two indeterminate sites. In addition, a "modern" graveyard was documented that reflected both traditional Hawaiian and European burial practices. The report suggests that the Honokōhau Bay area, including its fishponds, ceremonial *heiau*, *holua*, and residential complexes, was a primary locus of political and ceremonial activity along the northern Kona coast. A study by Cluff (1971) supplemented the reconnaissance by Emory and Soehren by expanding the survey area coverage, and provided significance evaluations and treatment recommendations for the identified sites.

Ching (1978) conducted a reconnaissance survey of coastal Keahuolū Ahupua'a between the shore and Queen Ka'ahumanu Highway (987 acres). As a result of the survey Ching identified fifty-nine sites containing 140 distinct features that included twenty-nine salt pans, twenty-one pavements, and twenty-one cairns. Nine of these sites had been previously identified by Bevacqua (1972) and seven had been previously identified by Sinoto (1975).

All of these early archaeological studies suggest a pattern of coastal settlements near fishponds and rich marine resources with a decrease in permanent habitation sites and an increase in agricultural features further inland. Beginning in the late 1970s numerous studies were conducted in *mauka* portions of Kealakehe and Keahuolū *ahupua'a*. These studies documented the presence of numerous agricultural features associated with the upland field systems in the two *ahupua'a* and documented the formal feature types that occur in the Middle Zone (roughly 15 to 800 or 900 feet above sea level) of between the coastal zone and the upland agricultural zone.

Soehren (1980) surveyed a 40-acre parcel and an access corridor for a proposed wastewater treatment plant in coastal Kealakehe at an elevation between 35 and 240 feet above sea level. One trail, SIHP 7704, was documented during the survey. Soehren believed this trail connected Aimakapa Pond, in Honokōhau, with a small settlement at Pawai Bay, in northern Keahuolū (Soehren 1980).

Soehren (1983) surveyed a 10-acre parcel in upper Keahuolū Ahupua'a at elevations ranging from 800 to 1,000 feet above sea level to the east of the Queen Liliuokalani Village subdivision. Soehren did not locate any sites or features. He noted that, "Such land appears suited only for arboreal crops, such as paper mulberry, if any", and that "no evidence was found of traditional agricultural structures such as kuaiwi, clearing mounds or terraces, nor were there any other features attributed to prehistoric Hawaiian culture seen on the parcel" (Soehren 1983).

Rosendahl (1983) conducted a reconnaissance survey of three separate areas within Keahuolū Ahupua'a. The areas included 100 acres west of Queen Ka'ahumanu Highway along the southern boundary of the *ahupua'a*, 100 acres east of the highway along the southern edge of Palani Road, and 12 acres along the northern edge of Palani Road and the southern edge of the *ahupua'a*. Rosendahl (1983) identified two large site complexes and five additional sites, but did not record them in detail. He recommended that intensive survey of all three areas be conducted.

Walker and Haun (1987) conducted a reconnaissance survey of a roughly half-acre parcel at an elevation of 900 feet above sea level. They recorded a single agricultural/habitation complex with eight features. Hammatt and Folk (1984) surveyed a 24-acre parcel along the south boundary of Kealakehe Ahupua'a at about 700 feet above sea level and found no archaeological sites, but they did note heavy mechanical disturbance had occurred on the property.

In 1987 Hammatt et al. (1987) conducted an inventory survey on a 15-acre parcel located between 700-760 feet above sea level in Kealakehe Ahupua'a. The project identified thirty-two features, seventeen of which were subjected to test excavations. Twenty-five of the features were interpreted as agricultural; the remaining fifteen were considered habitation features. The habitation features were further interpreted as "field hale" and were assigned to the late Precontact Period based on the results of a single radiocarbon date (A.D. 1645-1950). The report described the agricultural features as being part of the Kona Field System, but distinct from the typical dryland fields originally described (Soehren and Newman 1968) for the complex. The features they recorded are less formally arranged and exhibit adaptation to the particular environmental conditions of the area. Prior to testing, these features were considered possible burials. No human remains were discovered during testing and the features were interpreted as agricultural clearing mounds.

Between 1989 and 1992, PHRI conducted an archaeological inventory survey and mitigation program on a 950-acre area for the Kealakehe Planned Community (Burgett and Rosendahl 1992; O'Hare and Goodfellow 1994). The project area spanned the width of the *ahupua'a* and extended from 70 to 700 feet above sea level. Roughly 100 sites were recorded with numerous features, including agricultural features (the predominate feature type), habitation features, possible ceremonial and burial features, trails, storage and marker features, and boundary walls. The recording and excavation of sites within all elevational zones enabled the investigators to prepare a synthesis of settlement and land use patterns for the *ahupua'a* below 800 feet above sea level. Above approximately 600 feet above sea level the density and formal nature of the agricultural features increased, suggesting that this elevation marked "the lower boundary of a distinct agricultural zone" (O'Hare and Goodfellow 1994:87). They also noted an increase in permanent habitation sites beginning at about 740 feet above sea level, which was further reinforced by the *Māhele* data for Kealakehe Ahupua'a.

Donham (1990a and 1990b) conducted an inventory survey of a 150-acre parcel for the proposed Kealakehe Planned Development Site located at elevations ranging from 800 to 600 feet above sea level along the northern edge of Keahuolū Ahupua'a and the northwestern edge of Palani Road. As a result of the survey Donham recorded fifty-three sites including eighteen agricultural complexes containing 3 to 120 features each. Identified feature types included numerous mounds (n=278) and *pāhoehoe* excavations (n=173), along with a single platform and six terraces.

Donham (1990c) also conducted an inventory survey of 1,100 acres located east of the Old Kona Airport and along the northern edge of Palani Road in the southern portion of Keahuolū Ahupua'a. As a result of that survey Donham identified 239 sites containing 1,810 features. The predominant feature types (90% of the recorded features) consisted of *pāhoehoe* excavations, mounds, modified blisters, modified outcrops, terraces, low platforms, C-shapes, enclosures, and rubble walls representative of Precontact Hawaiian agriculture. Other functional categories assigned to the sites included quarry and habitation.

In 1990 PHRI conducted an inventory survey for improvements to Palani Road within Keahuolū Ahupua'a (Jensen 1990). The project area consisted of a 50-foot wide corridor that stretched along the southeastern edge of Palani Road from elevations of 180 to 580 feet above sea level. The Jensen (1990) project area terminated at the water tank along Palani Drive that marks the *makai* most boundary of the current project area. As a result of the survey Jensen recorded thirty-two sites containing forty-four features. The majority of the features (n=30) including mounds, walls, terraces, enclosures, and modified outcrops were determined to be related to agriculture/boundary. One of these boundary features was the Kuakini Wall. Thirteen of the remaining features including one small cave, five modified outcrops, and seven enclosures were determined to have been used for Precontact temporary habitation purposes. In addition to these features, one sealed lava tube contained a drilled conch shell. Jensen (1990:14) concluded that the cave had been sealed for the sole purpose of caching this artifact and was not used for any other purpose.

Cultural Surveys Hawaii (Borthwick and Hammatt 1992) conducted an inventory survey of a 22-acre corridor in Keahuolū and Kealakehe *ahupua'a* at elevations ranging between 10 and 75 feet above sea level. The project covered an area that stretched across Keahuolū Ahupua'a in its entirety and continued into a

small portion of southern Kealakehe Ahupua'a. Fourteen archaeological sites or complexes were recorded. All but one was located within the lower elevation range of the project area. Identified sites included temporary habitations in lava blisters and sinks, *pāhoehoe* excavations, two caves, and one Historic Period clearing mound.

In 1993 Cultural Surveys Hawaii (Borthwick et al. 1993) completed a reconnaissance survey of an area along both sides of Queen Ka'ahumanu Highway in Kealakehe Ahupua'a. During that survey a single site was recorded. This site was situated near the intersection of the Highway and the road to Honokōhau Harbor. During a more recent Haun and Associates survey (Haun and Henry 2001) this site could not be relocated.

In 1995 Cultural Surveys Hawaii (Walsh and Hammatt 1995) conducted an inventory survey for the new Queen Ka'ahumanu Highway between Palani Road and Keahole Airport that crossed several *ahupua'a*. This area had been previously subject to a reconnaissance survey conducted by Borthwick et al. (1993). As a result of these surveys two sites were recorded within the current study *ahupua'a* a stepping stone trail running in a *mauka/makai* direction within Kealakehe Ahupua'a, and the Old Māmalahoa Trail that crosses both *ahupua'a* as it parallels the highway alignment.

In 2000 Rechtman Consulting, LLC conducted an inventory survey in the *mauka* portion of Kealakehe Ahupua'a above Māmalahoa Highway at elevations ranging between 1,480 and 1,600 feet above sea level (Rechtman et al. 2000). They recorded six sites: four Historic Period walls and two Precontact agricultural complexes. Combined these two sites contained 41 features typical of Kona Field System sites in the *'apa'a* or Upland Zone.

