DRAFT ENVIRONMENTAL ASSESSMENT

Queen Lili'uokalani Village
Off-Site Sewer Line

Keahuolū, North Kona, Hawaiʻi

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July 2009

PREPARED FOR:

DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
COUNTY OF HAWAIʻI

PREPARED BY:

BELT COLLINS

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ACRONYMS AND ABBREVIATIONS

AAQS	Ambient Air Quality Standards
ACHP	Advisory Council on Historic Preservation
BCH	Belt Collins Hawaii
BMDI	Bhalme and Mooley Drought Index
BMPs	best management practices
CAA	Clean Air Act
CFR	Code of Federal Regulations
CIA	cultural impact assessment
CWA	Clean Water Act of 1977
dBA	decibel, "A" weighted
DEM	Department of Environmental Management
DHHL	Department of Hawaiian Home Lands
DLNR	Department of Land and Natural Resources
DOH	Department of Health
DPW	Department of Public Works
DWS	Department of Water Supply
EA	Environmental Assessment
EPA	Environmental Protection Agency
ESA	Environmental Site Assessment
FIRM	Flood Insurance Rate Map
FONSI	Finding of No Significant Impact
HAR	Hawaii Administrative Rules
HELCO	Hawaii Electric Light Company
HDOT	Hawaii Department of Transportation
HHFDC	Hawaii Housing Finance and Development Corporation
HRS	Hawaii Revised Statutes
IWS	individual wastewater system
LCCs	large capacity cesspools
LF	linear feet
LUPAG	Land Use Pattern Allocation Guide
LUC	Land Use Commission
mgd	million gallons per day
msl	mean sea level
NAAQS	National Ambient Air Quality Standards
NHPA	National Historic Preservation Act

NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
PHRI	Paul H. Rosendahl, Ph.D., Inc.
QLT	Queen Lili'uokalani Trust
QLV	Queen Lili'uokalani Village
ROW	right-of-way
SHPD	State Historic Preservation Division
SMA	Special Management Area
UIC	Underground Injection Control
WWTP	Wastewater Treatment Plant
TMK	Tax Map Key
US	United States
vog	volcanic emissions

PROJECT SUMMARY

Project Name:	Queen Liliʻuokalani Village (QLV) Off-Site Sewer Line
Proposed Action:	The proposed action calls for the construction of an off-site sewer line to serve the existing 51.6-acre QLV subdivision located east of Palani Road in Kailua-Kona, Hawaiʻi. The proposed gravity line will connect the QLV subdivision with an existing County of Hawaiʻi sewer line at Keanalehu Drive, a distance of approximately 3,800 feet. The proposed line will transverse Palani Road, extend approximately 2,700 feet across Department of Hawaiian Home Lands (DHHL) property, and then follow Keanalehu Drive extension (on Hawaiʻi Housing Finance & Development Corporation (HHFDC) property) to connect with the County's system at Keanalehu Drive and Manawaleʻa Street. The section through DHHL land will occur within an utility easement in favor of the County of Hawai'i, and will be designed and installed for temporary application.
Proposing Agency:	County of Hawaiʻi, Department of Environmental Management (DEM) 2100 Kanoelehua Avenue, Hilo, Hawaiʻi 96720
Approving Agency:	County of Hawaiʻi, DEM
Anticipated Determination:	Finding of No Significant Impact
Project Cost:	Preliminary estimate of $1.7 to $2.1 million
Project Location:	The proposed action is located in the Keahuolū and Kealakehe ahupuaʻa of North Kona District, island of Hawaii, approximately 1.7 miles northeast of downtown Kailua-Kona. The Tax Map Keys (TMK) are 7-4-13: 123 (QLV), 7-4-21: 20 (HHFDC), and 7-4-21: 21(DHHL).
Area:	Approximately 3,800 linear feet within a 15-foot wide easement or utility corridor.
State Land Use District:	Agricultural and Urban Districts
County Zoning:	A-5a Agricultural District and RS-15 Single-Family Residential
Special Management Area:	The proposed action will occur outside of the County's Special Management Area
Flood Insurance Rate Map:	Zone X: Area determined to be outside the 500-year floodplain.
Existing Use:	The majority of the land is undeveloped. A small portion is occupied by Palani Road.

Surrounding Uses: The project site is surrounded by undeveloped land, bounded to the north by DHHL land, to the south by DHHL and HHFDC lands, to the east by QLV, and to the west by Keanalehu Drive.

Required Permits:

- Right-of-Entry Authorization from State of Hawai'i
- Grading, Grubbing, Excavation and Stockpiling Permit
- Work within County Right-of-Way (Palani Road)
- National Pollutant Discharge Elimination System (Storm Water) Permit

CHAPTER 1: INTRODUCTION

1.1 INTRODUCTION

The County of Hawai‘i (County) Department of Environmental Management (DEM) is proposing to construct an approximately 3,800 linear foot (LF) off-site sewer line to connect Queen Lili'uokalani Village’s (QLV) sewer system to the County’s existing wastewater collection system in Keahuolū, North Kona, Hawai‘i. The proposed 8-inch diameter gravity sewer line will cross Palani Road (a County right-of-way), Department of Hawaiian Home Lands (DHHL) property, and Hawaii Housing Finance & Development Corporation (HHFDC) property before it follows the planned Keanalehu Drive extension to the Keanalehua Drive and Manawale'a Street intersection (presently under construction) where it will connect with the County’s existing sewer system.

The project site is located in the Keahuolū and Kealakehe ahupua‘a of the North Kona District of the island of Hawai‘i. It is situated approximately 1.4 miles mauka (east) of Queen Ka‘ahumanu Highway, about 1.7 miles northeast of downtown Kailua-Kona, and within the parcels identified by Tax Maps Keys (TMK) 7-4-13: 123 (QLV), 7-4-21: 20 (HHFDC), and 7-4-21: 21(DHHL). Figures 1.1, 1.2, and 1.3 show the location of the proposed sewer line.

This environmental assessment (EA), prepared in accordance with Hawai‘i Revised Statutes (HRS) Chapter 343, evaluates the potential environmental impacts that would be generated from the construction and use of the proposed sewer line. The County DEM is the Proposing as well as the Approving Agency for this project.

1.2 PURPOSE AND NEED

In 1998, the United States Environmental Protection Agency (EPA) promulgated regulations under 40 Code of Federal Regulations (CFR) § 144.14 requiring the elimination of all large capacity cesspools (LCCs) presently used for wastewater disposal. Under these regulations, LCCs were required to be closed by April 5, 2005. However, due to the large quantities of LCCs that presently exist throughout Hawai‘i County, EPA and County officials reached an agreement that allows the County a longer timetable to close these LCCs.[1]

QLV’s existing wastewater system consists of sewer lines for collection and LCCs for disposal all of which are maintained and operated by the County. Due to the EPA mandate to close LCCs, the County is planning to replace QLV’s existing sewer system with a new wastewater collection system. Planning and design of the new QLV sewer system have begun and an environmental assessment is being prepared.

The proposed off-site sewer line is intended to connect QLV’s converted sewer system to the County’s regional sewer system in Keahuolū and Kealakehe. The wastewater will then be conveyed to the Kealakehe Wastewater Treatment Plant (WWTP) for treatment and disposal. Construction of the QLV off-site sewer line is expected to start in the first quarter of 2010.

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[1] SSFM International, Inc., October 2007. *Draft Environmental Assessment for Queen Lili‘uokalani Subdivision Cesspool Conversion Project.*

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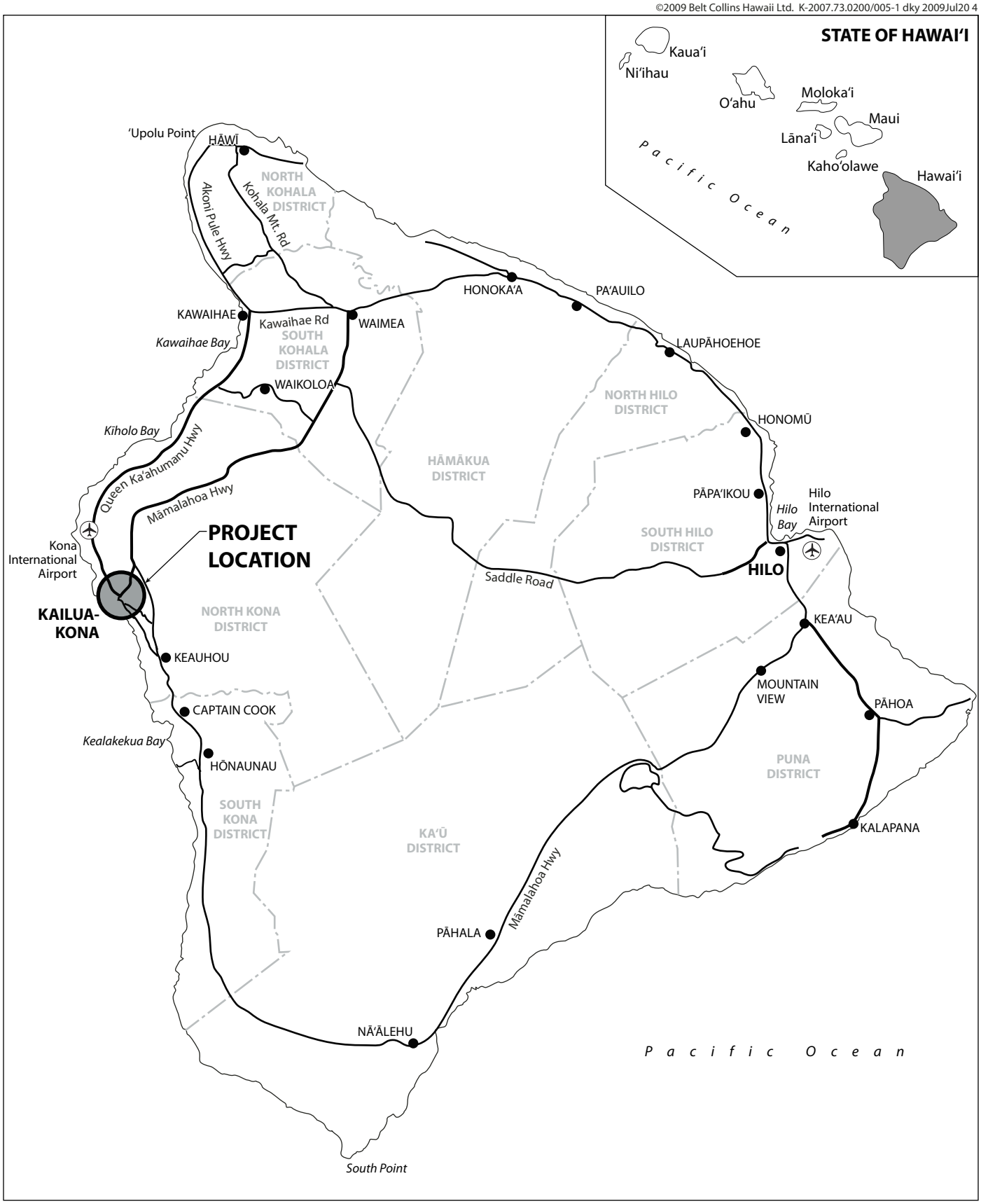

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NORTH

0 3 6 12

SCALE IN MILES

Figure 1.1
GENERAL LOCATION MAP

Queen Lili'uokalani Village Off-Site Sewer
July 2009

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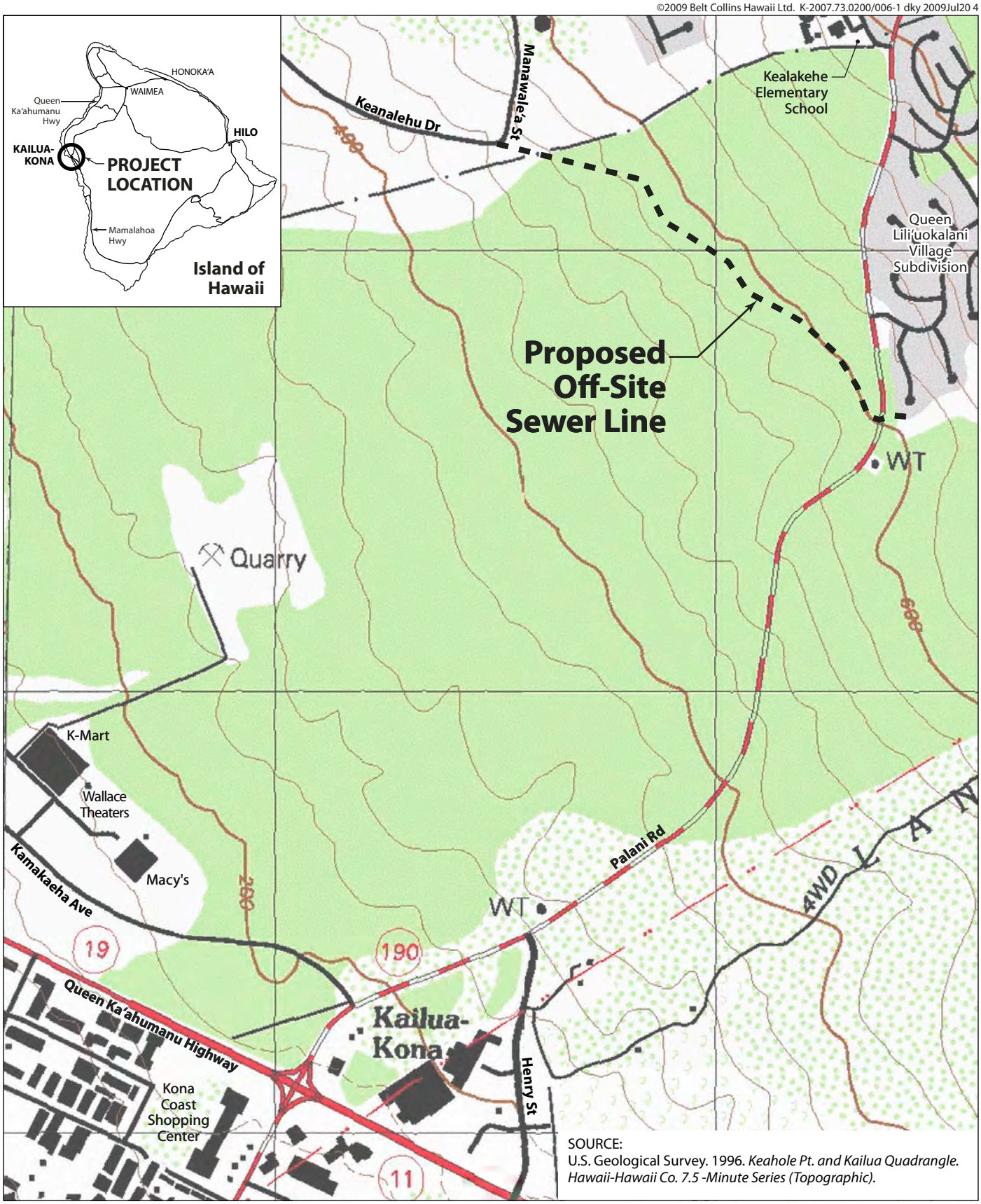

SOURCE:
U.S. Geological Survey. 1996. *Keahole Pt. and Kailua Quadrangle. Hawaii-Hawaii Co. 7.5 -Minute Series (Topographic).*

BELT COLLINS

NORTH

0 500 1000
SCALE IN FEET

Figure 1.2
USGS QUADRANGLE TOPOGRAPHIC MAP

Queen Lili'uokalani Village Off-Site Sewer
July 2009

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SOURCE: Google Earth Pro. 2007.