In 2001 Haun and Associates conducted an inventory survey of approximately 200 acres in Kealakehe Ahupua'a at elevations ranging from 30 to 85 feet above sea level for PBR Hawaii and the Department of Hawaiian Homelands (Haun and Henry 2001). A total of 123 archaeological features separated into fifty-six sites were recorded on the parcel. The sites consisted of ten formal feature types including *pāhoehoe* excavations, stone alignments, cairns, mounds, petroglyphs, trails, enclosures, caves, overhangs, and platforms. Two previously recorded sites extended into their survey area, including a trail route (SIHP 7704) recorded by Soehren in 1980, and a second trail route (SIHP 13194) recorded by Borthwick et al. (1993).

In 2002 Rechtman Consulting, LLC conducted an inventory survey (Rechtman and Dougherty 2002) on a property adjacent to the Rechtman et al. (2000) study area. One archaeological site (SIHP 23274) was identified, consisting of 79 features, all related to a single residential property that existed from the 19th to 20th century. Features recorded include walls, agricultural modifications, trail and road alignments, a corral, a concrete mausoleum, and features associated with both landowner and laborer residential activities.

Also in 2002 Rechtman Consulting, LLC (Rechtman and Escott 2002) conducted an inventory survey of a roughly 40-acre area located at elevations raging from 30 to 80 feet above sea level in Kealakehe Ahupua'a along the *makai* edge of Queen Ka'ahumanu Highway. As a result of that study five sites were recorded with features including a C-shaped enclosure, three *pāhoehoe* excavations, a collapsed lava blister used for temporary habitation purposes, three trail segments, two cairns (one modern), and a habitation area within a lava tube.

In 2003, Rechtman Consulting, LLC conducted fieldwork for an inventory survey of TMK:3-7-4-09:72, a roughly 9-acre parcel located in Kealakehe Ahupua'a at elevations ranging from approximately 930 to 1,000 feet above sea level. Unfortunately, the parcel owners terminated all work on the project upon completion of the fieldwork and a report of the findings was never prepared. The work conducted on the parcel is important to the present inventory survey, however, as the current survey corridor crosses a portion of this parcel along its *makai* edge (from Tomi Tomi Road to an existing water tank located at 936 feet above sea level). During the 2003 fieldwork Rechtman Consulting, LLC recorded ninety distinct features on the parcel described as twenty-nine temporary sites (Sites T-1 to T-29). The temporary sites included six agricultural complexes, six modified outcrops, five mounds, three enclosures, one *kuaiwi*, a lava tube containing burials, six Historic walls, and a Historic roadway. Six test units were excavated at the recorded sites. Seven of the recorded features, all related to agriculture, fall within the boundaries of the current project area.

In 2005, as part of the current proposed project, Rechtman Consulting, LLC completed an inventory survey (Clark and Rechtman 2005) of the project area. As a result of that study seven archaeological sites were recorded. One of the sites (SIHP Site 14239) is a continuation of a core-filled wall previously recorded by Jensen (1990) paralleling Palani Road. Three of the sites (Sites RC-0161-1, RC-0161-19, and RC-0161-29), all related to Precontact/Historic agriculture, were previously recorded (but not formerly reported on) during inventory fieldwork conducted by Rechtman Consulting, LLC at TMK:3-7-4-09:72. Three other sites were newly recorded. These sites include a Historic boundary wall (SIHP Site 24853), a Historic residence (SIHP Site 24854), and a series of Historic wall segments (SIHP Site 24855). All of the recorded sites provided evidence for the Historic Period use of the general project area. The intensive residential/agricultural use of this area following the late nineteenth and early twentieth century granting programs obliterated or obscured much of evidence of the earlier Precontact land use. The resources previously documented on TMK :3-7-4-009:72, however potentially do retain elements of earlier sites. Given the size and orientation of the water line corridor through this parcel, it was suggested (Clark and Rechtman 2005) that the impact to these sites would be minimal. SIHP Site 24854 was recommended for data recovery, SIHP Sites 24853 and 24855 were recommended for preservation, and no further work was the recommended treatment for the remaining resources.

CULTURE-HISTORICAL BACKGROUND

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. Hawai'i, the largest of the islands, was the first-born of these island children. As the Hawaiian genealogical account continues, we find that these same god-beings, or creative forces of nature who gave birth to the islands, 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 deep sea 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 clusters of houses where families lived could be found (McEldowney 1979:15). In these early times, Hawai'i's inhabitants were primarily engaged in subsistence level agriculture and fishing (Handy and Handy 1972:287).

Over a period of several centuries, areas with the richest natural resources became populated and perhaps crowded, 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 established at several locations—the Kailua (Kaiakeakua) vicinity, Kahalu'u-Keauhou, Ka'awaloa-Kealakekua, and Hōnaunau. The communities shared extended familial relations, and there was an occupational 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 and Handy 1972; Kamakau 1961; Kelly 1983; and Tomonari-Tuggle 1985).

In Kona, where there were no regularly flowing streams to the coast, access to potable water (*wai*), was of great importance and played a role in determining the areas of settlement. The waters of Kona were found in springs and caves (found from shore to the mountain lands), or procured from rain catchments and dewfall. Traditional and historic narratives abound with descriptions and names of water sources, and also record that the forests were more extensive and extended much further seaward than they do today. These forests not only attracted rains from the clouds and provided shelter for cultivated crops, but also in dry times drew the *kēhau* and *kēwai* (mists and dew) from the upper mountain slopes to the low lands (see also traditional-historical narratives and oral history interviews in this study).

In the 1920s-1930s, Handy and Handy (1972) conducted extensive research and field interviews with elder native Hawaiians. In lands of North and South Kona, they recorded native traditions describing agricultural practices and rituals associated with rains and water collection. Primary in these rituals and practices was the lore of Lono—a god of agriculture, fertility, and the rituals for inducing rainfall. Handy and Handy, observed:

> The sweet potato and gourd were suitable for cultivation in the drier areas of the islands. The cult of Lono was important in those areas, particularly in Kona on Hawai'i . . . there were temples dedicated to Lono. The sweet potato was particularly the food of the common people. The festival in honor of Lono, preceding and during the rainy season, was essentially a festival for the whole people, in contrast to the war rite in honor of Ku which was a ritual identified with Ku as god of battle. (Handy and Handy 1972:14)

Handy and Handy (1972) noted that the worship of Lono was centered in Kona. Indeed, it was while Lono was dwelling at Keauhou, that he is said to have introduced taro, sweet potatoes, yams, sugarcane, bananas, and *'awa* to Hawaiian farmers (Handy and Handy 1972:14). The rituals of Lono "The father of waters" and the annual *Makahiki* festival, which honored Lono and which began before the coming of the *kona* (southerly) storms and lasted through the rainy season (the summer months), were of great importance to the native residents of this region (Handy and Handy 1972: 523). The significance of rituals and ceremonial observances in cultivation and indeed in all aspects of life was of great importance to the well being of the ancient Hawaiians, and cannot be overemphasized, or overlooked when viewing traditional sites of the cultural landscape.

Over the generations, the ancient Hawaiians developed a sophisticated system of land and resources management. 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* within the island. The district of Kona itself, extends from the shore across the entire volcanic mountain of Hualālai, and continues to the summit of Mauna Loa, where Kona is joined by the districts of Ka'ū, Hilo, and Hāmākua. One traditional reference to the northern and southern-most coastal boundaries of Kona tells us of the district's extent:

> *Mai Ke-ahu-a-Lono i ke 'ā o Kani-kū, a hō'ea i ka 'ūlei kolo o Manukā i Kaulanamauna e pili aku i Ka'ū!*—From Keahualono [the Kona-Kohala boundary] on the rocky flats of Kanikū, to Kaulanamauna next to the crawling (tangled growth

of) 'ūlei bushes at Manukā, where Kona clings to Ka'ū! (*Ka'ao Ho'oniua Pu'uwai no Ka-Miki in Ka Hōkū o Hawai'i*, September 13, 1917; Translated by Kepā Maly)

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 *'akau* (North Kona), there are several ancient regions (*kalana*) as well. These regions were further divided into *ahupua'a*. Entire *ahupua'a*, or portions of the land were generally under the jurisdiction of appointed *konohiki* or lesser chief-landlords, who answered to an *ali'i-'ai-ahupua'a* (chief who controlled the *ahupua'a* resources). The *ali'i-'ai-ahupua'a* in turn answered to an *ali'i 'ai moku* (chief 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 resources 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, divisions of labor (with specialists in various occupations on land and in procurement of marine resources) were adhered to strictly.

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 tended 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 1961:372-377 and Malo 1951:63-67).

The current project area is located in the *ahupua'a* of Kealakehe and Keahuolū within the former area of agricultural fields commonly referred to as the Kona Field System (Cordy 1995; Haun and Henry 2001; Newman 1970; Schilt 1984). A land use and settlement pattern model applicable to the current study area was presented by Cordy et al. (1991) for nearby Kaloko Ahupua'a. This model delineates four environmental zones within the *ahupua'a*: the Coastal Zone from shoreline to 15 feet elevation, the Middle Zone from 15 to 800-900 feet elevation, the Lower Upland Zone from 900 to 1,500 feet, and the Upland-Forest Zone between 1,500 and 6,000feet elevation. The current project area is within the Middle Zone and Lower Upland Zone. According to Cordy et al. (1991) these zones represent a transitional area between the coastal habitation zone and the upland agricultural zone.

The Kona Field System and its development are significant to understanding the cultural contexts of the project area because agricultural elements characteristic to the Kona Field System did exist in the *mauka* portion of Kealakehe (Hammatt et al. 1987; Haun and Henry 2001; Rechtman and Dougherty 2002; Rechtman et al. 2000). *Māhele* documents and previous archaeological studies identify Kona Field System agriculture sites in the *kalu'ulu* zone (500 to 1,000 feet elevation) beginning at an elevation of 900 feet and in the *apa'a zone* (1,000 to 2,500 feet elevation).

While the archaeological record contributes to an understanding of how the Kona Field System developed over time, precisely how the record is interpreted is reflected in the various chronologies proposed for the system (Burtchard 1995; Cordy 1995; Haun et al. 1998; Hommon 1986; Kirch 1985; Schilt 1984). The chronology and terminology outlined by Haun et al. (1998) is used in the present discussion, and the chronological summary below is abstracted from Rechtman et al. (1999).

There is little archaeological evidence for permanent settlements in the Kona region throughout the first half of the Early Expansion Period of Hawaiian history (A.D. 600 to 1100) (Burtchard 1995; Hommon 1986; Kirch 1985). Although permanent habitation was still concentrated on the windward side, it is likely that windward residents may have traveled to the Kona coast to obtain needed resources (Cordy 1995). By the latter half of the Early Expansion Period, permanent settlements were established in Kona along the

coast and on lowland slopes, and informal fields were likely established at higher elevations (Cordy 1981; Cordy 1995; Schilt 1984).

An archaeological study by Cordy et al. (1991) along a coastal portion of nearby Kaloko Ahupua'a suggests this area was settled between A.D. 900 and 1200. Radiocarbon data from archaeological studies within the *ahupua'a* of Kealakehe indicate initial human activity in this region in the 1200s to 1300s, a gradual increase between the 1400s and 1500s, followed by more intensive activity from the 1600s to early historic period (Haun and Henry 2001).

Agricultural fields and habitation areas expanded across the slopes and coastal area of Hualālai during the Late Expansion Period (A.D. 1100 to 1400) (Burtchard 1995; Cordy 1995). Walled agricultural fields, planting mounds, and temporary habitations were established at the higher elevations that received greater amounts of rainfall.

The development of the extensive formal walled fields sometime during the initial stages of the Intensification Period (A.D. 1400 to 1600) marks the initiation of the Kona Field System (Schilt 1984). The development of these fields may have been, in part, a by-product of the need to extract more subsistence resources from an increasingly limited agricultural base. Radiocarbon data indicates that the population in Kona increased dramatically during this period (Burtchard 1995; Haun et al. 1998; Schilt 1984).

By the time of the Competition Period (A.D. 1600 to 1800), the environment may have reached its maximum carrying capacity, resulting in social stress between neighboring groups. The resulting hostility is reflected archaeologically by the frequent occurrence of refuge caves dating to this period (Schilt 1984). This volatile period was probably accompanied by internal rebellion and territorial annexation (Hommon 1986; Kirch 1985).

During the first of the defined historic periods (Haun et al. 1998), Last of the Ruling Chiefs (A.D. 1778-1819), Kalaniopu'u was chief of the Island of Hawai'i and often resided in the Kona District. This period covers Kamehameha's consolidation of control over the island to his death at Kailua in 1819. The period ends with the overthrow of the old religion, which took place when Liholiho, Kamehameha's heir, broke the traditional *kapu* laws and won a battle against the supporters of the old religion at Kuamo'o, along the southern coastline of Keauhou. Early historical accounts emphasize that modern day Kailua Town during this period was a significant political seat and population center. The Kona Field settlement and subsistence system continued to operate in the area through the first few decades of the historic era (Handy and Handy 1972).

William Ellis, one of the first missionaries to arrive on the Island of Hawai'i, visited the area above Kailua (likely in the vicinity of the current project area) on a tour around the island in 1825. Ellis' description of what the upland fields looked like at this time:

> After traveling over the lava for about a mile, the hollows in rocks began to be filled with a light brown soil; and about half a mile further, the surface was entirely covered with a rich mould, formed by decayed vegetation and decomposed lava. Here through a beautiful part of the country, quite a garden compared with that through which they had passed, on first leaving town. It was generally divided into small fields, about fifteen rods square, fenced with low stone walls, made of fragments of lava which had been gathered from the surface of the enclosures. These fields were planted with bananas, sweet potatoes, mountain taro, tapa trees, melons, and sugar cane, flourishing luxuriantly in every direction. Having traveled about three or four miles through this delightful region, and passed several pools of fresh water, they arrived at the thick woods, which extends several miles up the sides of the lofty mountain that rises immediately behind Kairua. (1963:27-28)

The second quarter of the 19th century, the Merchants and Missionaries Period (A.D. 1820-1847), was a time of profound social change in Hawai'i. Kamehameha I died in mid-1819, and a council of chiefs supported Kamehameha's son Liholiho as successor (Kelly 1983). Liholiho gained the council's support in exchange for the distribution of the profits from the sandalwood trade and the bounty of the land that moved up the hierarchy from the various *ahupua'a* under his control; privileges previously retained solely for the ruler. Within six months after Kamehameha's death, Liholiho, Ka'ahumanu, and Queen Keopuolani broke the *kapu* prohibiting men and women eating together. This act of "free eating" symbolized the end of

the traditional *kapu* system. The changes in social and economic patterns began to affect the lives of the common people. Liholiho moved his court to O'ahu, so the burden of resource procurement for the chiefly class lessened considerably. However, some of the work of the commoners shifted from subsistence agriculture to the production of foods and goods for trade to the early Western visitors. Introduced crops, such as yams, coffee, melons, Irish potatoes, Indian corn, beans, figs, oranges, guavas, and grapes (Wilkes 1845) were grown specifically for trade with Westerners. Other commodities, especially sandalwood, were collected to purchase Western goods, often to the detriment of agricultural pursuits. The arrival of the missionaries to Hawai'i in the 1820s brought further changes to the social and religious systems of the islands.

The socioeconomic and demographic changes that took place in the period between 1790 and the 1840s, promoted the establishment of a Euroamerican style of land ownership, and the *Māhele* was the vehicle for determining ownership of the native land. During this Legacy of the Great *Māhele* Period (1848-1899) (Haun et al. 1998), the *Māhele* defined the land interests of the King (Kamehameha III), the high-ranking chiefs, and the low-ranking chiefs, the *konohiki*. 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 and speeded the transfers (Chinen 1961:13). During this process 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. In 1862, the Commission of Boundaries (Boundary Commission) was established in the Kingdom of Hawai'i 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 was 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*. The information was collected primarily between A.D. 1873 and 1885. The testimonies were generally given in Hawaiian and simultaneously transcribed in English.

As a result of the *Māhele*, the *ahupua'a* of Keahuolū was awarded in its entirety to Ane Keohokālole as part of LCAw. 8452. Ane Keohokālole was the great granddaughter of Kame'eiamoku, one of the most important chiefs who supported Kamehameha I (Kelly 1983:31). Keohokālole was married to Kapa'akea and they were the parents of King (David) Kalākaua and Queen (Lydia Kamaka'eha) Lili'uokalani. Also, their youngest son, William Pitt Leleiohoku, was adopted at birth by Ruth Ke'elikōlani, the governess of Hawai'i Island from 1855 to 1874, and named for her first husband; and their youngest daughter, Miriam Likelike, was the mother of Ka'iulani, who was proclaimed heir apparent in 1891 after Queen Lili'uokalani took the throne following the death of her brother King Kalākaua (Kelly 1983:31). The *ahupua'a* of Kealakehe was reserved as Government land and sold as grants. As Kealakehe was retained as government land, there was no Boundary Commission testimony. Keahuolū on the other hand was an *ali'i* award and there was a substantial amount of testimony presented before theCommission (Appendix A).