NORTH

0 500 1000
SCALE IN FEET

BELT COLLINS

Figure 1.3
AERIAL PHOTO LOCATION MAP

Queen Lili'uokalani Village Off-Site Sewer
July 2009

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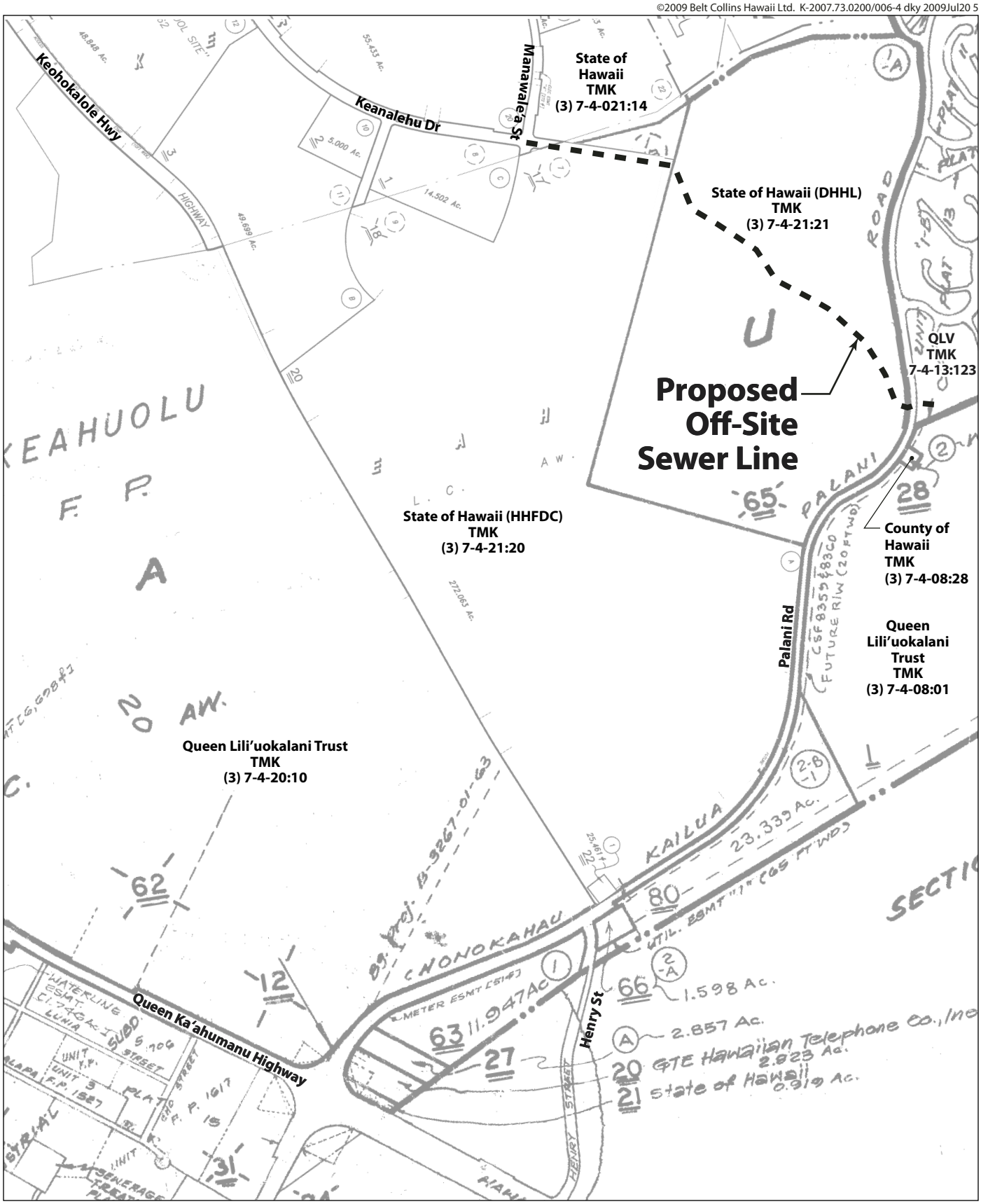

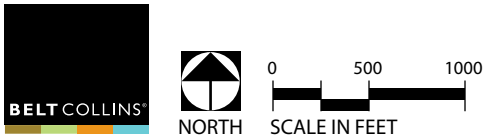

Figure 1.4
LAND OWNERSHIP
TAX MAP KEY

Queen Lili'uokalani Village Off-Site Sewer
July 2009

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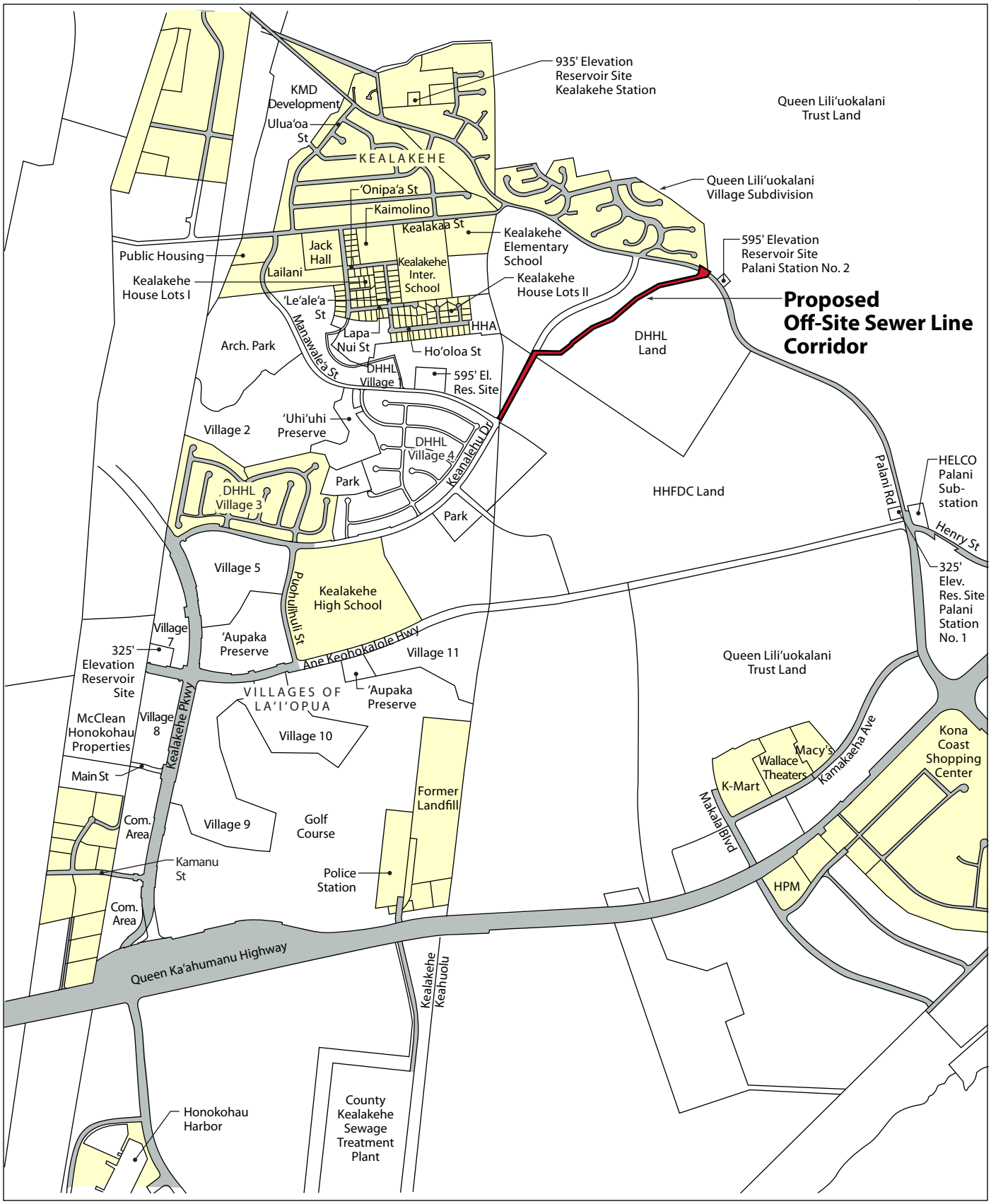


Figure 1.5
AREAWIDE LAND USES

Queen Lili'uokalani Village Off-Site Sewer
July 2009

BELT COLLINS

NORTH

0 600 1200 1800
SCALE IN FEET

LEGEND

Existing Developments

Existing Road

CHAPTER TWO: PROPOSED ACTION AND ALTERNATIVES CONSIDERED

2.1 PROPOSED ACTION

The proposed action consists of the construction of an approximately 3,800 LF off-site gravity sewer line that would connect QLV's sewer system with the County's sewer system in Kealakehe. The proposed sewer line is divided into four sections: (1) a section within the QLV subdivision; (2) a section crossing Palani Road; (3) a section across the DHHL Keahuolū property; and (4) a section within the extension of Keanalehu Drive through HHFDC property.

Section 1 includes a connection line from QLV's converted sewer system to the proposed off-site sewer line. Wastewater from QLV's sewer system gravity flows to this location into the off-site sewer line.

Section 2, the Palani Road crossing, will be accomplished using either trenchless technology, such as small-diameter micro-tunneling, or open-trench construction. The method to be used will be decided during the construction bid process. The sewer line for the remaining three sections will be installed using conventional open-trench construction.

All sections except the third section will be designed and installed as a permanent sewer line and shall comply with the *Design Standards of the Department of Wastewater Management, Volume 1* (1993). The third section through DHHL land will be located within a 15-foot-wide easement and installed for temporary application to account for DHHL's planned long-term use of its property. The design of this line segment will use the 1993 standards as a guideline.

Construction of the sewer line through Section 4 is expected to precede the construction of the Keanalehu Drive extension. A timetable for construction of this County road has not been finalized.

The proposed alignment through Sections 3 and 4 was selected based on the following criteria:

- To follow the natural terrain and maintain a minimum slope of 0.5 percent. The alignment will allow the wastewater to flow via gravity.
- To provide an alignment that will have no impact on archaeological sites.
- To select an alignment that is agreeable to existing landowners.

The 8-inch diameter sewer line will maintain a minimum of 0.5 percent slope to a maximum 11.1 percent slope to comply with the County design standards. It will be installed at a depth of four to ten feet below the ground surface.[2] The pipe material will be corrosion resistant polyvinyl chloride.

The off-site sewer line including manholes is primarily designed to serve the QLV subdivision, but other adjacent properties will be allowed to connect with the line. The segment of the

[2] As a cost savings measure, the minimum pipe cover for the temporary sewer is reduced to 12 inches. In practice, a minimum of 33 inches of cover is used at the sewer manholes based on the height of a pre-cast sewer manhole.

proposed sewer line within the Keanalehu Drive extension is sized to serve the future DHHL development already planned for that utility corridor.

2.2 PROJECT SCHEDULE AND ESTIMATED COST

County of Hawai'i funds will be used for the construction of the proposed QLV off-site sewer line. Construction costs are estimated to range from $1.7 to $2.1 million. Construction is expected to start in the first quarter of 2010 with project completion scheduled one year thereafter.

2.3 ALTERNATIVES CONSIDERED

2.3.1 No Action Alternative

Under the No Action Alternative, the QLV off-site sewer line would not be constructed. There would be no sewer line connection between QLV's sewer system and the County's sewer collection system at Keanalehu Drive. This alternative will not meet the purpose and need of the project which is to comply with the US EPA promulgated regulations under 40 CFR § 144.14, as described in Section 1.2.

It is noted, however, that this alternative will result in no impact or change to the natural environment, and therefore the existing environmental conditions would continue to prevail.

2.3.2 Alternative Sewer Line Alignments

Alternative alignments to the proposed sewer line were considered. The first alternative alignment was designed to connect with the HHFDC affordable housing project. From QLV, it crossed Palani Road and continued south following Palani Road until it turned west at the DHHL-HHFDC property line and ultimately connecting into the HHFDC housing project's wastewater collection system and planned County system in the Queen Lili'uokalani Trust (QLT) lands to the west.

The HHFDC housing project is still in the conceptual planning stages and is conditioned on the construction of the planned Ane Keohokalole Highway and the future sewer infrastructure in the makai QLT property. Construction of these projects is not expected to occur prior to the EPA agreed deadline for the LLCs. Therefore, this alternative was not further pursued.

A second alternative sewer line alignment was considered and dismissed. From the QLV, the sewer line would follow Palani Road on the east side and continue south in the right-of-way (ROW) to Henry Street, where it would connect with the existing County sewer line in Henry Street. The approximate distance from QLV to the Henry Street line is 5,200 LF, about 2,000 LF more than the proposed action. Additionally, as Palani Road is a major public road, construction activities in the ROW would cause significant traffic delays. However, this alternative alleviates the need for the County to obtain easements from private landowners.

Although this alignment resides in the County's existing ROW, the increased distance to the existing sewer in Henry Street and the considerable disruption of traffic along Palani Road during construction would make this alternative undesirable. Therefore, this alternative alignment was not considered for further review.

CHAPTER THREE: AFFECTED ENVIRONMENT

3.1 LAND USE AND OWNERSHIP

3.1.1 Existing Conditions

Development in the general vicinity of the project site is primarily residential. Figure 1.5 shows the existing land use in the project area. In the immediate vicinity, the project is surrounded by undeveloped land, bounded to the north by DHHL property, to the south by DHHL (southeast) and HHFDC (southwest) properties, to the east by QLT property and QLV, and to the west by Keanalehu Drive.

Historically, the primary methods of wastewater collection and disposal within the state of Hawai'i included either individual wastewater systems (IWSs) or LCCs. The IWSs consist of privately owned cesspools or small septic disposal systems that service single-family residences, while LCCs serve more than one single-family unit or public facility with the capacity to serve 20 or more people per day. Large cesspools were among the earlier forms of community sewage collection and disposal systems.

The existing wastewater system serving the QLV subdivision of 182 residences is comprised of a series of sewer collection lines within utility easements throughout the subdivision. These gravity-fed, County-owned sewer lines collect and convey wastewater from the residences to the 30 LCCs located throughout the subdivision for disposal.

The County is in the process of replacing QLV's LCC system with a wastewater collection system comprised of gravity sewer lines that will tie in with the proposed off-site sewer line to Keanalehu Drive. The replacement system is presently in the design stage and an EA is being prepared.

The southern segment of Keanalehu Drive between Kealakehe High School and Manawale'a Street extension, to which the proposed sewer line will connect, is presently under construction including its sewer line. The County sewer line in this roadway ties in with the Villages of La'i'opua sewer system that is presently served by the Kealakehe WWTP located on the makai land below Queen Ka'ahumanu Highway.

The Kealakehe WWTP, completed in 1992, has a current design capacity of 5.3 million gallons per day (mgd) and is presently treating approximately 1.0 mgd of wastewater.[3] The wastewater is treated to R-2 reuse quality using five aerated facultative lagoons in series and chlorine disinfection. The QLV subdivision and the proposed off-site sewer line are in the service area of the Kealakehe WWTP.

[3] County of Hawaii, Planning Department. *Mapping the Future, Kona Community Development Plan, Volume 2.* May 2008

3.1.2 Impacts and Mitigation Measures

The portion of the proposed sewer line through DHHL land will be coordinated with DHHL to assure proper placement and avoid interference with future plans for the property. A 15-foot-wide utility easement in favor of the County of Hawai'i will be established for the proposed sewer line. Once DHHL is ready to develop its property, the QLV off-site sewer line will be relocated to a permanent alignment.

The portion of the sewer line through HHFDC land will be located within the future right-of-way of the Keanalehu Drive extension. Prior to and while the ROW for the road extension is being created, the placement of the sewer line will be coordinated between HHFDC, DEM, and the County Department of Public Works along with the establishment of an easement in favor of the County of Hawaii.

3.2 GEOLOGY, SOILS, AND TOPOGRAPHY

3.2.1 Existing Conditions

Situated on the western slope of Hualālai volcano, the project area is composed of prehistoric lava flows estimated to be from 3,000 to 5,000 years old. The US Department of Agriculture, Natural Resources Conservation Service, classifies the soils on the project site as 'a'a Lava Flows (rLV), pāhoehoe Lava Flows (rLW), and Punalu'u extremely rocky peat (rPYD). The bare 'a'a and pāhoehoe lava flows predominate. The Punalu'u extremely rocky peat represents the Punalu'u series of well-drained, thin organic soils that have developed over pāhoehoe lava bedrock.

The project site has poor agronomic conditions. Soils are extremely rocky, rainfall is low, and water is not available for crop farming. No agricultural activities occur on the project site.

Elevations along the proposed sewer line alignment range from approximately 610 feet above mean sea level (msl) at the southeast end (QLV) to approximately 500 feet at the northwest end (Keanalehu Drive). In general, topography in the area slopes from east (mauka) to west (makai).

3.2.2 Impacts and Mitigation Measures

The proposed project is not expected to have a significant impact on the topography or soils of the area. Erosion control measures will be implemented to minimize the erosion potential of areas disturbed during construction. No impacts to potential agricultural activity are anticipated.

3.3 HYDROLOGY

3.3.1 Existing Conditions

Kona's regional water resources are classified in three distinct reserve types: basal groundwater, brackish basal groundwater, and dike-impounded perched groundwater. The region's rainfall pattern is responsible for the recharge of the basal aquifer that extends from the upper slopes of Hualālai to the shoreline. Seawater intrusion at the shoreline results in the creation of brackish water. The extent of brackish water inland is highly variable within the Kona region and depends on the character of

rainfall, specific terrain, and geologic formations. Dike-impounded perched groundwater may exist at higher elevations on Hualālai.