Eleven *kuleana* claims were awarded in the uplands of Kealakehe Ahupua'a, most at similar elevations to, but north of, the current project area. Twelve additional claims in Kealakehe were not awarded. Six *kuleana* claims were awarded in Keahuolū Ahupua'a, five in the uplands (all *mauka* of the current project area) and one at the coast. Four of the claims in Keahuolū describe the cultivation of taro, one mentions sweet potato, and one mentions coffee; no house lots are mentioned in the claims. The awardee at the coast claimed seven fan palms and a coconut grove, and described the land as salt land that is still yielding salt (Jensen 1990:A-4). Haun and Henry (2001:5-7) contains a complete listing of the twenty-three *kuleana* claims in Kealakehe Ahupua'a. They summarize the land use recorded in these claims as follows:

> The awarded parcels are all situated inland between approximately 900 ft and 1,900 ft elevation. Land use described in the LCA claim testimony consists of house lots and cultivated plots. Twenty claims included house lots with at least 20 houses. Enclosing walls are described for two of the house lots. The testimonies refer to 128 *kihapai* and cultivated parcels. Six *kihapai* are described as partially cultivated and one was uncultivated. Four taro and four sweet potato *kihapai* are the only crops referenced. LCA 7483 describes the inland boundary of one claimed parcel as being a mountain banana

> patch. The northern and southern boundaries of a second parcel are described as being *kua'iwi*. (Haun and Henry 2001:8)

In a letter dated July 8, 1869, David Kalākaua describes the land of Keahuolū and its possible uses to his sister Lydia Kamaka'eha (Lili'uokalani):

> This land is situated in the District of North Kona. Bounded by the ahupuaa of Lanihau (in Kailua) belonging to Prince Lunalilo on the Ka'u side, and on the Kohala side, by Kealakehe, a government land and Honokoniki belonging to Keelilkolani. Keahuolu runs clear up the mountains and includes a portion of nearly one half of Hualalai mountains. On the mountains the koa, kukui and ohia abounds in vast quantities. The upper land or inland is arable, and suitable for growing coffee, oranges, taro, potatoes, banana & c. Breadfruit trees grow wild as well as Koli oil seed. The lower land is adopted for grazing cattle, sheep, goat, &c. The fishery is very extensive and a fine grove of cocoanut trees of about 200 to 300 grows on the beach. The flat land near the sea beach is composed chiefly of lava, but herbs and shrubbery grows on it and [it is] suitable for feed of sheep and goats. It is estimated at 15,000 to 20,000 acres or more. (Jensen 1990:A-4)

Following the *Māhele* the upper portions of Kealakehe Ahupua'a between approximately 500 and 1,400 feet above sea level were sold as grants (Figure 7). It was the Homestead Act of 1884 that directed the Minister of the Interior to make the land available for homesteads. The lots were to be no more than 20 acres in size and the grantees had five years to comply with all conditions necessary for obtaining the homesteads. In 1886, King Kalākaua executed a 20-year lease for various lands in North Kona, including lands in the upper portion of Kealakehe, which were to be sold in two blocks (first and second series) (Haun and Henry 2001:9). Grant increment roads were established to allow the homesteaders access to their parcels. The current project area crosses portions of two of the first series of homestead grants in Kealakehe; Grant 3965 to W. H. Kalaiwaa in 1896 and Grant 3970 to Beniamina in 1896. The project area also follows the grant increment roads between several other homestead parcels including Grant 3742 to Kailiuaua in 1895, Grant 3967 to J. Kahookiekie in 1896, Grant 4144 to J. Peahi Jr. in 1898, Grant 4786 to Keaweualani in 1903, and Grant 6361 to J. S. Barros in 1915. Historic land use of these parcels likely included residential, diversified agriculture, and cattle ranching.

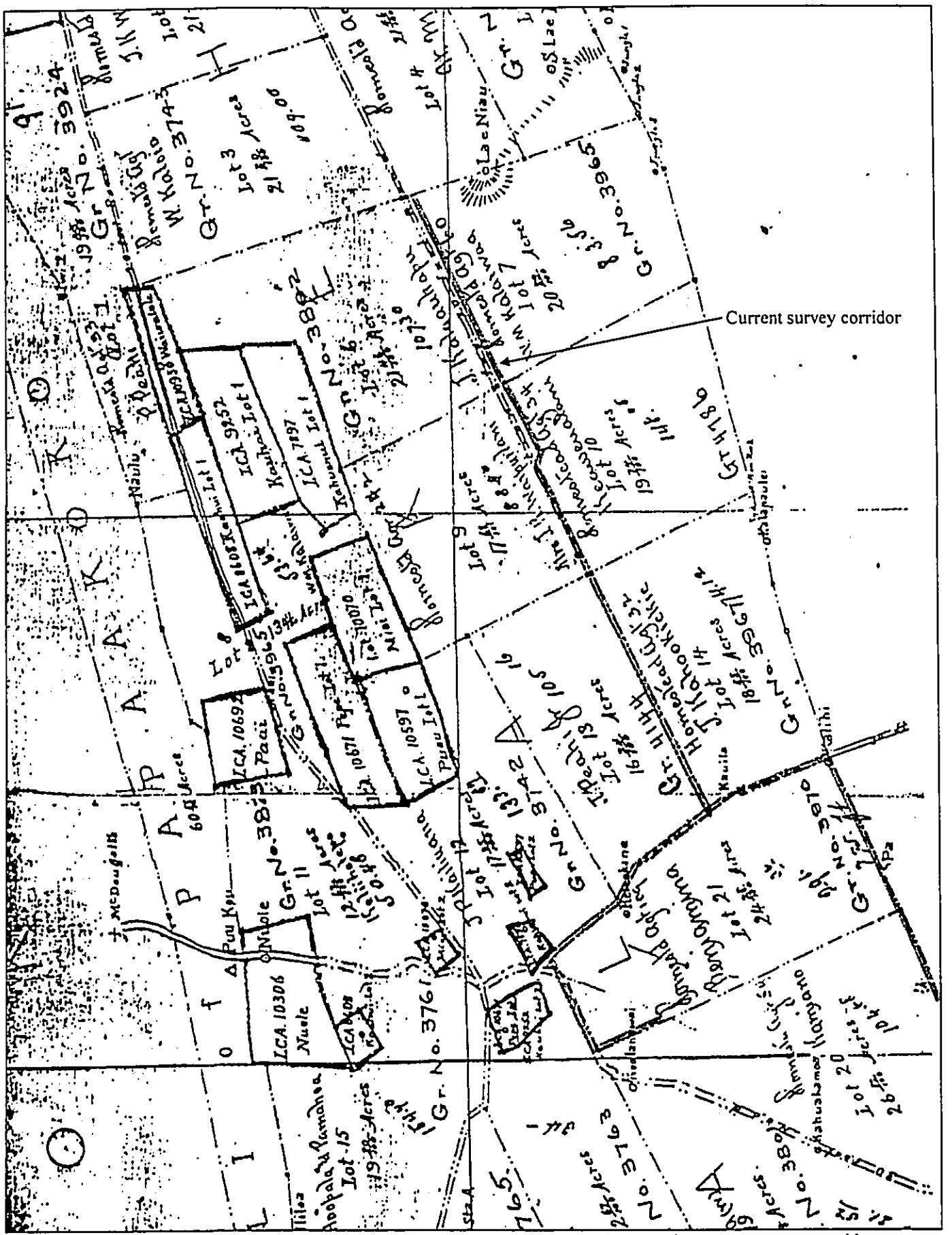

Figure 7. Portion of Emerson field map [ca.1905-1907] from Hammatt et al. (1987) showing current survey corridor.

A short lived, but interesting agricultural pursuit began in Hawai'i in 1893. It was in this year that the Hawaiian Commissioner of Agriculture and Forestry ordered 20,000 sisal plants from Florida (Conter 1903:11). It appears that at some later point, likely in the early 20th century, a sisal mill, used to process the raw sisal into fibers, was constructed by McWayne in Keahuolū Ahupua'a along Palani Road *makai* of the current project area. Kelly (1983:89) relates that Kona was naturally adapted to the cultivation of sisal, and that depending on the terrain anywhere between 500 to 1,000 plants could be grown on an acre. Thrum (1905:181) reported that the "McWayne sisal tract consisted of about 500 acres at or near Kailua". Jensen 1990:A-5), reports that the first crop from the McWayne Estate did not reach Honolulu until 1918. Also, Mr. Minoru Inaba, who worked at the mill from 1920-21, stated that it was owned by Luther S. Aungst from 1917 until its closing in 1924 (in Jensen 1990:A-5). Mr. Inaba recalled that over a thousand acres were in cultivation in Kealakehe and Keahuolū *ahupua'a* surrounding the mill along Palani Road. Workers would harvest the plants in the field and then bundle and transport them to mill by donkey where they were thrashed, dried, and, baled and sent to San Francisco on steamers (Jensen 1990:A-5). It is evident, based on the proximity of the mill to the current project area (Figure 8) and the amount of sisal growing within the survey corridor, that the sisal fields likely encompassed at least a portion of the current project area.

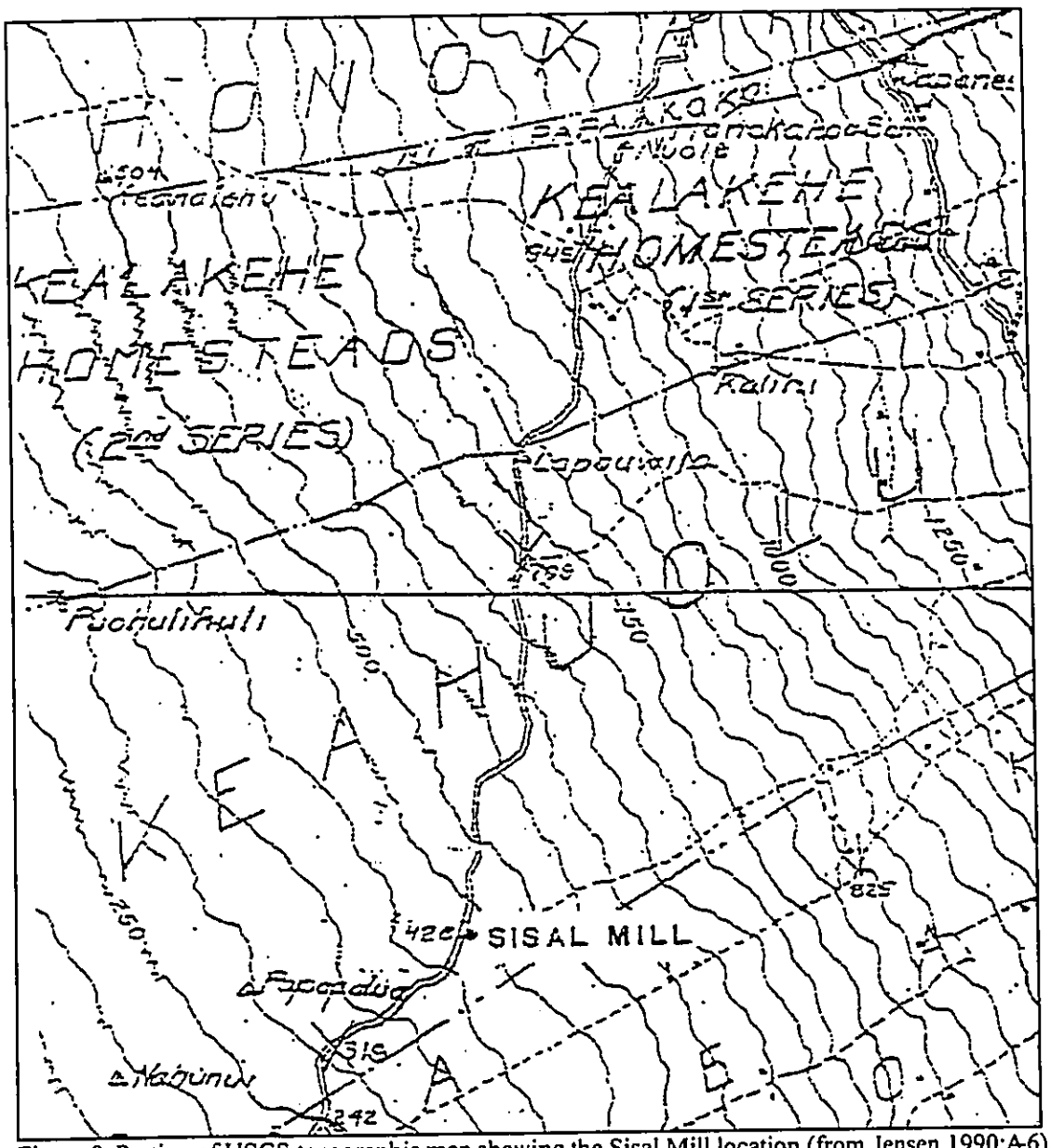

Figure 8. Portion of USGS topographic map showing the Sisal Mill location (from Jensen 1990:A-6).

CONSULTATION

Given the nature of the proposed water transmission project, consultation for the current study was designed to gather both general regional information and specific local knowledge. To this end the following organizations and individuals were consulted. The Queen Lili'uokalani Trust, The Office of Hawaiian Affairs-West Hawai'i, Kulana Huli Honua, and Lavern Muller Morikami. All consultations were informal in that they were not recorded. Consultants were asked questions both about the general cultural significance of the area and about their knowledge of any specific resources within the project area. Below is a summary of the participants and the information they most generously shared.

Queen Lili'uokalani Trust

The Queen Lili'uokalani Trust owns Tax Map Parcel 3-7-4-008:001, a large parcel that contains the *makai* portion of the current project area. On December 2, 1909, Queen Lili'uokalani executed a Deed of Trust, which established the legal and financial foundation of an institution dedicated to the welfare of orphaned Hawaiian children. She amended her Deed of Trust in 1911 to include destitute children. It states, "all the property of the Trust Estate, both principal and income...shall be used by the Trustees for the benefit of orphan and other destitute children in the Hawaiian Islands, the preference given to Hawaiian children of pure or part-aboriginal blood."

The Trust was contacted both by telephone and in writing in an effort to identify any culturally significant places or practices (ancient or modern) associated with their property that might be affected by the current proposed project. While the Trust did provide both archaeological and cultural background information, no culturally significant places or practices were identified within the current project area.

Office of Hawaiian Affairs-West Hawai'i

The Office of Hawaiian Affairs (OHA) is a state agency with the stated purpose "to mālama Hawai'i's people and environmental resources, and OHA's assets, toward ensuring the perpetuation of the culture, the enhancement of lifestyle and the protection of entitlements of Native Hawaiians, while enabling the building of a strong and healthy Hawaiian people and nation, recognized nationally and internationally." (OHA Mission Statement from the 2004 annual report). Ms. Ruby McDonald, Community Resource Coordinator for West Hawai'i, was contacted both in person and over the phone. The project was described to her and she was verbally provided with some of the names of former Hawaiian residents of the area. Ruby offered to assist with contacting Alice Benjamin Kihe, a *kupuna* that potentially grew up in the area. Consultation will be on-going with this individual.

Kulana Huli Honua

Kulana Huli Honua is a 501-C3 non-profit organization initially organized following the 1975 restoration of Ahu'ena Heiau in association with individuals who wished to practice their Hawaiian culture and to serve the community in connection with the care of Ahu'ena Heiau at the Kamakahonu National Historic Landmark in Kailua-Kona, Hawai'i. Currently, they have expanded their mission to include the protection of all sacred sites in and around the Kona area. Their mission statement contains two elements, 1) "Guide and support the life and care of Ahu'ena Heiau at Kamakahonu, Hawai'i and other cultural treasures;" and 2) "Promote the practice, study, education and preservation of Hawaiian Culture through means including the establishment of Archive Libraries to contain the history and wisdom of Hawai'i's ancients for the native Hawaiian people in their Homeland and for the communities of Hawai'i.

The organization's executive director, Mikihala Roy was contacted and met with Robert B. Rechtman, Ph.D. to discuss the current project and project area. While Ms. Roy did not identify any specific resources or practices within the project area, she expressed the view that any project that alters the landscape has a cumulative effect on the Hawaiian environment and thereby on the indigenous culture. Ms. Roy suggested that I contact Clement Kanuha Jr. (Junior). Junior was contacted by telephone. He is related to the Peahi Family, who received a Homestead Grant (Grant 4144) along Kuni Road. Junior was familiar with the project area and the families that once lived there, but had no specific knowledge of any significant cultural resources or associated cultural practices. Junior said that he would also check with his auntie. Consultation will be on-going with this individual.

Laverne Lokelani Muller Morikami

Laverne Lokelani Muller Morikami (Auntie Laverne) was born on O'ahu in 1930, and is the granddaughter (through her father Richard) of Waldemar Muller and Mereana (Mary Ann) Kekaula Palaualelo (Figure 9). Waldemar and Mary Ann were married in 1885 and they resided on their grant property (Grant 4061) in Kealakehe (just *mauka* of the current project area) (Figure 10) from the 1890s until Waldemar's death in 1924. Waldemar and Mary Ann had ten children; one of their middle children, Richard (born 1893) along with his second wife (Mary Kawailau Pohaku Hook), returned to reside in the family home in 1936. They had eight children; Auntie Laverne was their third.

Auntie Laverne was about six years old when she moved (in 1936) to the Kealakehe house on Grant Parcel 4061 and she resided on the parcel continuously through the 1940s. She is familiar with the *mauka* portion of the current project area, having regularly walked between her property and the Benjamin property (Grant 3970) (see Figure 10). Auntie Laverne's eldest uncle Emil Maximilian Muller married Rose Kawehiwehi Benjamin in 1908, and as can be seen in Figure 7, a footpath is shown to have once existed between the two homestead lots. By 1936 the *makai* portion (below Māmalahoa Highway) of this path was no longer in use as Auntie Laverne would follow the path only as far as the highway then walk north along the highway to the road just before the "Japanese School," then head *makai* to the Benjamin property along an established roadway. Auntie Laverne also indicated that the homestead road (Kuni Road) directly *makai* of her property, as seen in Figure 10, was overgrown and not used during her tenure (post 1936) on Grant 4061.

Figure 9. Waldemar and Mary Ann Muller circa 1900
(Photo courtesy of the Laverne Muller Morikami).