The project site is located mauka of the Department of Health's (DOH) Underground Injection Control (UIC) line, which generally follows the 500-foot elevation line of the Keahuolu area. The UIC program was established by the EPA and is administered locally by the DOH to protect the quality of underground sources of drinking water from pollution by subsurface disposal of fluids. The UIC line is the boundary between non-drinking water aquifers (generally seaward of the UIC line) and underground sources of drinking water (generally inland of the UIC line).

3.3.2 Impacts and Mitigation Measures

The proposed project is not expected to have a significant impact on the groundwater or hydrogeology of the area. The required construction work would not encounter groundwater nor would it likely introduce to or release from the soil any materials that could adversely affect groundwater. No mitigation is required or proposed.

3.4 SURFACE WATER AND DRAINAGE

3.4.1 Existing Conditions

There are no perennial streams, existing drainage facilities, or defined natural drainage ways on the project site. No floodways or significant flood zones have been identified in the project area. The high permeability of existing soils is evident by the absence of any natural storm water channels or gullies.

3.4.2 Impacts and Mitigation Measures

Sediment loading of storm water runoff could occur when unstabilized, exposed soils at excavation sites or stockpiles of excavated material experience heavy rains. This impact is considered to be short-term and temporary. Moreover, potential impacts will be minimized by best management practices (BMPs). Since the construction area for the proposed sewer line will be larger than one acre, a National Pollutant Discharge Elimination System (NPDES) permit for discharge of storm water associated with construction activity will be required. The permit would describe BMPs and erosion control plans to minimize surface erosion and groundwater impacts. Dewatering is not anticipated for this project.

No additional impacts to water resources in the immediate project area are anticipated. Once installed, the proposed off-site sewer line is not expected to increase runoff volumes and rates in the vicinity.

3.5 CULTURAL RESOURCES

3.5.1 Historic and Archaeological Resources

In August and September 2007, Paul H. Rosendahl, Ph.D., Inc. (PHRI) conducted site confirmations of earlier archaeological surveys and flagged and plotted significant archaeological features and sample blocks in the project area. All of the sites had been previously identified during two

archaeological inventory surveys conducted in 1990.[4] At that time, they were initially assessed for significance, and treatments were first recommended. The reports on the surveys were approved by Hawai'i State Historic Preservation Division (SHPD) in a letter dated February 11, 1993. All sites were later included in a subsequent mitigation plan,[5] including an amendment, that was approved by SHPD in December 1993. Figure 3.1 shows the locations of the archaeological features relative to the sewer alignment. PHRI's January 23, 2008 letter report on its 2007 survey work is included in Appendix B.

Results

The project corridor is clear of archaeological features except for a small segment that affects Site 13222 (Sample Block F). Based on the recent site confirmation study, PHRI concluded that the proposed alignment is a feasible corridor for the sewer line with minor mitigation measures to Site 13222.

If a portion of Site 13222 is found to be within the project corridor, (1) the corridor could be slightly adjusted to avoid the portion, or (2) Sample Block F could be slightly adjusted to avoid the corridor.

Site 13222 consists of a large group of primarily agricultural mounds that are ubiquitous throughout the sample. Its general significance is categorized by PHRI as D or important for information content. PHRI's recommendation for the site is for further data collection. For the short-term, a slight shift in Sample Block F to accommodate the proposed sewer line would not, in any significant way, affect the overall sample. The alignment would be staked and walked to confirm field conditions. Based on its recent field work, PHRI concluded that the project alignment is feasible, and if the suggested field adjustments are made for the proposed corridor and sample block, the sewer line should have no detrimental effect on archaeological sites in the vicinity.

3.5.2 Cultural Resources

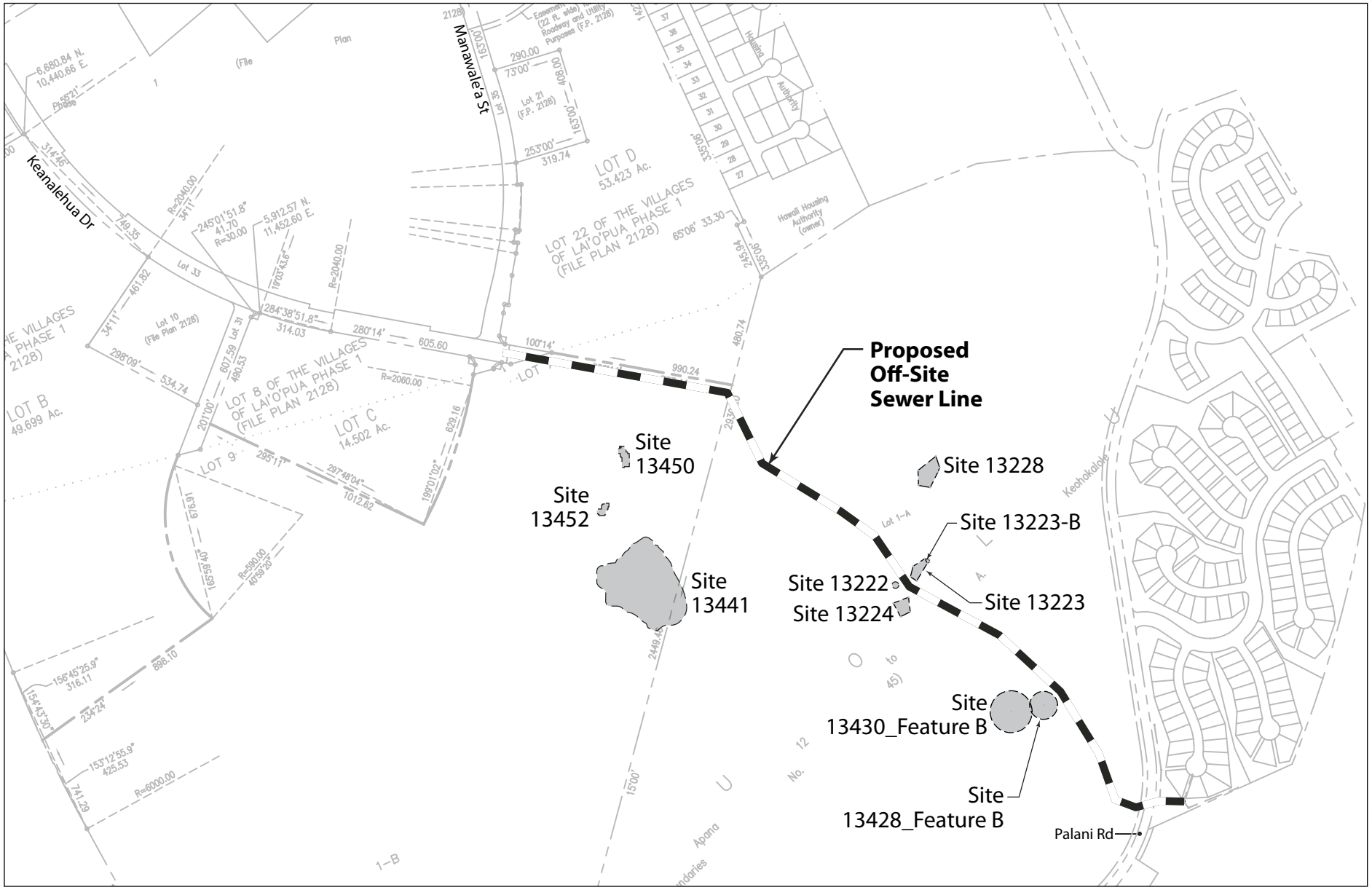
In 2008, PHRI conducted a cultural impact assessment (CIA) for the proposed off-site sewer line project. The primary objective of the CIA was to identify any native Hawaiian traditional and customary rights currently being practiced within or adjacent to the project area that could be negatively affected, constrained, or restricted.

The completed assessment revealed that relatively few cultural activities occurred or continues to occur in the project area. The few cultural practices that do occur are the gathering of ocean resources and specific plants from the 300-foot elevation seaward. The current project area is not located within these seaward boundaries.

Based on the findings of this assessment, the proposed sewer line will have minimal, or no, effect on native Hawaiian traditional and customary practices. No adverse impacts on traditional and customary rights are anticipated. No mitigation measures will be required.

[4] Donham, T. K., Archaeological Inventory Survey, Kealakehe Planned Community Project Area, PHRI Report 652-010890, 1990a; and Donham, T. K., Archaeological Inventory Survey, Kealakehe Planned Community Project Area, PHRI Addendum Report 652-051090, 1990b.

[5] Jensen, P. M., T. Donham, and P. H. Rosendahl, Archaeological Mitigation Program, Kealakehe Planned Community Project Area, PHRI Report 991-101491, 1992.



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SOURCE: Paul H. Rosendahl, Ph.D., Inc. (PHRI)

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Figure 3.1
ARCHAEOLOGICAL FEATURES MAP

Queen Lili'uokalani Village Off-Site Sewer
July 2009

3.6 FLORA AND FAUNA

3.6.1 Flora

A botanical field survey was conducted by Isle Botanica (Art Whistler, Ph.D.) in the project area in December 2007. The objectives of the field study were to provide a general description of the vegetation types present at the site (particularly any sensitive types of vegetation that may harbor rare plant species), to make a checklist of all native and naturalized vascular plants found, and to search for threatened and endangered species on or within in the vicinity of the proposed sewer line corridor.

Results

Only two types of vegetation can be recognized along the corridor: (1) Managed Land Vegetation; and (2) *Schinus/Psydrax* Scrub:

> Managed Land Vegetation comprises land that is under periodic or frequent management, such as dirt roads or recently bulldozed tracks. It is a relatively minor component of the overall vegetation on the sewer line corridor, where it comprises a short, recently bulldozed track dominated mostly by weeds. One unusual plant was found in the bulldozed track, auhuhu (Tephrosia purpurea), which is an ancient Polynesian introduction to Hawai‘i and uncommon in parts of Hawai‘i.
>
> *Schinus/Psydrax* Scrub: The *Schinus*/*Psydrax* type of vegetation covers nearly the whole extent of the sewer line corridor. It is dominated by three tree species, the alien Christmas berry (Schinus terebinthifolius), the indigenous alahe‘e (Psydrax odoratum), and the alien koa haole (Leucaena leucocephala). The ground cover in this vegetation is variable. This vegetation is classified as disturbed because of the high number of alien species present.

Neither of these vegetation types is comprised predominantly of native species. None of the nine native plant species, out of a total of 42 species recorded along the corridor, are federally listed as “threatened” or “endangered.” No areas of wetlands or undisturbed native vegetation occur at the site. As such, the proposed sewer line construction would not have an adverse affect on sensitive botanical elements in the project site.

3.6.2 Fauna

An avian and feral mammalian species survey was conducted on July 16 and 17, 2008, by Phillip L. Bruner, Environmental Consultant. The primary purpose of this survey was to document the native and migratory species in the project area. Additionally, the survey devoted special attention to determining and documenting the presence of any wildlife that is listed as threatened or endangered.

Avian Survey Results

Avian data collected over the survey period, indicate that no native land or native water birds were found at the project site. Further, no nesting seabirds or migratory shorebirds were observed. The survey concluded that there is no habitat suitable for shorebirds in the project area. Additionally, less than 10 alien species were documented along the proposed sewer line corridor, compared to 19

species in the surrounding lands. None of the birds documented are listed as threatened or endangered.

The avian data suggest that the only endangered species that might occur in this area is the endangered Hawaiian Hawk or ʻIo (*Buteo solitarius*). Additionally, the avian data suggest that the Hawaiian Short-eared Owl (*Asio flammeus sandwichensis*) might occasionally occur. The State of Hawaiʻi does list the Hawaiian Short-eared Owl as an endangered species on the island of Oʻahu, but not on the island of Hawaiʻi.

Feral Mammalian Survey Results

The survey documented the observation of only one Small Indian Mongoose (*Herpestes javanicus*) on the project site. No rats (*Rattus spp*), mice (*Mus musculus*), cats (*Felis catus*), or pigs (*Sus scrofa*) were observed and documented. However, the species enumerated above are known to occur in the area.

No endangered mammals, including the Hawaiian Hoary Bats, were detected and reported.

No adverse impacts on fauna are anticipated. No threatened or endangered fauna are known to inhabit the project site. No mitigations measures will be required.

3.7 PUBLIC HEATH AND SAFETY

3.7.1 Flood Hazards

Flood hazard areas in North Kona are difficult to delineate due to the lack of defined drainage ways. The following provides a summary profile for the North Kona district:

> The North Kona district is divided into two watershed areas. The area north of Keāhole Point along the coast extending to the summit of Hualālai has very low rainfall and runoff. The soils in the area are extremely permeable and there is no record of hazardous flooding. The second watershed area in North Kona extends to the south from Keāhole Point and includes most of the urban development in the district. The steep slopes, shallow soils, frequent high intensity rains, and the lack of well-defined drainage ways make this area susceptible to flooding and overland flows. Flood water and sediment damage occurs along the entire coffee belt with the Kainaliu, Holualoa and Kailua Village areas experiencing the heaviest damage (Civil Defense Agency, 2005).

The project site is located in the second watershed area that is susceptible to flooding and overland flows. The Flood Insurance Rate Maps (FIRM) prepared by the Federal Emergency Management Agency (FEMA) under the National Flood Insurance Program do not identify any major floodways or flood plains in the project area. According to the FIRM, the site is subject to potential minimal flooding.

3.7.2 Earthquakes

The island of Hawai'i experiences thousands of earthquakes every year although only a few of them are strong enough to be felt or cause any damage. Most of these earthquakes are directly related to volcanic activity caused by magma moving below the earth's surface; particularly beneath the island's two most active volcanoes, Mauna Loa and Kīlauea. A few of the earthquakes are less directly related to volcanic activity and may occur in zones of structural weakness at the base of the volcanoes or deep within the earth under any part of the island (Civil Defense Agency, 2005).

Strong earthquakes, while infrequent, may endanger people and property by shaking structures, causing ground cracks, ground settling, and landslides. Such earthquakes can destroy buildings, water tanks and bridges and damage roadways, water, sewer, and utility lines. The Kona area is subject to earthquakes with intensities up to VIII on the Modified Mercalli Scale.[6] The most recent damaging earthquakes to impact Hawai'i occurred on October 15, 2006 (BCH 2008a). It measured 6.7 on the Modified Mercalli Scale.[7]

3.7.3 Hurricanes

Since 1950, when adequate records began, eight hurricanes have affected the Hawaiian Islands and 12 others have posed a threat by their passage. Hurricane Iniki was the most recent, and the most powerful hurricane to strike Hawai'i in recorded history.

Hurricanes can be damaging to trees, vegetation, crops, transmissions lines and lightly built dwellings and structures. However, underground utilities, such as the proposed sewer line, are less susceptible to damage from a hurricane.

3.7.4 Volcanic Hazards

The project site is situated on the west facing flank of the Hualālai volcano. Of the three active volcanoes on the island of Hawai'i, Hualālai is considered to be the least active. The estimated lava production rate for Hualālai over the past 3,000 years is about 2 percent of the current rate of Kīlauea volcano.

The last volcanic eruption of Hualālai in the general project area occurred in 1800 to 1801. Lavas emerged from the northwest volcanic rift zone at about the 1,600-foot elevation (in the vicinity of the Puhi-a-Pele Cinder Cone, just makai of Māmalahoa Highway), creating a flow that entered the ocean north of Keāhole Point.

The Lava Flow Hazard Map prepared by the Hawaiian Volcano Observatory of the U.S. Geological Survey shows the island of Hawaii in nine Lava Flow Hazard Zones (Zone 1 being the most hazardous and Zone 9 being the least), based on geologic criteria, including frequency of past lava flows and coverage, distance from eruptive vents, and topography that currently protects certain areas from lava inundation. The summit of Mauna Loa and its rift zones as well as Kilauea crater and its

[6] According to the Federal Emergency Management Agency, during an earthquake with an intensity of VIII on the Modified Mercalli Scale, drivers have trouble steering. Houses that are not bolted down might shift on their foundations. Tall structures such as towers and chimneys might twist and fall. Well-built buildings suffer slight damage. Poorly built structures suffer severe damage. Tree branches break. Hillsides might crack if the ground is wet. Water levels in wells might change.

[7] See USGS website at http://earthquake.usgs.gov/eqcenter/recenteqsww/Quakes/ustwbh.php.

rift zones are located in Zone 1. The project site is located in Zone 4, a moderately rated hazardous zone.