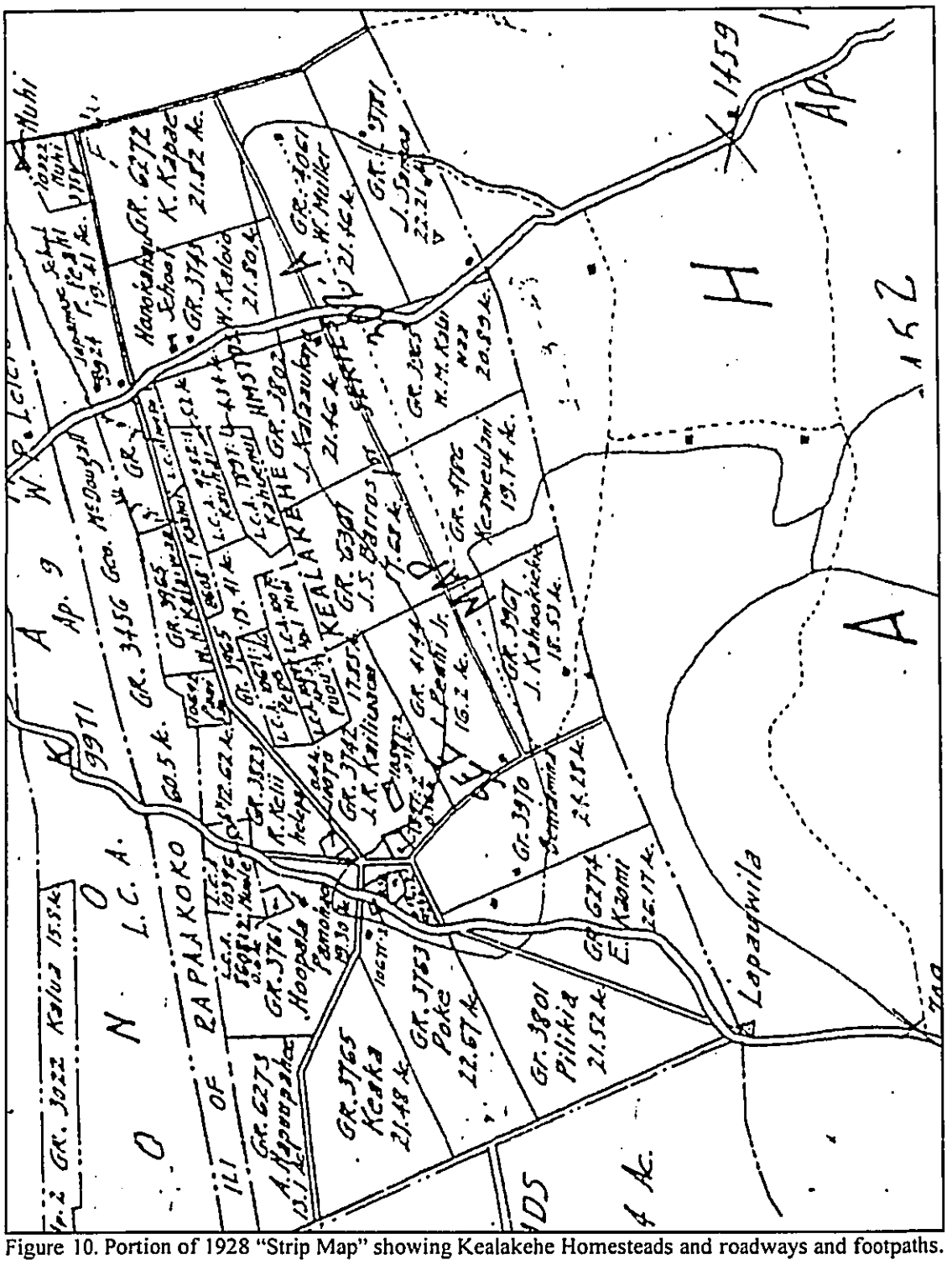

Figure 10. Portion of 1928 "Strip Map" showing Kealakehe Homesteads and roadways and footpaths.

IDENTIFICATION AND MITIGATION OF POTENTIAL CULTURAL IMPACTS

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, 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 state criteria for evaluating the significance of historic properties, of which traditional cultural properties are a subset. To be significant the potential historic property or traditional cultural property 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 value to the native Hawaiian people or to another ethnic group of the state due to associations with 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.

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 Hawaiian practices 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 mitigative actions to be taken to reasonably protect native Hawaiian rights if they are found to exist.

As a result of the archaeological studies within the project area seven archaeological sites (Sites RC-0161-1, RC-0161-19, RC-0161-29; and SIHP Sites 14239, 24853, 24854, and 24855) were identified that have the potential to be impacted by the proposed project. All were evaluated as significant under Criterion D and Site 24855 was further considered significant under Criterion A (Clark and Rechtman 2005). To mitigate the potential impacts to the these cultural resources, an archaeological mitigation plan containing both data recovery and preservation elements should be submitted to, and approved by, DLNR-SHPD before any development activities commence. None of these sites are considered traditional cultural properties and as a result of the archival research and the consultation there were no specific natural or cultural resources with associated cultural beliefs and practices identified within the proposed development area.

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APPENDIX A–Boundary Commission Testimony for Keahuolū Ahupua'a

Keahuolu Ahupuaa, District of North Kona, Island of Hawaii, Boundary Commission, Hawaii, Volume A, No. 1, p. 225

R.A. Lyman, Esquire, commissioner of Boundaries for the Island of Hawaii
Sir:
I beg to make application to you to define and settle the boundaries of the ahupuaa of Honohina situated in the district of Hilo, Hawaii, also the boundaries of the Ahupuaa of Keahuolu situated in the district of Kona, Hawaii.
I remain, Yours Respectfully
(signed) Jno. O. Dominis

Keahuolu Ahupuaa, District of North Kona, Island of Hawaii, Boundary Commission, Hawaii, Volume A, No.1, pps 354-358

The Ahupuaa of Keahuolu, District of North Kona, Island of Hawaii, 3d Judicial Circuit.

On this 12th day of August A.D. 1873 the Commission of Boundaries for the 3d Judicial Circuit met at Kailua, North Kona, for the hearing of the application of J.O. Dominis, for the settlement of the Boundaries of Keahuolu, situated in North Kona, Hawaii.

Notice to all parties interested in the settlement of Boundaries of lands in North and South Kona Hawaii; that the Commissioner of Boundaries for the 3d Judicial Circuit would be prepared to receive application for the settlement of boundaries of land in said Districts, at the Court House in Kona, on August 2d A.D. 1873. Served by publication in the Hawaiian Gazette of July 16th and Kuokoa of July 19th 1873, and adjourned to Kailua, on the 12 instant, due notice personally served on owners and agents as far as known of adjoining lands. Present: J.G. Hoapili for applicant, the Hawaiian Government and His Majesty, S. Kaai and others.

For Petition see Folio 225 [Keahuolu] [below]

Testimony
J.Z. Waiau, kane, sworn, I was born at Honuaula, Kona, Hawaii at the time of the fight of Keakuaokalani. I now live at Lanihauiki, know the land of Keahuolu and its boundaries, have seen a part, and have heard where a part of them are from my parents and kamaaina on the land. I leased the land in former times. Kealakehe bounds it on the North side and Lanihaunui on the South side. A round rock on the sea shore called Pohakuloa is on the boundary between Lanihaunui and Keahuolu; thinks the boundary between these two lands run mauka about one hundred fathoms and then turns South, to the North side of an old village, on Lahihau, called Makaeo. Thence the boundary runs straight mauka to Hoenui, a pile of stones makai of the wall of Governor Adams. If you look maikai [makai] from mauka near the Government road, it looks like a wall or iwi aina on the pahoehoe, but you cannot see it from makai. From Hoenui to Maili along [page 355] the boundary runs along an iwi aina, a wall or iwi aina from some way above Adams wall. Maili is an old village at Puuokaliu, a pali pali [sic] ahua, where houses used to stand; thence to the mauka Government road at Kahuoli; an old kihapai koele, there are two kuleanas there, on Lanihau, adjoining Keahuolu. Said kuleanas belong to Kaawa and Luhei.

Thence mauka along the iwi aina to Puukoai, a very small ahua, of dirt and stones; thence to Keanawai, a water hole where there used to be a great many houses. Thence to Kaopapa, a place in the woods in Akolea fern a punawai, where Lanihauiki cuts of Lanihaunui. This place is a grove of young koa trees about the

distance of a mile from the edge of the woods. I have heard Sleeper surveyed the line from Piilani down, that is mauka of Keanawai, on the boundary between Lanihaunui and Lanihauiki, from Kaopapa to Puulepo, a kuapapa; this is above the young koa trees, in the ohia. From Puulepo the boundary runs direct mauka to Waiakamalama, a water hole where the natives get water when it fails below the woods. You have to dig to get it; have been to this place once.