3.7.5 Tsunami Inundation

The lowest portion of the project area is about 2.5 miles inland from the shoreline. Elevations on the project site range from approximately 500 to 610 feet msl. The Civil Defense tsunami evacuation zones are derived from tsunami inundation maps, but the evacuation zones are more conservative in that they encompass a broader area potentially at risk that should be evacuated. The project site falls outside of the tsunami evacuation zone.

3.7.6 Wildfires

Wildfires are becoming known as "wildland" fires, defined as any non-structural fire in an uncultivated or undeveloped area. On Hawai'i island, wildland fires range from moderate size grass fires on ranch lands to major scrub 'ohi'a fires in the Volcanoes National Park. Approximately 1.6 million of the island's 2.6 million acres of land are listed as forested while a large but unstated amount is in pasture and brush; areas on the mountains above the tree line are bare. Department of Land and Natural Resources (DLNR) has reported in the past that 70 to 80 wildfires occurred on the island of Hawai'i annually. Any adverse impacts from wildland fires to the proposed sewer line would be minimal as the proposed sewer line would be constructed underground.

3.7.7 Impacts and Mitigation Measures

Regardless of whether the sewer line is constructed or the property remains undeveloped, the property is subject to the impacts of flooding, earthquakes, hurricanes, volcanic hazards, and wildfires. No mitigation measures are required. Once installed, the sewer line would not be significantly impacted by these natural hazards.

3.8 AIR QUALITY

3.8.1 Existing Conditions

Except for periodic impacts from volcanic emissions (vog) and possibly localized traffic congestion, air quality in the North Kona area is relatively good. Limited air quality data available from the State DOH indicate that, despite the vog, concentrations are well within state and national air quality standards.

3.8.2 Impacts and Mitigation Measures

The proposed project is not expected to have a significant impact on air quality. Construction activities may result in short-term air quality impacts, including the generation of dust from soil excavation and backfill, and emissions from gas- or diesel-powered construction vehicles and equipment. To mitigate these impacts, the contractor will be required to comply with the DOH Hawai'i Administrative Rules (HAR),

Title 11, Chapter 60.1, "Air Pollution Control." Compliance with State regulations will require adequate measures to control fugitive dust by methods such as, but not limited to:

- Planning the different phases of construction, focusing on minimizing the amount of dust generating equipment and activities, centralizing on-site vehicular traffic routes, and locating potentially dusty equipment in areas of the least impact;
- Providing an adequate water source at the project site prior to initiation of construction activities;
- Frequent watering of any exposed dirt area;
- Landscaping and rapid covering of bare areas, including slopes, starting from the initial grading phase;
- Controlling of dust from road shoulders and unpaved access roads;
- Providing adequate dust control measures during weekends, after hours, and prior to daily start-up of construction activities;
- Controlling dust from debris being hauled away from the project site; and
- Constructing a dust barrier/fence.

Exhaust emissions from construction vehicles are anticipated to have negligible impacts on air quality, as emissions would be relatively small and readily dissipated.

3.9 NOISE

3.9.1 Existing Conditions

The predominant noise source in the project vicinity is traffic noise from Palani Road and QLV in the southern end of the project site. The majority of the project site is in an undeveloped area. In the northern section of the project site, the closest noise source is residential uses over 800 feet away.

3.9.2 Impacts and Mitigation Measures

No significant adverse impacts are anticipated from the long-term operations of the proposed sewer line.

Noise impacts, however, are expected during the project's short-term construction activities. To mitigate short-term construction-related impacts, compliance with the provisions of HAR 11-46, "Community Noise Control," will be required. A noise permit will be required if the noise level from the construction activity is expected to exceed specified levels. It shall be the contractor's responsibility to minimize noise by properly installing and maintaining noise mufflers and other noise-attenuating devices on construction equipment. Should construction activities be required during evenings, nights, and weekend hours, a variance will be sought from the DOH.

3.10 TRAFFIC

3.10.1 Existing Conditions

The proposed project will involve the construction of the QLV off-site sewer line across Palani Road and within the Keanalehu Drive extension. Palani Road is a County right-of-way that provides primary access between Māmalahoa Highway in the uplands of North Kona and Kailua-Kona town at Kailua Bay. It is a well-traveled two-lane road with an average daily traffic of 16,500 vehicles.[8] Peak-hour traffic occurs between 7:15 a.m. and 8:15 a.m. in the morning with a volume of 1,482 vehicles and 4:15 p.m. and 5:15 p.m. in the afternoon with a volume of 1,537 vehicles. These peak-hour times appear to coincide with workforce and school commuter traffic.

At the northern terminus of the proposed sewer line, Keanalehu Drive extension is planned for future construction; no traffic currently occurs in the area.

3.10.2 Impacts and Mitigation Measures

Installation of the sewer line across Palani Road will be done either by the traditional open-trench method or by micro-tunneling. A decision on which method to be used will be made during the contractor selection and award process. The tunneling option will not require lane closures. The traditional open-trench option will require a temporary by-pass or detour road in the adjacent DHHL land and closure of Palani Road at the construction site to minimize impact to traffic. Coordination of the work will be required between DHHL and the County DPW and DEM. Once the sewer line is completed across Palani Road, the temporary by-pass road will be removed and the land returned to its pre-bypass road condition.

Installation of the sewer line in the Keanalehu Drive extension will not impact existing traffic as traffic on the road does not currently occur.

3.11 INFRASTRUCTURE

3.11.1 Water Supply System

The Department of Water Supply (DWS) presently supplies potable water to the area via a 12-inch diameter line along Palani Road. This line increases to a 16-inch line further south along the County right-of-way. The source of the water is the Honokōhau and QLT wells. Water is stored at the well sites in 1.0 million-gallon tanks. The proposed sewer line will go under the existing water line with the required clearances per DWS and DPW Standards. No interruption of service is anticipated.

3.11.2 Drainage Facilities

There are no man-made drainage collection systems in the project area. For Palani Road, runoff sheet flows off the pavement to the shoulder and road side area where percolation occurs.

[8] 2004 Hawai'i Department of Transportation [HDOT] 24-Hour Traffic Count. Traffic count station located on Palani Road makai of Mamalahoa Highway and Palani Road intersection. 24-hour traffic count taken on May 24 and 25, 2004.

3.11.3 Sewer System

The existing wastewater system serving the QLV community as described in Section 3.1.1 is comprised of a series of sewer lines running along roads and utility easements throughout the subdivision. These County-owned lines collect and convey wastewater from the residences to onsite LCCs for disposal. The proposed project calls for conveying the wastewater away from the QLV to the regional WWTP in Kealakehe.

3.11.4 Solid Waste

The DEM Wastewater/Solid Waste Division operates two County landfills, one in Kona (Pu'uanahulu Landfill) and the other in Hilo (Hilo Landfill). There are also several solid waste transfer stations located around the island.

Construction of the off-site sewer line will generate solid waste typical of construction activities, such as grubbing and clearing. Such activities are expected to generate green waste as well as solid waste. The impact on the County solid waste facilities or landfills, however, is expected to be minor.

3.11.5 Electricity, Telephone, and Cable TV

Electricity to the area is provided by Hawaii Electric Light Co. (HELCO), land-line telephone services are provided by Hawaiian Telcom, and cable is provided by Oceanic Time Warner. These utilities are located overhead along Palani Road and will not be impacted by the proposed sewer line. Installation of the sewer line in the planned Keanalehu Drive extension is being coordinated with the County DPW, DWS, and utility companies

3.11.6 Impacts and Mitigation Measures

With the required clearance between water and sewer lines, per DWS and DPW Standards, no interference in utility services is expected to occur. No additional mitigation measures are required or proposed.

The existing sewer collection system for QLV will be replaced with the implementation of new on-site and off-site sewer lines. As this is in compliance with the EPA mandate to close LCCs, no mitigation measures are required or proposed.

None of the remaining overhead utilities will be impacted by the sewer line construction. The contractor will provide the required notice to the appropriate agencies and utility companies prior to construction. No other mitigation measures are required or proposed.

3.12 PUBLIC FACILITIES

3.12.1 Medical and Educational Facilities

The Kona Community Hospital, located in Kealakekua approximately 10 miles south of Kailua-Kona, services the Kona community. The 94-bed hospital is part of the Hawaii Health Care System supported by the State. It has 24-hour emergency services, an intensive care unit, maternity, oncology, and other units. Ambulance services are provided primarily by the County Fire Department. American Medical Response provides backup ambulance services in the event the

Fire Department is unable to respond. There are a number of private physicians, medical clinics, and health care facilities in Kailua-Kona offering a range of specialties.

Kealakehe Elementary, Kealakehe Intermediate, and Kealakehe High Schools provide public education for students in grades Kindergarten through 12th grade and are operated by the Hawai'i State Department of Education. The Kealakehe School complex is within one mile of the proposed project.

3.12.2 Police Protection

The Hawai'i County Police Department provides services to the Kona district, which encompasses 834 square miles between the South Kohala District at Kaauau Point and the Ka'u District at Kaulana-mauna. Hawai'i County Police officers operate from a central station in Kealakehe and from district stations in Keauhou and Captain Cook, as well as from a mini-station in Kailua-Kona.

The project is not expected to create additional demand for police protection and related services since it will not increase the resident population or visitors to the area. This project should have minimal impact on the police department's operations or ability to provide adequate protection services to the surrounding community. If necessary, off-duty staff may be hired to assist in directing traffic during construction activities.

3.12.3 Fire Protection

There are fire stations located within the Kailua-Kona community, which include the project area. The regular fire stations and volunteer stations provide 24-hour fire protection and emergency medical services. The County has contracted with the State for emergency medical ambulance services. All fire department personnel, who provide basic and advanced life support, are licensed or certified as required by State law.

The proposed sewer line is not expected to have a significant impact on the County Fire Department's ability to provide fire protection services.

3.12.4 Impacts and Mitigation Measures

No significant long-term impacts are anticipated to occur on fire protection services in the Kona area. No mitigation measures are required or proposed.

3.13 VISUAL AND ASTHETIC RESOURCES

3.13.1 Existing Conditions

The prominent visual amenities in the region consist of Hualālai volcano toward the east and the Kona coastline toward the west of the project site. The County has designated Queen Ka'ahumanu Highway, which transverses North Kona and South Kohala as a scenic corridor.

3.13.2 Impacts and Mitigation Measures

The underground location of the proposed sewer line will not interfere with any visual planes from Queen Kaahumanu Highway to the outlying areas. No mitigation measures are required.

3.14 SOCIO-ECONOMIC CONDITIONS

3.14.1 Existing Conditions

For much of the 20th century, West Hawai‘i was an agricultural region with major commodities of coffee (South Kona), sugar (North Kohala), and cattle (uplands of South Kohala). The visitor industry in North Kona grew after statehood, and the district now receives the majority of the island's visitors. Kailua-Kona became increasingly dependent on tourism and is now a regional center with commercial, industrial, and resort facilities. The North Kona district has seen continuing increases in population, visitor numbers, and commercial areas. In 2000, West Hawai‘i had 56,301 residents and an average visitor census of 17,784. Approximately 10,000 people worked in Kailua-Kona. Of this number, 70 percent commuted from other places on the island.[9] As of 2002, Kailua-Kona had 165 retail establishments with gross sales of $410 million, 24 percent of the island total. The retail workforce in Kailua numbered 2,174.

3.14.2 Impacts and Mitigation Measures

The proposed sewer line will have no long- or short-term adverse impacts on the socio-economic conditions in the area. It is not expected to change the existing resident population or its demands and needs in the North Kona District. However, the proposed sewer line would improve the County's existing wastewater system and bring the system into compliance with US EPA regulations. It would temporarily benefit the economy with the mobilization of construction-related jobs. These jobs would result in a multiplier effect generating income and spending throughout the local economy. No mitigation measures are required or proposed.

[9] This Census calculation is for the Kailua-Kona Census Designated Place. Residents of the subdivisions to the north of Kailua-Kona such as Kona Palisades would count as "commuters" to Kailua-Kona along with residents of more distant areas (US Census data calculated by DBEDT, available at http://www.hawaii.gov/dbedt/info/census/Folder.2005-10-13.2927/DaytimePop).

CHAPTER 4: CONFORMANCE WITH PUBLIC PLANS AND POLICIES

4.1 STATE AND COUNTY LAND USE AND ENVIRONMENTAL POLICIES

4.1.1 State Land Use Law

Under HRS Chapter 205, all lands in the State of Hawai‘i are classified into four land use districts: Urban, Rural, Agricultural, and Conservation.

The proposed QLV off-site sewer line is located in the Urban and Agricultural Districts. Sewer line projects are permissible in these districts.

4.1.2 State Environmental Law

The State Environmental Policy under HRS Chapter 344 established an environmental policy that (1) encourages productive and enjoyable harmony between people and their environment; (2) promotes efforts that will prevent or eliminate damage to the environment and biosphere; (3) stimulates the health and welfare of humanity; and (4) enriches the understanding of the ecological systems and natural resources important to the people of Hawai‘i.

The proposed action would be in full compliance with the State Environmental Policy in its goals to prevent and eliminate damage to the environment and promote health and welfare. Also, the proposed action will connect a project that is designed to comply with US EPA regulations addressing environmental concerns for outdated LCCs to a nearby public wastewater collection system.

4.1.3 County of Hawai‘i General Plan

The County adopted in 1971 its first comprehensive General Plan for the island of Hawai‘i. The General Plan set forth a policy of comprehensive development for the entire island based upon long-term goals, visions, values, and priorities important to the people of the County. The General Plan called for five- and ten-year comprehensive reviews and updates to maintain the dynamism and flexibility of the plan, and also, to accommodate major changes and trends that may occur.

The County of Hawai‘i’s most recent update of the General Plan occurred in 2005. The General Plan’s accompanying Land Use Pattern Allocation Guide (LUPAG) Map establishes the future land use patterns for the island, which include the community of Kailua-Kona. Figure 4.1 shows the LUPAG land use designations for the project area as Low Density Urban and Urban Expansion. The proposed sewer improvements are consistent with the LUPAG designations.

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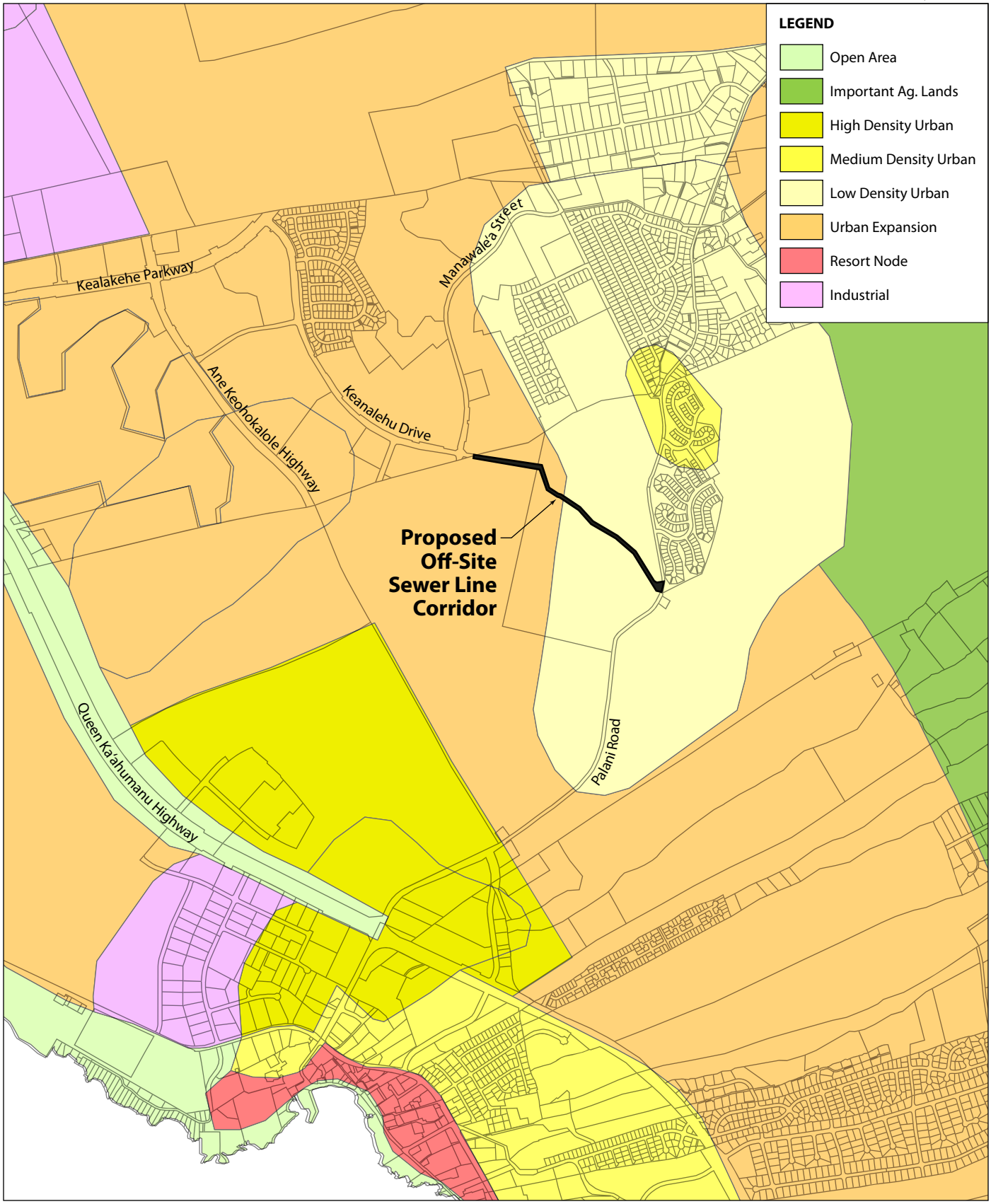

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Figure 4.1
GENERAL PLAN'S LAND USE PATTERN ALLOCATION GUIDE

Queen Lili'uokalani Village Off-Site Sewer
July 2009

4.1.4 Keāhole to Kailua Development Plan

The County adopted in 1990 the Keāhole to Kailua Development Plan to serve as a guide for future infrastructure and land uses in the region. The Development Plan serves as an implementing tool for the County's General Plan and as a sub-regional guide and developmental framework for the West Hawai'i Plan. The overall goal of the Development Plan is to setforth a mixed residential, commercial, resort, industrial, and recreational community with appropriate shoreline uses, public facilities, and infrastructure, which would be built in phases over the course of 20 years. One of the objectives of the plan is to develop an area-wide system of sewage facilities with 6 mgd capacity to accommodate development of the region. The proposed sewer line is an integral component of the long-range Keāhole to Kailua Developmental Plan.