Thence to Kawauhooni, a kupapau, a place where the natives used to sleep when on their way with dead bodied to throw into the crater on Hualalai; the koa woods are on Lanihauiki, and ohia on Keohuolu; thence turn North to kahawai Opilopilo, the mauka corner of Kealakehe. I do not know the boundaries in the woods between Keahuolu and Kealakehe; know where the mauka corner of Kaahui's land is, it is at a pile of stones on Kealakehe, at the junction of Kaohia's land or Kealakehe and Keahuolu; thence to an ahu pohaku called Laeaniau, at the Government road; thence makai along an iwi aina to a few fathoms on the North side of a heiau called Kalualapauila; thence to Puunahaha, a large red hill on the mauka side of the makai Government road, thence to Puuokaloa, an oioina or small hill; thence to Kaiwi a lae pohaku on the middle of point. Ancient fishing rights extending out to sea.

Cross-examined. I saw the haole survey the line down the road, the lands of Lanihau nui and Lanihauike [page 356], said road runs down an iwi between these two lands. I do not know whether he surveyed to the boundaries of Keahuolu or not.

Kealakai, kane, sworn, I was born at Keahuolu, North Kona, Hawaii at the time of Kuhehe & saw building Kiholo 2nd. Have always lived there, and know the makai boundaries. My parents; makuakane hanai Kaohimahi (now dead) told them to me. The boundary at sea shore between Lanihaunui and this land is at Pohakuloa; thence towards Kailua; the sand on Lanihau and the pahoehoe on Keahuolu; Thence mauka along raised lava (flat lava being on Lanihau) passing some distance on the North side of Puuopalena; thence mauka to Hoenui, a good ways makai of Governor Adams wall; thence mauka along an iwi aina to the mauka Government road; thence mauka to Puukoae, a puuolepo; thence mauka to Piilani, a mahina ai; the boundary passing to the North side of it; thence to Puulepo. I do not know where Lanihaunui ends; as I have never been there; have only heard of these boundaries. The mauka corner of Keahuolu is an ahua called Kaohiamaekanaka; thence makai along Kealakehe, but I do not know the points on the line. Off Government road there is an ahu, called Kalaioniau, a puu makai of said road which can be seen from the road. Thence makai along an iwi aina to Kalualapauila, a heiau; thence makai to the North side of a hill called Puuouliuli; thence to Puunahana; the boundary passing on the North side; from thence to Puuokaloa; thence makai to Kaiwi, the kula in middle of point and læ pohaku on the point at sea shore.
Ancient fishing rights extending out to sea and claiming the opelu.
Cross-examined

Kahuanui, kane, sworn, I live at Kealakehe, and have always lived there, know the boundaries between Keahuolu and Kealakehe. I have bought a piece of the latter land, but have not received the Patent. Have seen the boundaries adjoining [?]. Kaiwi is the boundary at the shore between Kealakehe and Keahuolu; thence mauka to Puukaloa, thence [page 357] to Puulaula, mauka side of the Government road, thence to Puunahaha; thence to Kaenaena, a hill; thence to Akaeeku, a hill; thence to Kalualapawila; thence to Lainiau, the iwi or the South side; thence to Keahupuaa, an ahua pohaku at the mauka Government road; thence along the iwi aina (the land below the road was surveyed by Wiltse for me); thence mauka to Ohiakaukanaka; a pali in the woods where you can look down to the sea shore. It is the long pali that runs across all the lands. This is the mauka end of Keahuolu and is here cut off by Lanihauiki (in koa) and by Kaloko; thence makai along Lanihauiki to Puulepo; thence makai to Piilani, in woods, at which place Lanihaunui ends and Lanihauiki leaves Lanihaunui and Keohuolu boundary (~~mistake~~ Lanihaunui ends at Pukalua, a water hole above the young koa. Piilani is way below the woods.
Cross-examined.

Kapea, kane, sworn, I live on Moeanoa, Kona, Hawaii, have lived there several years, know the land of Keahuolu, and have been up the road to the woods, after water. The mauka corner is on a pali at Koohiahoomoekanaka. The koa is on Lanihau and Kaloko; thence makai along Lanihauiki, to Puulepo;

thence to Kohonoa, the mauka corner of Lanihaunui, where there is an ahua; thence down the pali to Kaopapa, a punawai; thence to Piilani outside of the woods. There is young koa growing at Koopapa. I have been there with the kamaaina after water. I do not know the boundaries on the other side.
Cross-examined

Case continued to August 13th 1873
R.A. Lyman, Commissioner of Boundaries, 3d Judicial Circuit
[page 358]
Kalaoa, North Kona, August 13th 1873
Boundary Commission sat according to adjournment from the 12th instant. Present: L.K. Kaai in place of J.G. Hoapili.

Mahu, kane, sworn, I was born on the land of Keahuolu at the time of the birth of Kamehameha II, and my parents who were kamaainas of the land told me its boundaries. Kealakehe bounds it on the North side, the boundary at shore between the two lands is at Kaiwi; thence it runs mauka to Puuokaloa; thence to Puunahaha; thence to Kaunauhila, a puu aa. Thence to Kalualapapauala; thence mauka to Kalaeoniau; thence to Keahupuaa at the Government road; thence to Kahuaakaulei in the woods (I have not been there) then into Ohiawela (I have not been there, but have heard that there is a spring there). Thence to Kahilhia, the mauka corner of Kealuolu where Lanihauiki cuts it off. I do not know whether Kaupulehu or Kaloko cuts if off on the North side; Thence makai along Lanihauiki, all the koa except what is just on the lower edge of the woods being above the boundary of Keahuolu. Thence makai to Kauwau, a grove of large trees where they used to lay dead bodies; from thence makai to Ohiapiipa[?]; thence to Waiakamalama. (I have been up to the mauka corner of the land on the road between Keahuolu and Lanihauiki but I have not been on the North side.)

Thence makai to Kapulehu, an oioina; thence to Nohoana o maa, an oioina, at the mauka corner of Lanihaunui, near the lower edge of the woods. My father's name was Kamaha and my mother's name was Lorna.
Cross-examined
I do not know places called Kaenaena or Kauku.
Case continued until further notice to interested parties.
R.A. Lyman, Commissioner of Boundaries, 3d Judicial Circuit.

Keahuolu Ahupuaa, District of South Kona, Island of Hawaii, Boundary Commission, Hawaii, Volume C, No. 3, pps 44-47

For testimony see Folio 354, Book A.

No. 45

Land Boundary Commission, Hawaii, 3d Judicial Circuit

Certificate of the Boundaries of Keahuolu, District of North Kona, Island of Hawaii, 3d Judicial Circuit

Upon the application of J.O. Dominis, and by virtue of the authority vested in me by law, as sole Commissioner of Boundaries of Land Boundaries for the Island of Hawaii, 3d Judicial Circuit I hereby decide and certify the boundaries of the Ahupuaa of Keahuolu, situated in the District of North Kona, Island of Hawaii, to be as hereinafter set forth.
Given under my hand at Hilo, Hawaii, This First day of September A.D. 1874
R.A. Lyman, Commissioner of Boundaries, 3d Judicial Circuit

Boundaries of Keahuolu

Commencing at a point of land at the seashore called Kaiwi, boundary between this land and the land of Kealakehe K; thence running mauka along boundary of Kealakehe,
North 69° 30' East 20.26 chains to an ahupohaku;
North 71° 30' East 28.10 chains to a rock marked K;
North 68° 15' East 105.50 chains to a hill of aa called [page 45] Punahaha to a rock marked X;
North 70° East 24.70 chains;
North 73° 15' East 12.85 chains to a rock marked K at Puuohulihuli;
North 65° 45' East 27.75 chains to an ahupohaku;
North 64° 30' East 25.30 chains to an ahupohaku;
North 47° East 11.80 chains;
North 59° East 7.50 chains;
North 73° 30' East 6.30 chains;
North 78° East 3.53 chains to a rock marked X at place called Kalua Lapauila; on the mauka side of trail to Kailua;
North 35° 30; East 2.50 chains;
North 762° East 13.70 chains;
North 61° 15' East 9.80 chains to an ahupohaku marked K;
North 56° 30' East 9.10 chains;
North 64° 30' East 3.90 chains;
North 65° East 5.73 chains;
North 66° 15' East 3.30 chains
North 70° East 3.05 chains;
North 69° East 3.63 chains to a kukui tree marked H;
North 67° 30' East 22.75 chains to a rock marked X;
North 56° 45' East 31.80 chains to a rock marked X or (K) on the makai side of the Government road from Kona to Kawaihae. Thence running along Royal Patent No. 1571;
North 61 1/2° East 8.84 chains;
North 62 3/4° East 8.00 chains;
North 64 1/4° East 5.50 chains;
North 63 1/4° East 7.10 chains;
North 61 1/2° East 8.40 chains;
Noerth 54° East 2.06 chains to a kukui tree marked K at the mauka corner of said Patent; Thence
North 56° 30' East 23.20 chains to an Opiko tree marked K;
North 58° 45' East 33.15 chains to an ohia tree marked X;
North 52° East 29.50 chains to an ohia tree marked V;
North 57° East 50.40 chains to an ohia tree marked K [over] + ten feet east of an ahupohaku; This place is called Kahihiie, and is the corner of the land Kealakehe, Keahuolu and Lanihauiki. Thence across the head of this land along boundary of Lanihauiki;
South 61° East [page 46] 51.50 chains to an ohia tree 4 feet in diameter marked I at place called Kauwau or Kaohiahomoekanaka; Thence running ~~running~~ makai along Lanihauiki;
South 48° West 26.10 chains to a large ohia tree marked X;
South 41° West 21.10 chains to an ohia tree marked K;
South 65° West 29.50 chains to an opiko tree marked H;
South 46° 15' West 25.40 chains to a rock marked X at the mauka corner of land of Lanihaunui at place called Nohoana o Maa or Nonoanaa; thence makai along boundary of Lanihaunui;
South 49° 30' West 10.56 chains to a koa tree marked Y at Kaopapa;
South 60° West 22.33 chains to a rock marked L, 50 feet South East (North West Certificate of Boundaries No. 25) of koa tree marked X;
South 54° 30' West 21.89 chains to a rock marked X;
South 54° 15' West 9.41 chains;
South 59° 30' West 5.01 chains;
South 63° 30' West 15.56 chains;
South 50° West 7.58 chains;

South 44° 15' West 4.45 chains;
South 59° West 3.12 chains;
South 47° 30' West 2.82 chains;
South 60° 30' West 3.57 chains;
South 58° West 4.64 chains;
South 59° West 3.38 chains;
South 58° 30' West 6.45 chains to a rock marked X on the mauka side of Government road from Kona to Kawaihae; Thence along kuleana No. 5317;
South 30 1/2° West 0.32 chains;
South 63° West 2.14 chains;
South 53° 30' West 3.25 chains;
South 45.15' Wet 4.48 chains to the makai corner of said kuleana; Thence
South 49 1/2° West 2.06 chains;
South 54° West 51.20 chains;
South 53° West 4.15 chains;
South 54° West 6.41 chains;
South 48° 15' West 3.02 chains to a rock marked X;
South 49° West 39.30' chains to a rock marked X at place called Kahoi;
South 49° West 38.79 chains to a rock marked X at a place called Waianuia; [page 47]
South 48° West 11.35 chains to point on pahoehoe marked X;
South 44° 30' West 35.88 chains to point on pahoehoe marked X;
South 52° 30' West 28.70 chains to point on pahoehoe marked S;
South 59° West 4.39 chains to point on pahoehoe marked X;
North 82° West 12.88 chains to point on pahoehoe marked X;
North 74° 45' West 30.14 chains to corner of stone wall;
North 64° 15' West 19.85 chains to rock marked X;
South 49° 30' West 9.33 chains to a point on the Kailua side of cocoanut grove;
South 83° West 7.42 chains to a prominent point of rocks at the seashore called Pohakuloa. Thence along seashore
North 32° 45' West 16.50 chains;
South 79° 30' West 13.50 chains;
North 77.30° West 16.00 chains;
South 57° West 16.20 chains;
North 83° West 11.00 chains;
North 46° 30' West 3.87 chains;
North 48° West 25.90 chains;
North 25° West 22.80 chains;
North 84° West 6.50 chains to point called Kaiwi marked Koupahoehoe at the place of commencement.
Area 4071 Acres
As surveyed by J.F. Brown
R.A. Lyman, Commissioner of Boundaries, 3d Judicial Circuit

Note Costs: Hearings 20.-; 29 folio testimony 7.25; Certificate 2.-; Stamp 1.-; 12 folio description certificate 6.-; $36.25
(Paid by applicant. Witnesses paid by ditto [applicant]

[No. 45, Keahuolu Ahupuaa, District of South Kona, Island of Hawaii, Boundary Commission, 4071 acres, 1874]

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ARCHAEOLOGICAL, CULTURAL, AND HISTORICAL STUDIES

May 10, 2006

RC-0314

Julie Taomia, Ph.D.
Hawai'i Island Archaeologist
DLNR-SHPD
74-383 Kealakehe Parkway
Kailua-Kona, HI 96740

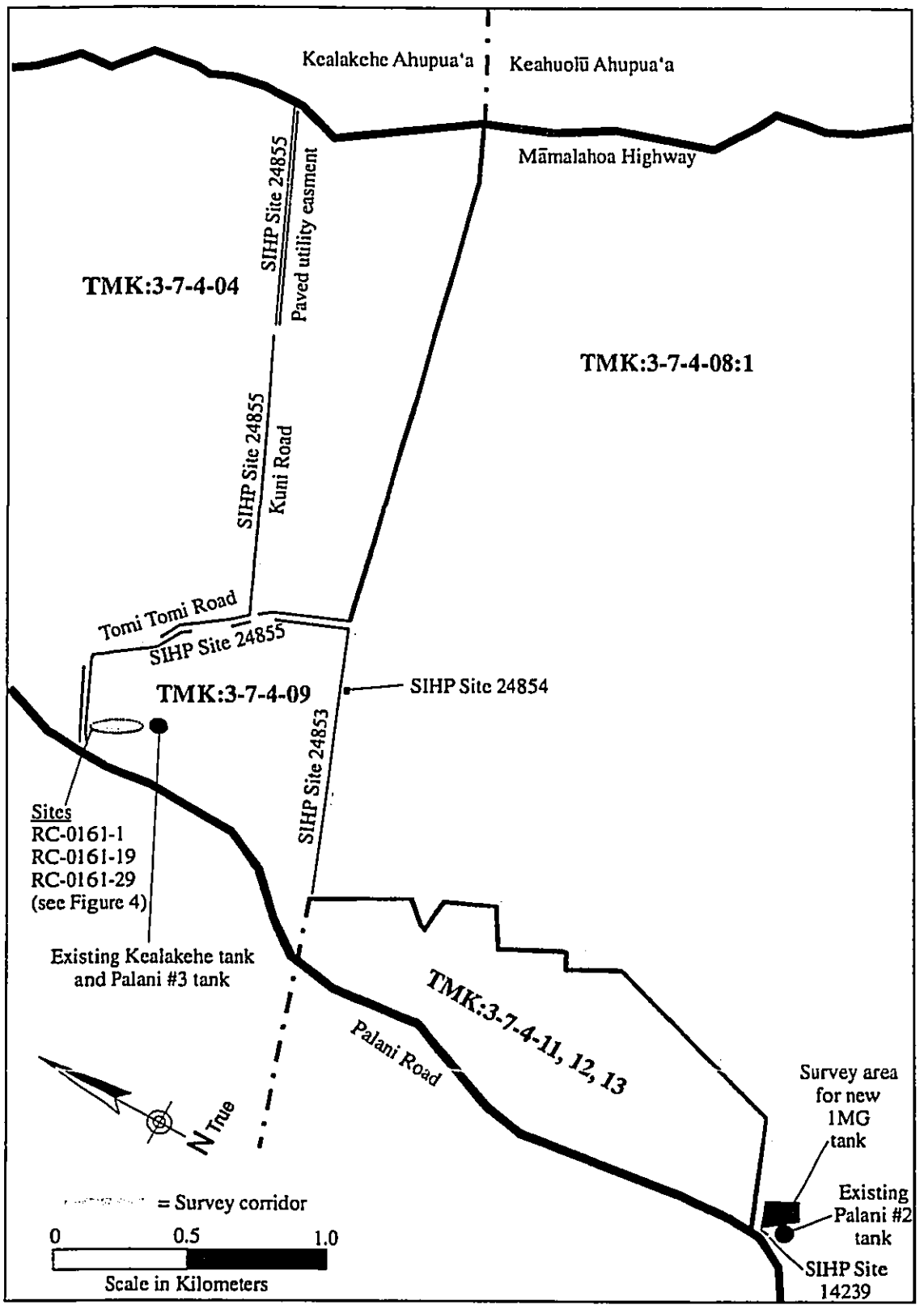
Dear Julie:

In December 2005 Rechtman Consulting, LLC submitted *An Archaeological Inventory Survey of Alternative 3 of the Palani Road Transmission Main Water Supply Route (TMKs: 3-7-4-04:1 por. 3-7-4-08:1 por. and 3-7-4-09:72 por.)* for regulatory review and approval. In February 2006 the report was reviewed and approved (DOC NO. 0601NM35). Subsequent to the submittal and approval of that report, the County of Hawai'i has added another element to the Palani Road Transmission Main Water Supply system, 1 MG reservoir/tank. This tank will be situated next to the existing tank in an area adjacent to that which was surveyed as part of the earlier project (see attached Figure). On April 17, 2006 the area for the footprint of the additional tank was inspected by Robert B. Rechtman, Ph.D. Visibility was excellent and similar to the results of the earlier survey in the adjacent area, no historic properties were observed on the mostly exposed *pāhoehoe* surface where this tank is to be situated. It is our intent that this letter will serve as an addendum to the earlier Inventory Survey report, and that the project area be expanded to include this area with respect to the issuance of a grading permit. Please note that the landowner, Queen Lilioukalani Trust, is requesting to have archaeological monitors present when ground-altering activities are conducted on their property.

Should you have any questions, or would like further information please don't hesitate to contact me.

Regards,

Bob Rechtman, Ph.D.
Principal Archaeologist



Archaeological survey location areas.