4.1.5 Kona Community Development Plan

The Hawai'i County General Plan requires that community development plans be adopted by the County Council for each judicial district in the County. The Kona Community Development Plan, which the County Council recently adopted in September 2008, represents the judicial district of North and South Kona covering 800 square miles of land or 20 percent of the land area for the County.[10]

Kona, with its ideal climate and unsurpassed beauty, has experienced tremendous growth over the past 25 years, attracting an influx of new residents. The population has more than doubled, driven by resort development and the second-home residential market. As a result of this rapid growth rate, the Kona community recognizes the need to adopt sensible planning strategies that will meet growth demands and deal with issues of added traffic, affordable housing, and infrastructure, while maintaining the quality of life for Kona residents.

A major goal of the plan is to provide essential infrastructure and facilities concurrent with growth and current regulations. The proposed sewer line would be an integral component for upgrading essential infrastructure services as defined by the Kona Community Development Plan.

4.1.6 County of Hawai'i Zoning Code

The zoning regulations for the County of Hawai'i are prescribed in Chapter 25 of the Hawai'i County Code. This Zoning Code is applied and administered within the framework of the General Plan, and for the purpose of promoting health, safety, morals, and the general welfare of the County.

Under the Zoning Code, various zoning districts are established which regulate the type of development and permitted uses of property, and are depicted on zoning district maps. The current zoning for the project site is RS-15 Residential and A-5a Agricultural. See Figure 4.2.

This project will be consistent with the County's Zoning Code because it involves a government function for public benefit by providing improved and more reliable sewage collection service to the community. Such use is permitted in any zoning district.

[10] Wilson Okamoto. May 2008. *Kona Community Development Plan*

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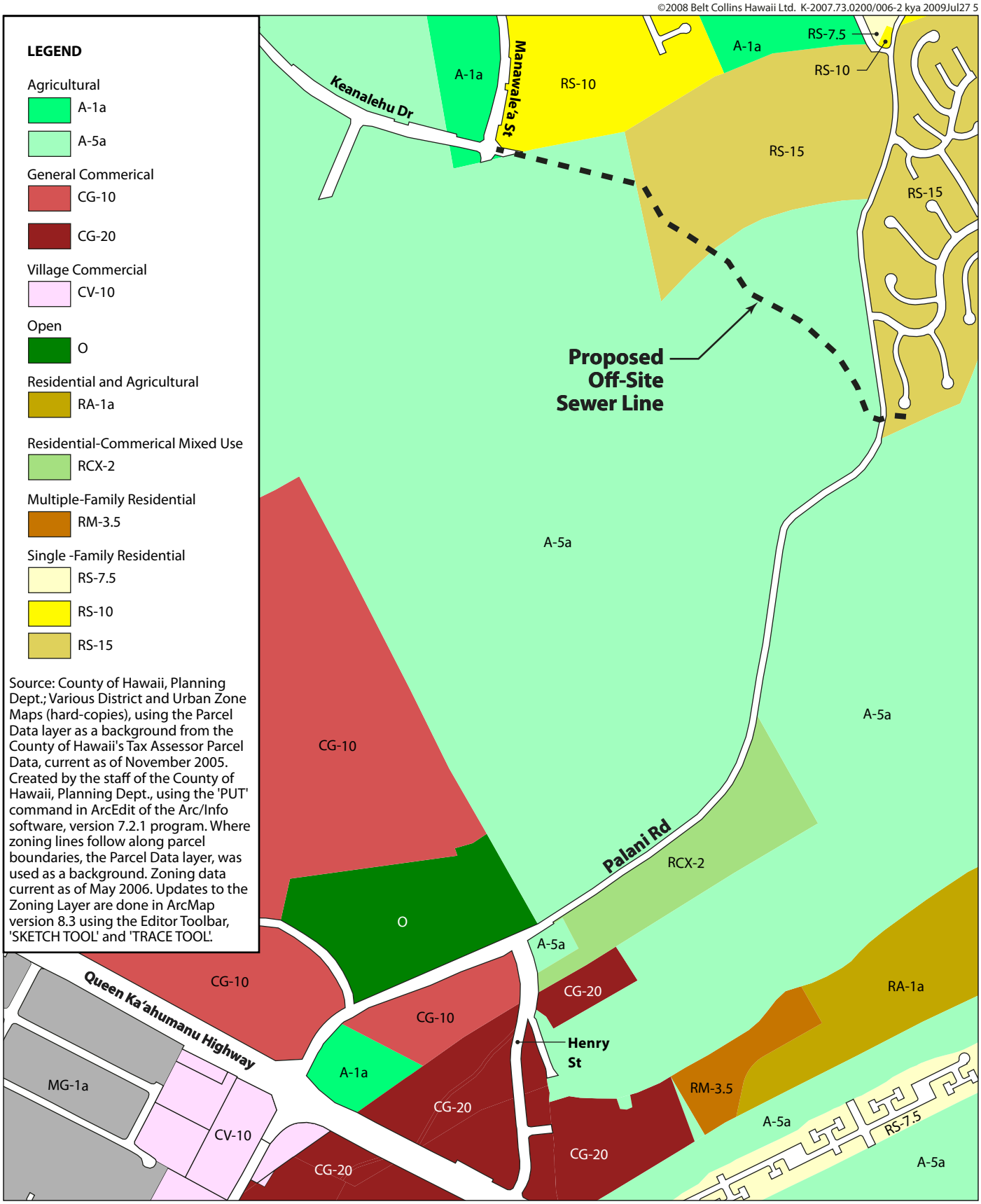

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Figure 4.2
ZONING MAP
COUNTY OF HAWAI'I

Queen Lili'uokalani Village Off-Site Sewer
July 2009

4.1.7 Special Management Area

Under HRS Chapter 205A (Coastal Zone Management), Hawaii County is given authority to regulate land uses located within the Special Management Area (SMA) of the island of Hawai'i. The SMA boundary in North Kona follows the coastline generally up to the Queen Ka'ahumanu Highway.

The proposed sewer line is located outside of the SMA, and therefore, not subject to the Rules and Regulations of the County of Hawai'i.

4.1.8 Required Permits and Approvals

Government permits and approvals that would be required for the proposed sewer line include:

- Grubbing, Grading, Excavation and Stockpiling Permit
- Work within County Right-of-Way Permit
- NPDES Permit for discharge of storm water associated with construction activity

CHAPTER FIVE: CONTEXTUAL

5.1 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Environmental analysis includes an identification of "…any irreversible and irretrievable commitments of resources which would be involved in the proposed project should it be implemented." Irreversible and irretrievable resource commitments are related to the use of nonrenewable resources and the effects that the uses of these resources have on future generations. Irreversible effects primarily result from the use or destruction of a specific resource (e.g., energy and minerals) that cannot be replaced within a reasonable time frame and could have been used for other purposes. Irretrievable resource commitments involve the loss in value of an affected resource that cannot be restored as a result of the action (e.g., the disturbance of a cultural site).

With the exception of fuels, materials, and funding to support the sewer line construction activities, no other irreversible or irretrievable commitments have been identified.

5.2 CUMULATIVE AND SECONDARY IMPACTS

Cumulative impacts are defined as impacts on the environment which result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

When completed, the proposed QLV off-site sewer line would be a part of the County's sewer system serving the North Kona region and a necessary infrastructure for accommodating the urban growth identified and planned in the Kona Community Development Plan. The proposed sewer line is an individual component for a replacement sewer system in QLV and is not part of a larger project or first phase of a multi-phase development program. It is noted that the portion of the proposed sewer line across DHHL's property will be relocated when the State agency completes planning and develops its property.

CHAPTER SIX: FINDINGS AND ANTICIPATED DETERMINATION

6.1 FINDINGS AND REASONS SUPPORTING ANTICIPATED DETERMINATION

1. Involves an irrevocable commitment to loss or destruction of any natural or cultural resource.

The proposed sewer line would not adversely affect natural or cultural resources of significance. It would not destroy or result in the loss of endangered or threatened botanical or faunal species and their natural habitats.

Archaeological resources have been identified in the project area and will be avoided during project construction. The proposed sewer line corridor is not known to be in an area that is culturally significant, i.e., used for traditional native Hawaiian or other cultural practices. In the event subsurface historic properties or burials are encountered during construction, all work within the immediate vicinity of the find will cease and the SHPD notified. Treatment of the find would be conducted in compliance with HRS Chapter 6E and HAR §13-300.

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

The underground placement of the proposed sewer line will provide opportunities for surface and above ground uses. The portion of the line through DHHL land is being designed for temporary placement and will be relocated when DHHL's housing project is developed.

3. Conflicts with the State's long-term environmental policies or goals and guidelines as expressed in Chapter 344, HRS, and any revisions thereof and amendments thereto, court decisions, or executive orders.

The proposed project would not conflict with the State's long-term environmental policies, goals, and guidelines as expressed in HRS Chapter 344. A discussion of the project's consistency with applicable guidelines is provided in Section 4.1.2 of this document.

4. Substantially affects the economic or social welfare, or cultural practices of the community or state.

As discussed in this document, the proposed project would not have significant adverse impacts on North Kona's economy or social welfare. Instead, it would generate minor short-term construction-related employment and increased tax revenues with minor positive effects on the overall economy of the county and state.

There are no known traditional cultural practices presently occurring within the project area. Consequently, the proposed project is not expected to have an adverse impact on cultural resources or traditional cultural practices nor would the proposed project restrict access to such resources or practices in the surrounding areas.

5. Substantially affects public health.

The proposed project is expected to have a beneficial affect on public health by improving the community's existing wastewater collection system.

Construction activities associated with the project will be short-term and incorporate BMPs and other mitigation measures to minimize fugitive dust and other nuisances that might affect public health.

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

The proposed project will not have secondary impacts on the social environment or the community's public facilities and infrastructure. The project is limited to the improvement of the Keahuolu's sewage collection system. As a result, the proposed improvement does not include new housing units or visitor units, which affect resident population and demand for public facilities.

7. Involves a substantial degradation of environmental quality.

The proposed project will not generate significant adverse impacts and will not involve a substantial degradation of the quality of the surrounding environment. The project's overall impact would improve the quality of the environment by improving the area's sewer system.

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

This proposed project involves the improvement of the community's infrastructure, and therefore does not involve a commitment for larger actions. Impacts associated with this improvement are addressed in this document and are primarily short-term and associated with its construction. Consequently, the proposed project would not have a significant adverse impact on the environment, both individually and cumulatively.

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

There are no known endangered, threatened, or rare botanical resources within the project area. The proposed project is not expected to affect any endangered or threatened faunal or avifaunal species. BMPs will be implemented during construction to minimize runoff and other potential short-term impacts associated with construction activities. Thus, the proposed project is not expected to substantially affect potential habitats of such species.

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

The proposed project is not expected to have a significant detrimental impact on the area's air quality, water quality, or ambient noise levels. Probable impacts would be primarily limited to short-term construction activities, which would be subject to applicable state regulations addressing air, noise, and water quality. Additionally, existing residences in the area are located at a distant location from any major portion of the project's construction area.

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

The proposed project will not occur within any environmentally sensitive area, nor is it situated within a tsunami inundation zone, erosion prone area, or geologically hazardous area. Construction of the new sewer line will be in compliance with applicable state and county environmental laws, codes, and County DEM standards.

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

The underground placement of the proposed sewer line will not affect scenic vistas or view planes identified in county or state plans or studies.

13. Requires substantial energy consumption.

Operations of the proposed sewer line will occur by gravity; there will be no mechanical component in the line and no requirement for energy consumption.

6.2 ANTICIPATED DETERMINATION

From preliminary findings, this EA demonstrates that the proposed project will have no significant adverse impact on the environment and an Environmental Impact Statement would not be warranted. A Finding of No Significant Impact (FONSI) is, therefore, anticipated for this project.

CHAPTER 7: AGENCIES AND PERSONS CONTACTED

STATE OF HAWAIʻI

Office of Environmental Quality Control
Department of Hawaiian Home Lands
Hawaiʻi Housing Finance and Development Corporation
Department of Health
Department of Land and Natural Resources
Department of Transportation
State Historic Preservation Division
Office of Hawaiian Affairs

COUNTY OF HAWAIʻI

Planning Department
Department of Water Supply
Department of Public Works
Police Department
Fire Department

UTILITY COMPANIES

Hawaiian Telcom
Hawaii Electric Light Co., Inc.
The Gas Company

ELECTED OFFICIALS

Councilmember Angel Pilago

LAND OWNERS

Queen Liliʻuokalani Trust

CHAPTER 8: REFERENCES

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APPENDICES

APPENDIX A

PRECONSULTATION LETTERS

PHONE (808) 594-1888

FAX (808) 594-1865

RECEIVED

2008 SEP 24 AM 11: 14

BELT COLLINS HAWAII

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

HRD08/3766

September 16, 2008

Glen T. Koyama
Belt Collins Hawaii, Ltd.
2153 North King Street, Suite 200
Honolulu, HI 96819-4554

RE: Request for comments on a pre Draft Environmental Assessment notice, off-site sewer line for Queen Lili'uoakalani Village, Kailua-Kona, Hawai'i Island; TMKs: 7-4-021: 020 and 021

Aloha e Glen Koyama,

The Office of Hawaiian Affairs (OHA) is in receipt of the above-mentioned letter dated August 7, 2008. According to your letter, the Department of Environmental Management, County of Hawai'i, intends to install approximately 3,800 feet of temporary sewer line from Queen Lili'uokalani Village to Keanalehu Drive in Keahuolū. Approximately 960 feet of the sewer would be permanent and in the planned Keanalehu Drive extension. OHA has reviewed the proposal and has no comments at this time.

Thank you, however, for the opportunity to comment. We look forward to the opportunity to provide a substantive review of the forthcoming Draft Environmental Assessment, with its required Cultural Impact Assessment, when it is produced. If you have further questions, please contact Heidi Guth at (808) 594-1962 or e-mail her at heidig@oha.org.

'O wau iho nō me ka 'oia'i'o,

Clyde W. Nāmu'o
Administrator

C: OHA – Kona CRC Office

LINDA LINGLE
GOVERNOR OF HAWAII

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

RECEIVED
2008 AUG 26 PM 1:42
BELT COLLINS HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION

POST OFFICE BOX 621
HONOLULU, HAWAII 96809

August 22, 2008

Belt Collins Hawaii Ltd.
2153 North King Street Suite 200
Honolulu, Hawaii 96819

Attention: Mr. Glen T. Koyama

Gentlemen:

Subject: Environmental Assessment for Proposed Off-Site Sewer Line for Queen Lili'uokalani Village

Thank you for the opportunity to review and comment on the subject matter. The Department of Land and Natural Resources' (DLNR), Land Division distributed or made available a copy of your report pertaining to the subject matter to Engineering Division for their review and comment.

The Department of Land and Natural Resources has no other comments to offer on the subject matter. Should you have any questions, please feel free to call our office at 587-0433. Thank you.

Sincerely,

Charlene E. Unoki
for Morris M. Atta
Administrator

Cc: Office of Planning

LINDA LINGLE
GOVERNOR OF HAWAII

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

'08 AUG 12 AM 11:08 ENGINEERING
RECEIVED
LAND DIVISION

2008 AUG 22 A 10: 17
DEPT. OF LAND & NATURAL RESOURCES STATE OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
POST OFFICE BOX 621
HONOLULU, HAWAII 96809

August 8, 2008

MEMORANDUM

TO: **DLNR Agencies:**
__Div. of Aquatic Resources
__Div. of Boating & Ocean Recreation
/ x Engineering Division
__Div. of Forestry & Wildlife
__Div. of State Parks
__Commission on Water Resource Management
__Office of Conservation & Coastal Lands
__Land Division –

FROM: for Morris M. Atta
SUBJECT: Pre-consultation for draft environmental assessment for proposed off-site sewer line for Queen Lili'uokalani Village
LOCATION: Kailua-Kona, Hawaii TMK: (3) 7-4-21:20 & 21
APPLICANT: Belt Collins Hawaii Ltd.

Transmitted for your review and comment on the above referenced document. We would appreciate your comments on this document. Please submit any comments by August 27, 2008.

If no response is received by this date, we will assume your agency has no comments. If you have any questions about this request, please contact my office at 587-0433. Thank you.

Attachments

( ) We have no objections.
( ) We have no comments.
(X) Comments are attached.

Signed: _____
Date: 8/21/08

DEPARTMENT OF LAND AND NATURAL RESOURCES
ENGINEERING DIVISION

LD\MorrisAtta
REF.:PreConDEAOffsiteSewerQueenLiliuokalani
Hawaii.403

COMMENTS

( ) We confirm that the project site, according to the Flood Insurance Rate Map (FIRM), is located in Flood Zone ___.

(X) **Please take note that the project site, according to the Flood Insurance Rate Map (FIRM), is located in Flood Zone X. The National Flood Insurance Program does not have any regulations for developments within Zone X.**

( ) Please note that the correct Flood Zone Designation for the project site according to the Flood Insurance Rate Map (FIRM) is ___.

( ) Please note that the project must comply with the rules and regulations of the National Flood Insurance Program (NFIP) presented in Title 44 of the Code of Federal Regulations (44CFR), whenever development within a Special Flood Hazard Area is undertaken. If there are any questions, please contact the State NFIP Coordinator, Ms. Carol Tyau-Beam, of the Department of Land and Natural Resources, Engineering Division at (808) 587-0267.

Please be advised that 44CFR indicates the minimum standards set forth by the NFIP. Your Community's local flood ordinance may prove to be more restrictive and thus take precedence over the minimum NFIP standards. If there are questions regarding the local flood ordinances, please contact the applicable County NFIP Coordinators below:

( ) Mr. Robert Sumitomo at (808) 768-8097 or Mr. Mario Siu Li at (808) 768-8098 of the City and County of Honolulu, Department of Planning and Permitting.

( ) Mr. Kelly Gomes at (808) 961-8327 (Hilo) or Mr. Kiran Emler at (808) 327-3530 (Kona) of the County of Hawaii, Department of Public Works.

( ) Mr. Francis Cerizo at (808) 270-7771 of the County of Maui, Department of Planning.

( ) Mr. Mario Antonio at (808) 241-6620 of the County of Kauai, Department of Public Works.

( ) The applicant should include project water demands and infrastructure required to meet water demands. Please note that the implementation of any State-sponsored projects requiring water service from the Honolulu Board of Water Supply system must first obtain water allocation credits from the Engineering Division before it can receive a building permit and/or water meter.

( ) The applicant should provide the water demands and calculations to the Engineering Division so it can be included in the State Water Projects Plan Update.

( ) Additional Comments:_____

( ) Other:_____

Should you have any questions, please call Ms. Suzie S. Agraan of the Planning Branch at 587-0258.

Signed: _____
ERIC T. HIRANO, CHIEF ENGINEER

Date: 8/21/08

LINDA LINGLE
GOVERNOR

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

BRENNON T. MORIOKA
DIRECTOR

Deputy Directors
MICHAEL D. FORMBY
FRANCIS PAUL KEENO
BRIAN H. SEKIGUCHI

RECEIVED
2008 AUG 20 PM 1:47
BELT COLLINS HAWAII

IN REPLY REFER TO:

STP 8.2967

August 14, 2008

Mr. Glen T. Koyama
Belt Collins Hawaii Ltd.
2153 North King Street, Suite 200
Honolulu, Hawaii 96819-4554

Dear Mr. Koyama:

Subject: Queen Liliuokalani Village Off-Site Sewer Line
Pre-Environmental Assessment
TMK: 7-4-21: 20 and 21

Thank you for requesting the Department of Transportation's (DOT) review of the subject project.

The proposed project to install a 3,800-foot temporary sewer line will not significantly impact any State highway facilities.

The DOT appreciates the opportunity to provide comments.

Very truly yours,

BRENNON T. MORIOKA, PH.D., P.E.
Director of Transportation

RECEIVED
2008 SEP 10 PM 2:12
BELT COLLINS HAWAII

LINDA LINGLE
GOVERNOR OF HAWAII

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

RUSSELL Y. TSUJI
FIRST DEPUTY

KEN C. KAWAHARA
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

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

September 8, 2008

Mr. Glen Koyama
Belt Collins Hawaii Ltd.
2153 North King Street, Suite 200
Honolulu, Hawaii 96734

LOG NO: 2008.3533
DOC NO: 0809TD11
Archaeology

Dear Mr. Koyama:

Subject: **Pre-Consultation for an Environmental Assessment (EA)**
Off-Site Sewer Line for Queen Lili`uokalani Village
Keahuolu Ahupua'a, North Kona District, Island of Hawai'i
TMK: (3) 7-4-21: 20 & 21

Thank you for providing notice of your intent to complete an EA for the subject project, which involves an approximately 3,800 foot temporary sewer line between Keanalehu Drive and Queen Lili`uokalani Village. The bulk of the project is within parcel 21, which was formerly TMK 7-4-08: 65. This parcel was included in the 950-acre project area identified as the Kealakehe Planned Community, and has been subjected to an archaeological inventory survey (Donham 1990). The portion of the project within parcel 20 was formerly TMK 7-4-08: 56, and was also surveyed as part of a larger project area in 1990.

Due to the scale at which site locations were mapped during the 1990 surveys, it is difficult to determine which sites, if any are actually within or near the proposed alignment. We request that an archaeological field inspection of the proposed corridor alignment be conducted as part of EA preparation, in order to verify the location of previously recorded archaeological sites, and to ascertain whether previously unidentified sites might be present within the project area. Once this information is available, we would then be able to determine whether mitigation (preservation or data recovery) is warranted.

If you have any questions or would like to discuss this project further, please contact Theresa Donham at (808) 981-2979.

Aloha,

Nancy A. McMahon

Nancy McMahon, Deputy SHPO/State Archaeologist
and Historic Preservation Manager
Historic Preservation Division

Harry Kim
Mayor

Christopher J. Yuen
Director

Brad Kurokawa, ASLA LEED® AP
Deputy Director

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2008 AUG 22 PM 1:52
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County of Hawaii
PLANNING DEPARTMENT
101 Pauahi Street, Suite 3 • Hilo, Hawaii 96720-4224
(808) 961-8288 • FAX (808) 961-8742

August 20, 2008

Mr. Glen Koyama
Belt Collins Hawaii Ltd.
2153 North King Street, Suite 200
Honolulu, Hawaii 96819-4554

Dear Mr. Koyama:

Subject: Pre-Consultation for Draft Environmental Assessment
Project: Off-Site Sewer Line for Queen Liliuokalani Village
Tax Map Key: 7-4-021:20 and 21

This is in response to your letter, dated August 7, 2008, in which you requested preliminary input regarding the proposed project. We understand that the proposed project includes the construction of a 3,800-foot long temporary sewer line from Queen Liliuokalani Village to Keanalehu Drive, of which approximately 960 feet of the line will be permanent.

The proposed sewer line will be partially located in each of TMKs 7-4-021:020 and 21, which are both owned by the State of Hawaii. The project areas of the parcels are situated in the State Land Use Agricultural and Urban districts. The zoning by Hawaii County is Agriculture A-5a and Residential (RS-15). According to the County of Hawaii's General Plan Land Use Pattern Allocation Guide Map, the parcels are designated as Urban Expansion and Low-Density Urban. The property is not located within the Special Management Area, and as such, is not subject to review against the SMA guidelines by the Planning Department.

Please provide this office with a copy of the Environmental Assessment upon its publication. Should you have questions, please feel welcome to contact Dana Okano of my staff at 961-8288.

Sincerely,

CHRISTOPHER J. YUEN
Planning Director

DO:cs
P:\public\wpwin60\Dana\EA - EIS\Belt Collins for DEM 7-4-21-20&21 Pre-DEA.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

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2008 SEP -5 PM 3:05
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September 3, 2008

Mr. Glen T. Koyama
Belt Collins Hawaii, Ltd.
2153 North King Street, Suite 200
Honolulu, HI 96819

PRE-ENVIRONMENTAL ASSESSMENT CONSULTATION
PROPOSED OFF-SITE SEWER LINE FOR QUEEN LILIUOKALANI VILLAGE
TAX MAP KEY 7-4-021:020 AND 021

We have reviewed the subject Pre-Environmental Assessment Consultation and have the following comments.

Please be informed that there is an existing 12-inch ductile iron water main within Palani Road at the proposed sewer line crossing on Palani Road. The Department has no objection to the project; however, the proper vertical clearances between the sewer line and water main must be maintained as per our Water System Standards. Construction plans for the sewer line crossing must also be submitted to the Department for review and approval.

Should there be any questions, you may contact Mr. Finn McCall of our Water Resources and Planning Branch at 961-8070, extension 255.

Sincerely yours,

Milton D. Pavao, P.E.
Manager

FM:dfg

The Department of Water Supply is an Equal Opportunity provider and employer. To file a complaint of discrimination, write: USDA, Director, Office of Civil Rights, Room 326-W, Whitten Building, 14th and Independence Avenue, SW, Washington DC 20250-9410. Or call (202) 720-5964 (voice and TDD)

Harry Kim
Mayor

Lawrence K. Mahuna
Police Chief

Harry S. Kubojiri
Deputy Police Chief

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2008 AUG 26 PM 1:38
BELT COLLINS HAWAII

County of Hawaii

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

August 21, 2008

Mr. Glen T. Koyama
Belt Collins Hawaii Ltd.
2153 North King Street, Suite 200
Honolulu, Hawaii 96819-4554

Dear Mr. Koyama:

SUBJECT: Environmental Assessment
Proposed Off-Site Sewer Line for Queen Liliuokalani Village
Kailua-Kona, Hawaii, TMK (3) 7-4-21:20 and 21

This is in response to your letter dated August 7, 2008, soliciting any comments in reference to the above-referenced project.

Staff has reviewed the Environmental Assessment and has no comments or objections to offer at this time.

Sincerely,

LAWRENCE K. MAHUNA
POLICE CHIEF

HENRY J. TAVARES JR.
ASSISTANT POLICE CHIEF
AREA II OPERATIONS

CB:dmv

GTK

Harry Kim
Mayor

Darryl J. Oliveira
Fire Chief

Glen P.I. Honda
Deputy Fire Chief

RECEIVED
2008 AUG 25 PM 2: 29
BELT COLLINS HAWAII

County of Hawai'i

HAWAI'I FIRE DEPARTMENT
25 Aupuni Street • Suite 103 • Hilo, Hawai'i 96720
(808) 981-8394 • Fax (808) 981-2037

August 20, 2008

Belt Collins Hawaii Ltd.
2153 North King Street
Suite 200
Honolulu, Hawaii 96819

SUBJECT: ENVIRONMENTAL ASSESSMENT
PROPOSED OFF-SITE SEWER LINE FOR
QUEEN LILIUOKALANI VILLAGE
TAX MAP KEY: (3) 7-4-021:020 AND 21, KAILUA-KONA

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

DARRYL OLIVEIRA
Fire Chief

GN:lpc

APPENDIX B

ARCHAEOLOGICAL SURVEY

PHRI **Paul H. Rosendahl, Ph.D., Inc.**
Archaeological • Historical • Cultural Resource Management Studies & Services
224 Waianuenue Avenue • Hilo, Hawai'i 96720 • (808) 969-1763 • FAX (808) 961-6998
P.O. Box 23305 • G.M.F., Guam 96921 • (671) 472-3117 • FAX (671) 472-3131

Letter Report 2697-011408

January 23, 2008

John Chung, P.E.
Belt Collins Hawaii, Ltd.
2153 North King Street, Suite 200
Honolulu, Hawai'i 96819-4554

Subject: Relocation, Flagging, and Plotting of Archaeological Sites and Sample Blocks
Queen Liliuokalani Village Offsite Sewer Project
Land of Keahuolu, North Kona District
Island of Hawai'i (TMK:3-7-4-08)

Dear Mr. Chung:

At your request, for Belt Collins Hawaii Ltd., on behalf of the County of Hawaii, Paul H. Rosendahl, Ph.D., Inc. (PHRI) conducted relocation, flagging, and plotting of significant archaeological sites and sample blocks at the Queen Liliuokalani Village Offsite Sewer Project, located in Keahuolu, North Kona District, Island of Hawai'i (TMK:3-7-4-08). More specifically, PHRI conducted the following: (a) relocated, flagged, and plotted Sites 13222, 13223, 13224, 13228, 13428, and 13430; and (b) established the general locations and boundaries of previously designated data recovery sample blocks (two blocks, both designated "F")(*Figure 1*, at end). The purpose of the work was to assist in establishing a suitable route for placement of a sewer line; such a route would circumvent the archaeological sites, including sites in the sample blocks, thereby assuring that no archaeological sites would be affected by construction of the sewer line. The project was conducted in association with filing of Hawai'i County grading and grubbing permits, and possibly other permits for the project area.

All of the sites had been previously identified during the course of two archaeological inventory surveys conducted in 1990 (Donham 1990a,b), at which time they were initially assessed for significance and initial recommended treatments were established. The reports on the surveys were approved by the SHPD in a letter dated 2/11/93 (to P. Rosendahl, PHRI, from D. Hibbard, SHPD). All sites were later included in a subsequent mitigation plan (Jensen et al. 1992), which established a sample block strategy to collect information from the project area. The mitigation plan, which includes an amendment (PHRI Letter 1152-052493), was approved in December 1993 (SHPD approval letter of 12/21/93, Log 10361, Doc. 9312RC02). *Table 1* (at end) summarizes the sites in terms of site type, feature function, and final general significance assessments, and recommended general treatments.

Based on discussions with the client concerning the work requirements, a preliminary review of prior archaeological work done by PHRI, that included the subject project area, and our familiarity with both the general project area and the current regulatory review requirements of the State Historic Preservation Division (SHPD) and the Hawai'i County Planning Department (HCPD), the following scope of work was determined to be appropriate for the current project:

1. Conduct appropriate background review and research of readily available archaeological and other relevant literature;

2. Mobilization – including all field work preparations, field crew travel time, and demobilization;

3. Fieldwork – relocate, flag, and reconsider evaluations for all data recovery sites, and determine the locations of Sample Block "F" limits;

4. Fieldwork – assist professional land surveyors (to be provided) in the recognition and accurate plotting of the sites and limits;

5. Analyze all field and other relevant data;

6. Prepare a short written summary report documenting the relocation and plotting project activities; and

7. Coordinate and consult with client, client representatives, agency staff, etc. (as appropriate and/or required).

The project area is on the leeward side of Hawai'i Island in Keahuolu Ahupua'a (a very short segment of the corridor extends into Kealakehe Ahupua'a). The project area is bounded on the north by the *ahupua'a* of Kealakehe, on the east by land belonging to Hawaiian Homes Land, on the south and southeast by Palani Road, and on the east by the remainder of Keahuolu Ahupua'a. The area lies along the western slope of Mt. Hualalai. Hualalai Series flows form the surface mantle. These flows are composed primarily of alkalic olivine basalt (Macdonald, Abbott, and Peterson 1983:366). Specifically, the flows consist of *pāhoehoe* flats, fissures, and upthrusts, with collapsed blisters and tubes interspersed with fingers of *'a'ā* that are generally oriented east-west. Although the topography of the flows is rough in places, the overall aspect is a gradual slope from east to west. Elevation in the project area is approximately 600 ft, and annual median rainfall within the project area is approximately 20-40 inches.

Predominant tree species within the general area are *kiawe* (*Prosopis pallida* [Humb. And Bonp. Ex Willd.] HBK), *koa-haole* (*Leucaena leucocephala* [Lam.] de Wit), *alahe'e* (*Canthium odoratum*), and Christmas-berry (*Schinus terebinthifolius* Raddi). Understory plants consist predominantly of lantana (*Lantana camara* L.), *kolu* (*Acasis farnesiana* [L.] Willd.), *'ilima* (*Sida cordifollia* L.), fountain grass (*Pennisetum setaceum* [Forsk.] Chiov.), California grass, (*Brachiaria mutica* [Forsk.] Stapf), Jamaica vervain (*Stachytarpheta jamaicensis* [L.] Vahl), and airplant (*Bryophyllum pinnatum* [Lam.] Kurz).

There are three soil/substrate types in the project area: (a) bare *pahoehoe* lava flows (rLW), (b) bare 'a'ā lava flows (rLV), and (c) Punaluu extremely rocky peat (6-20% slopes), representing the Punaluu series of well-drained, thin organic soils that have developed over *pahoehoe* lava bedrock; they are found on uplands and are rapidly permeable, with slow run-off, and a slight erosion hazard (Sato et al. 1973:48). Types rLV and rLW predominate.

The fieldwork for the current project was conducted on August 6 through September 12, 2007 by PHRI Supervisory Archeologist Alan B. Corbin, M.A., assisted by Field Technician Leonard Kubo, B.A. The initial stage of site relocation involved searching for the sites based on the study of previously compiled site maps, overall project maps, and aerial photos. If the site could not be located by this method, a further methodology was employed: using distance and bearings from known points, compass and tape were used in the field to establish a central point that would be in the site's probable vicinity. This vicinity was then searched. If the site still was not found, a circular grid was established from the point; using tape

and compass the surveyors radiated out 60 meters from the point, systematically walking transects in all directions. This eventually resulted in the location of all sites.

The vegetation in almost all areas was very dense, making site relocation extremely difficult. When sites were relocated they were flagged with white-and-red striped flagging. Then, to enable quick relocation, all sites were connected to at least one other site or to flagged access trails leading to Palani Road. Subsequently, on September 12, 2007, all relocated sites were plotted (using GPS equipment) by personnel of Towill, Shigeoka. An accurate map was then compiled (*Figure 1*).

Figure 1 depicts the GPS locations of sites relative to two possible sewer line alignments (Alignments A and B). You have indicated that Alignment B is the preferred alignment (e-mail from J. Chung to P. Rosendahl dated Oct. 30, 2007, 9:50 AM). The only site that appears to be near the Alignment B is Site 13222, which is in the corner of Sample Block F (Jensen 1992,p.4). You will recall that in an e-mail sent to you on November 13, 2007 (from L. Kubo, 1:19 PM) PHRI indicated that if a portion of Site 13222 is found to be within the corridor, either of two options would be suitable: (1) the corridor can be slightly adjusted to avoid the portion, or (2) Sample Block F could be slightly adjusted to exclude the site portion. The former option would be more desirable. The latter option was deemed feasible because Site 13222 consists of a large group of primarily agricultural mounds that are ubiquitous throughout Sample Block F, and a slight movement of the block would not in any significant way affect the overall sample. You indicated subsequently that Alignment B would be staked and walked to confirm field conditions (e-mail from J. Chung, to L. Kubo dated Nov. 13, 2007, 1:20 PM).

Based on the current site relocation fieldwork, PHRI concludes that Alignment B is a feasible corridor for sewer line placement, and if the above-noted placement suggestions are followed, the corridor should have no detrimental effect on archaeological sites in the vicinity.

Sincerely yours,

Paul H. Rosendahl

Paul H. Rosendahl, Ph.D.
President and Principal
Archaeologist

LK/lk

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Table 1. Summary of General Significance Assessments and Recommended General Treatments

SIHP Site Number	Formal Site Type	Tentative Functional Interpretation	Significance Category					General Recommendations			
			A	B	C	D	E	FDC	NFW	PID	PAI
13222	Complex: 15 mounds, four *pāhoehoe* excavations	Agriculture/quarry	-	-	-	+	-	+	-	-	-
13223**	Complex: an enclosure, 2 platforms, a terrace, cleared depressions	Agricultural/habitation	-	-	-	+	-	+	-	-	-
13224	Complex: terrace, 19+ *pāhoehoe* excavations, 8 rock mounds	Agriculture	-	-	-	+	-	+	-	-	-
13228	Enclosure	Indeterminate/poss. ceremonial	-	-	*	+	-	+	-	+	-
13428	Complex: 5 faced mounds, an alignment, a platform, a terrace, 10 rock mounds, and 25 *pāhoehoe* excavations	Agricultural	-	-	-	+	-	+	-	-	-
13430	Complex: Platform, 8 mounds, collapsed blister, 5 *pāhoehoe* excavations	Agriculture/habitation	-	-	-	+	-	+	-	-	-

General Significance Categories:

A = Important for historical contribution to significant events and/or broad patterns of history

B = Important for association with the lives of important individuals in history

C = Excellent example of site type at local, region, island, State, or National level

D = Important for information content

E = Culturally significant

Recommended General Treatments:

FDC = Further data collection necessary (detailed recording, surface collections, and limited excavations, and possibly subsequent data recovery/mitigation excavations)

NFW = No further work of any kind necessary, sufficient data collected, no preservation potential

PID = Preservation with some level of interpretive development recommended (including appropriate related data recovery work)

PAI = Preservation "as is", with no further work (and possible inclusion into landscaping), or possibly minimal further data collection necessary

***=Tested negative for presence of human skeletal remains under PHRI Project 2688*

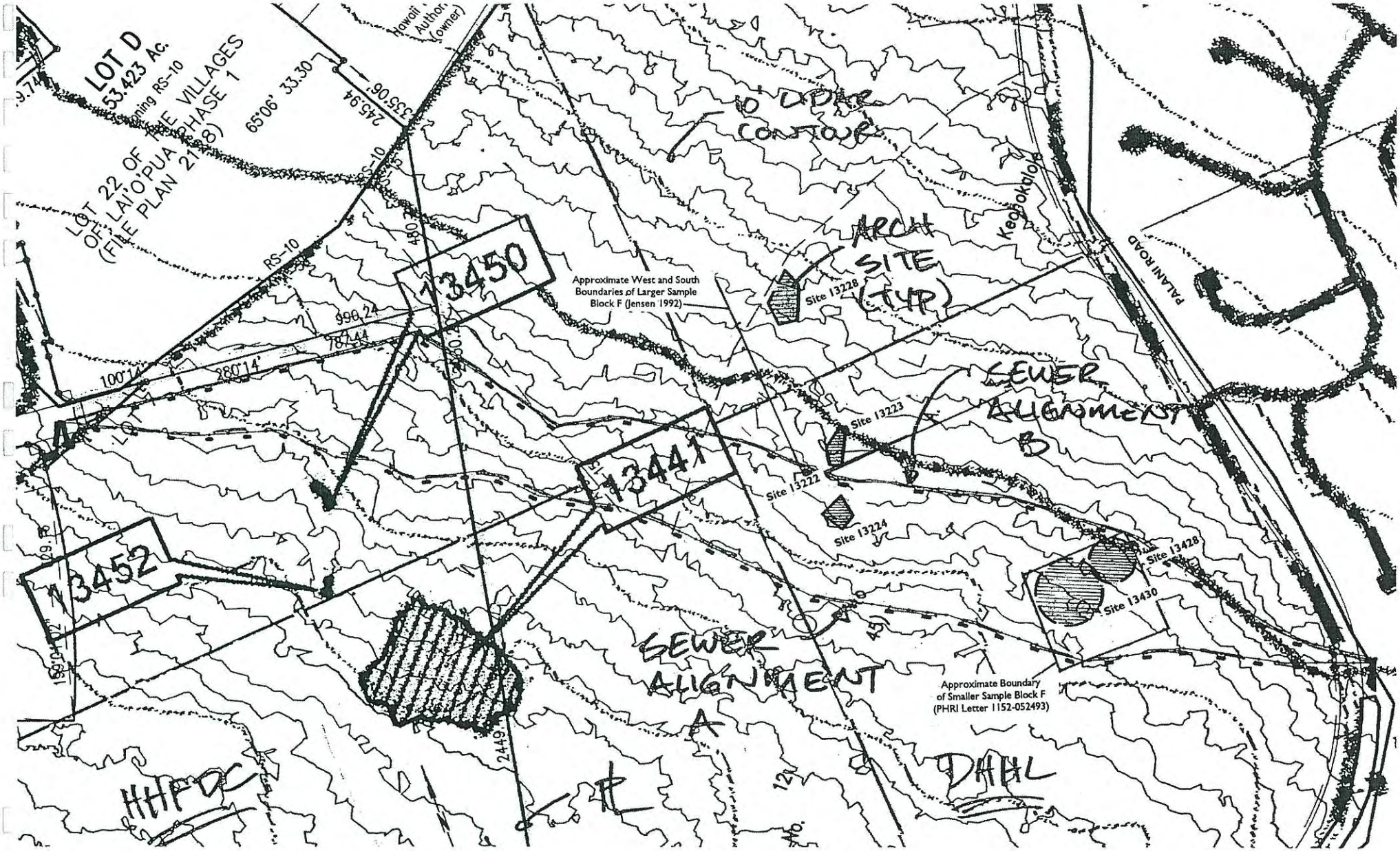

Figure 1. Project Area, Site Locations, and Sewer Line Alignments

APPENDIX C

CULTURAL IMPACT ASSESSMENT

Report 2742-070108

Cultural Impact Assessment Queen Liliuokalani Village Offsite Sewer Project

Land of Keahuolu, North Kona District Island of Hawai'i (TMK:3-7-4-21:20&21)

BY

PHRI (Paul H. Rosendahl, Ph.D., Inc.

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JULY 2008

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INTRODUCTION

BACKGROUND

This Cultural Impact Assessment report has been prepared by Paul H. Rosendahl, Ph.D., Inc. (PHRI) at the request of Mr. Glen Koyama of Belt Collins Hawaii, Ltd., on behalf of his client, Queen Liliuokalani Trust (QLT). The report is connected with the preparation of environmental studies, engineering, and permit applications for the Queen Liliuokalani Village Offsite Sewer Project in the Land of Keahuolu, North Kona District, Hawai'i Island. The project area consists of a sewer line corridor extending northwest-southeast for approximately 15,000 feet, between Palani Road and the south end of the existing section of Keohokalole Highway, in the Villages of Laiopua, in the adjacent Land of Kealakehe (*Figures 1 and 2*). The overall objective of the current project was to comply with the historic preservation requirements of the Hawai'i State Historic Preservation Division (SHPD).

SCOPE OF WORK

Based on (a) project specifications provided by Belt Collins Hawaii, (b) prior PHRI work within the Land of Keahuolu and vicinity, and (c) PHRI's familiarity with both the general project area and the current regulatory review requirements of the SHPD and the Hawai'i County Planning Department (HCPD), the following tasks were determined to constitute an adequate scope of work:

1. Conduct (a) appropriate archaeological and historical documentary background review and research, including information from archeological survey and cultural impact assessment studies prepared recently by PHRI for the Ana Keohokalole Highway project in the Lands of Keahuolu and Kealakehe (PHRI Report 2650-071307; Corbin and Wong-Smith 2008) and for an EIS in support of a State housing project in the Land of Keahuolu (PHRI Report 2667-101907; Corbin and Wong-Smith 2007), and (b) identification of and consultation with appropriate local informants and agency staff;

2. Conduct informal (non-taped) interviews with identified knowledgeable informants;

3. Preparation of draft and final reports; and

4. Coordination and consultation with client, client representatives, local informants, agency staff, etc.

PURPOSE, GOALS, AND OBJECTIVES

The purpose of this cultural impact assessment is to comply with the requirements of *Chapter 343 (Haw. Rev. Stat.),* as amended by H.B. No.2895 H.D. 1 of the Hawai'i State Legislature (2000) and approved by the Governor as *Act 50* on April 26, 2000, and which among other things requires that environmental assessments (EA) and environmental impact statements (EIS) identify and assess the potential effects of any proposed project upon the "...cultural practices of the community and State...." *Chapter 343 (Haw.Rev.Stat.)* was amended by the State legislature because of the perceived need to assure that the environmental review process explicitly

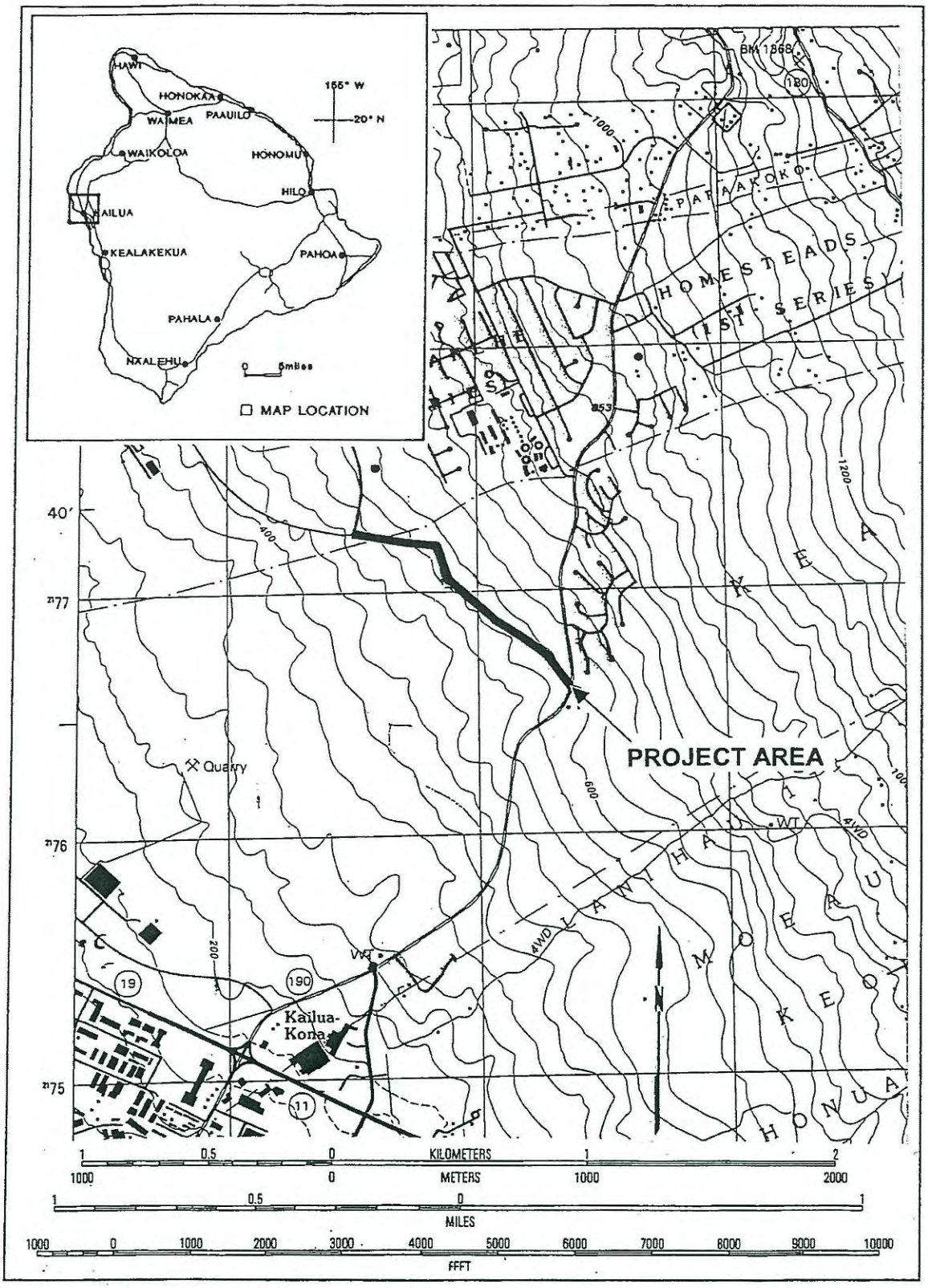

Figure 1. Project Location

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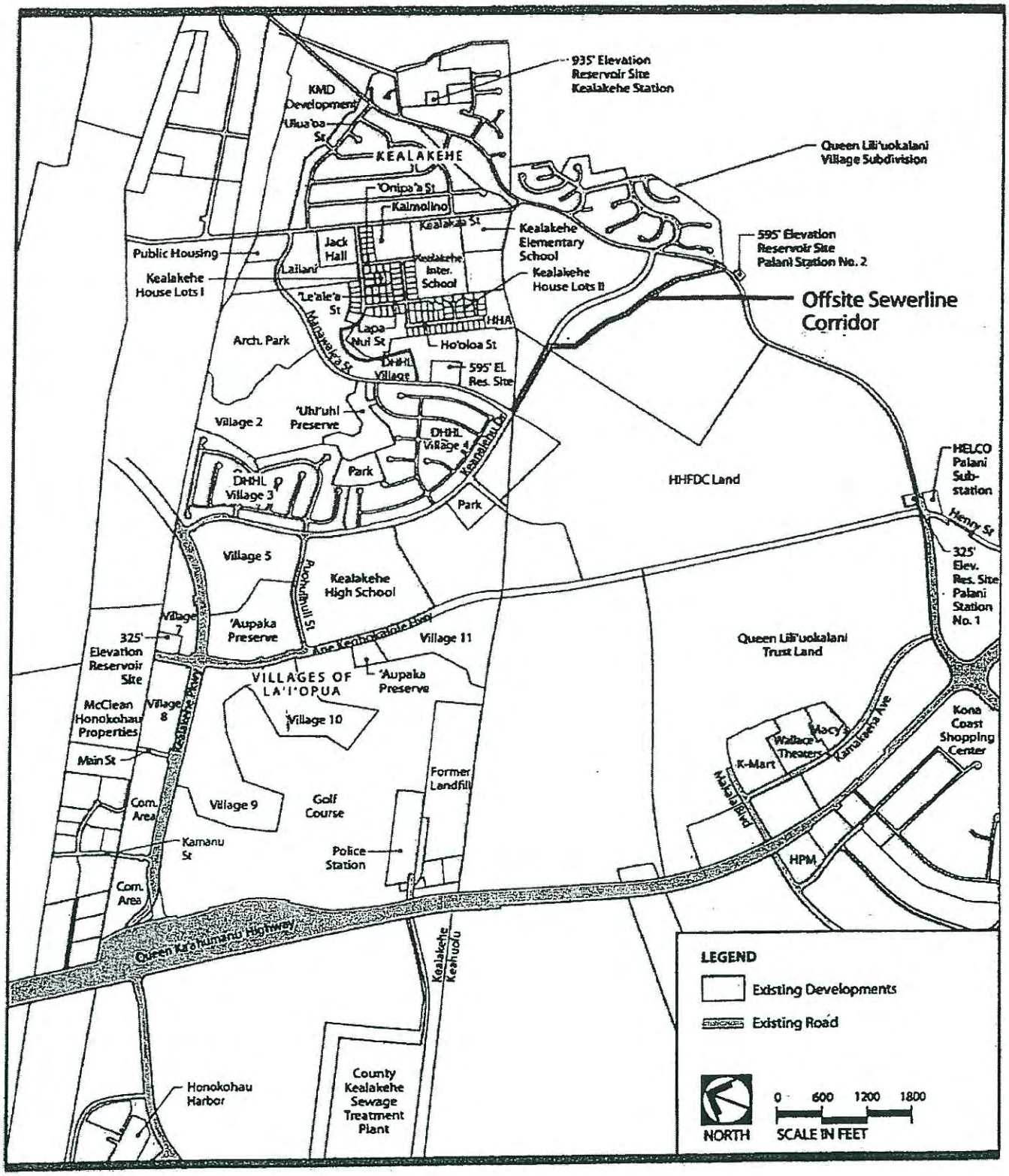

Figure 2. Project Area in Relation to Existing Development

addressed the potential effects of any proposed project upon "...Hawai'i's culture, and traditional and customary rights." Guidelines previously prepared and adopted by the State Office of Environmental Quality Control[1] provide compliance guidance. Both *Act 50* and the OEQC *Guidelines for Assessing Cultural Impacts* mandate consideration of all the different groups comprising the multi-ethnic community of Hawaii. This inclusiveness, however, is generally understated, and the emphasis – as indicated by a background review of the cultural impact assessment issue (*Appendix A*), and the intent and evolution of both the legislative action and the guidelines – is clearly meant to be primarily upon aspects of Native Hawaiian culture – particularly traditional and customary access and use rights.

Cultural resources include a broad range of often overlapping categories of cultural items – places, behaviors, values, beliefs, objects, records, stories, and so on. A traditional cultural property ("TCP") is a historic property or place that is important because it possesses "traditional cultural significance":

> "Traditional" in this context refers to those beliefs, customs, and practices of a living community of people that have been passed down through the generations, usually orally or through practice. The traditional cultural significance of a historic property, then, is significance derived from the role the property plays in a community's historically rooted beliefs, customs, and practices....A traditional cultural property, then, can be defined generally as one that is...[important/significant]...because of its association with cultural practices or beliefs of a living community that (a) are rooted in that community's history, and (b) are important in maintaining the continuing cultural identity of the community[2].

In addition, it is important to realize that sometimes a traditional cultural property may not have a visible physical manifestation:

> Although many traditional cultural properties have physical manifestations that anyone walking across the surface of the earth can see, others do not have this kind of visibility, and more important, the meaning, the historical importance of most traditional cultural properties can only be evaluated in terms of the oral history of the community[3].

There are at least two significant differences that distinguish traditional cultural properties as a subset within the larger sphere of cultural resources. First, while cultural resources such as practices and beliefs may be spatially associated with general types of geographical areas, such as the exposed lava lands of the Keahole Point area, a traditional cultural property is a specific physical entity or feature with a definable boundary, such as a specific location within the current project site. Second, while cultural resources such as practices and beliefs can include general cultural behaviors such as the gathering of various natural resources for general subsistence, industrial, or ceremonial uses, a traditional cultural property is a specific place or feature directly associated with specific behaviors the continuity of which over time, in either actual practice or remembrance, can be demonstrated.

Based on these two significant distinctions, it is possible to suggest three types of practitioner claims relating to cultural practices, beliefs, and features that are likely to be encountered in the

---

[1] OEQC (1997)
[2] Parker and King (1990)
[3] Sebastian (1993)

course of conducting a cultural impact assessment study. These claims can be referred to as (a) traditional cultural property claims, (b) traditional and customary cultural practice claims, and (c) contemporary or neo-traditional cultural practice claims.

Traditional cultural property claims would be those which lie within the purview of the current historic preservation review process (DLNR 2002a,b); that is, they are claims involving the traditional practices and beliefs of a local ethnic community or members of that community that (a) are associated with a definable physical property (an entity such as a site, building, structure, object, or district), (b) are founded in the history of the local community, (c) contribute to the maintenance of the cultural identity of the community, and (d) demonstrate a historical continuity of practice or belief up to the present–through either actual practice or historical documentation. Furthermore, to qualify as a legitimate traditional cultural property within the historic preservation context, a potential traditional cultural property must be able to demonstrate its historical significance in terms of established evaluation criteria, such as those of the National Register of Historic Places and/or the Hawai'i Register of Historic Places.

Traditional and customary cultural practice claims would be those native Hawaiian claims which lie within the purview of Article XII, Section 7, of the Hawai'i State Constitution ("Traditional and Customary Rights"), and various other state laws and court rulings, particularly as reaffirmed in 1995 by the Hawai'i State Supreme Court in the decision commonly referred to as the "PASH decision," and as further clarified more recently in its 1998 decision in State of Hawai'i v. Alapa'i Hanapi and its 2000 decision in Ka Pa'akai o Ka 'Aina et al. v. Land Use Commission, State of Hawai'i et al. The notable points of the decisions in PASH and in Hanapi can be summarized as follows: (a) the reasonable exercise of ancient Hawaiian usage is entitled to protection under Article XII, Section 7 of the Hawai'i State Constitution; and (b) those persons claiming their conduct is constitutionally protected must prove that they are a native Hawaiian as defined in PASH, that the claimed right is constitutionally protected as a traditional or customary native Hawaiian practice, and that the exercise of the right is occurring on undeveloped or less than fully developed property. Ka Pa'akai generally reaffirms the same points as in the PASH and Hanapi decisions and, in addition, (a) indicates the explicit responsibility of the regulatory agency involved in any application review to arrive at affirmative and substantive conclusions regarding potential impacts upon traditional and customary native Hawaiian cultural practices and resources, and (b) suggests an "analytical framework" for the identification of and potential impacts upon any such cultural practices and resources.

Traditional native Hawaiian cultural practices can be categorized as two general types: (a) practices with active behaviors involving both observable activities with material results and their inherent values or beliefs; and (b) practices with more passive behaviors that seek to produce nonmaterial results. The former type of behaviors – practices with active behaviors, for example, would involve practices like the gathering and collecting of different animal and plant resources for various purposes, such as subsistence, medicinal, adornment, social, and ceremonial possibly other uses. Uses such as these usually have associated beliefs and values (both explicit and implicit) relating to a pervasive general theme that flows throughout traditional native Hawaiian culture and binds it together. To native Hawaiians, the natural elements of the physical environment–the land, sea, water, winds, rains, plants, and animals, and their various embodied spiritual aspects–comprise the very foundation of all cultural life and activity – subsistence, social, and ceremonial; to native Hawaiians, the relationship with these natural elements is one of family and kinship. The latter type of behaviors – practices with more passive behaviors – involves more experiential activities focused on "communing with nature"; that is, behaviors relating to spiritual communication and interaction that reaffirm and reinforce familial and kinship relationships with the natural environment.

While traditional cultural property claims, as defined above, would certainly fall within the general domain of traditional and customary cultural practice claims, not all traditional and customary cultural practice claims would necessarily qualify as traditional cultural property claims. Traditional and customary cultural practice claims subsume a broad range of cultural practices and beliefs associated with a general geographical area or region, rather than a clearly definable property or site–for example, the gathering of marine resources from along a section of shoreline for traditional subsistence or ceremonial purposes, in contrast to the gathering of a specific marine resource species for a specific use by current generation members of a family that had obtained the same resource from the same recognized site for several generations.

Contemporary, or "neo-traditional", cultural practice claims overlap with neither traditional property claims nor traditional and customary practice claims. Contemporary cultural practice claims would be those made by cultural practitioners relating to current practices or beliefs for which no clear specific historical basis in traditional culture can be clearly established or demonstrated; for example, the conducting of ritual ceremonies of uncertain authenticity at sites or features for which no such prior use can be demonstrated.

The specific purpose of the present cultural impact assessment study is to assess the potential impacts of the proposed project upon the cultural resources – the practices, features and/or beliefs – of native Hawaiians or any other ethnic group that might be associated with project area. To accomplish this purpose, several specific objectives were established:

1. Identify any native Hawaiian or other ethnic group cultural practices currently being conducted by individual cultural practitioners or groups;

2. Collect sufficient information so as to define the general nature, location, and authenticity of any identified cultural practices;

3. Assess the potential impacts of the proposed project upon identified cultural practices; and

4. Recommend appropriate mitigation measures for any potentially adverse impacts upon identified cultural practices.

Thus, the overall goal or objective of the present cultural impact assessment study was to identify any native Hawaiian or other cultural practices currently being conducted within or immediately adjacent to the present project area that might potentially be in some manner constrained, restricted, prohibited, or eliminated if the proposed project were to be approved. The types of practices to be identified would be inclusive; that is, claims for all three types of practices – traditional cultural property, traditional and customary cultural practices, and contemporary cultural practices – would be identified and considered. More specifically, the objectives of the cultural impact assessment were to determine the following: (a) if the project area is currently being accessed by native Hawaiian cultural practitioners for any traditional and customary cultural uses; (b) if the proposed project would have any adverse impacts upon any identified current native Hawaii cultural uses of the area; and (c) what measures might be proposed to mitigate any adverse impacts the proposed project might have upon any identified current native Hawaiian uses of the area. The present study scope and methodology is discussed in detail in relation to cultural impact assessment issues and the OEQC guidelines in *Appendix A*.

CIA STUDY BY HELEN WONG-SMITH

Cultural Resources Specialist Helen Wong-Smith, M.A., conducted the current CIA study. Ms. Wong-Smith has extensive experience in historical documentary and informant research, having worked for many years as a Historical Researcher/Cultural Resources Specialist for PHRI. She is currently the Hawaiian and Pacific Collection Librarian at University of Hawaii at Hilo.

The informant research for this project initially involved compiling a list of potential informants for Keahuolu and Kealakehe, and its general vicinty. The list of potential informants was compiled by contacting informants known through past projects, and through inquiries with departments and cultural specialists such as Kepâ Maly, OHA, Ruby McDonald, and Keola Lindsey, formerly of the Hawaii Island SHPD office. One contact usually led to another until a list of over thirty potential informants was compiled (*Table 1*). The potential informants were contacted by phone and e-mail and those responsive were interviewed preliminarily to assess their potential to and willingness to provide information. To further assess informants, informants were asked to fill out written forms to answer some preliminary questions such as: Who are in your immediate family? What was your previous occupation and education? What is your family background? What are your residential ties? Do you know of any specific historic/cultural properties, practices, and/or beliefs relevant to the project area? This was followed up with phone conversations. Helen Wong-Smith then conducted further interviews with a few selected individuals who had potential to provide further information, and to provide further documentary information on the project area.

Table 1. List of Potential Informants

	Name	Status/Expertise	Affiliation
1	*Ruby P. Keana'aina McDonald*	Native Hawaiian, executive director	OHA, NAHKHAC
2	Elaine Watai	Native Hawaiian	KCA/SAFIS
3	Craig "Bo" Kahui	Native Hawaiian, president of organization	KCAVL
4	Wally Lau	Native Hawaiian, executive director	NPK
5	Reginald Lee	Native Hawaiian	DOCARE
6	Elizabeth Lee	Native Hawaiian, *lauhala* weaving master	
7	Michael Ikeda	Community Building Facilitator IV	QLCC
8	Mahealani Pai	Native Hawaiian, cultural specialist	BHI
9	J. Curtis Tyler III	Native Hawaiian, cultural resource specialist	KCDPSC
10	Geraldine Bell	Native Hawaiian, park superintendent	KHNHP, NAHKHAC
11	Kahu Akahai	Native Hawaiian, *kahu*, minister, pastor	MZCC
12	David Garcia	Counselor	QLCC
13	Clarence Medeiros, Jr.	Native Hawaiian, journeyman mason	
14	Lily Kong	Native Hawaiian	KOONKOK
15	Ulalia Ka'ai-Berman	Native Hawaiian, *kumu hula*	NAHKHAC
16	Taro Fujimori	Native Hawaiian	N/A
17	Zachary Kanuha	Native Hawaiian	N/A
18	Clement "Junior" Kanuha	Native Hawaiian	N/A
19	Raeanne Kahaiali'i	Native Hawaiian	N/A
20	Clarence Rapoza	Native Hawaiian	N/A
21	E. Kalani Flores	Native Hawaiian, *kumu olelo* Hawaii	HL-HCCW
22	Gail Souza-Save	General knowledge	QLCC
23	Lydia Mahi	General knowledge	KCDPSC,HCEOC
24	Arthur "Uncle Aka" Mahi	Native Hawaiian	N/A
25	Rae Ann (Fujimori) Godden	Native Hawaiian	N/A
26	Gloria Muraki	General knowledge	N/A
27	Violet Leihulu Mamac	General knowledge	N/A
28	Angel Pilago	Native Hawaiian	HCC
29	Kelly Greenwell	General knowledge	N/A
30	Michael Keala Ching	General knowledge	N/A
31	Iris Nalei Napaepae-Kunewa	General knowledge	N/A
32	Dr. Frank Sayre	General knowledge	N/A
33	Robert Kawaiula Brancp	General knowledge	N/A
34	Kahu Henry Kanoelani Boshard	Native Hawaiian, *kahu*, minister, pastor	MC
35	Kahu Brian Boshard	Native Hawaiian, *kahu*, minister, pastor	MC
36	Ka'ea Lyons Alapai	Native Hawaiian, *kumu olelo* Hawaii	KAPA, EHES

TABLE KEY:

Affiliation:

N/A	Not Available
KCA	Kealakehe Community Association
SAFIS	Salvation Army Family Intervention Services
OHA	Office of Hawaiian Affairs
QLCC	Queen Liliuokalani Children's Center
BHI	Bishop Holdings, Inc.
MZCC	Mauna Ziona Congregational Church
KHNHP	Kaloko-Honokōhau National Historical Park
NPK	Neighborhood Place of Kona
NAHKHAC	Na Hoapili o Kaloko Honokōhau Advisory Commission
KCAVL	Kaniohale Comm. Association at the Villages of La'I 'Ōpua
DOCARE	State of Hawaii DLNR – Department of Conservation and Resources Enforcement Division
KCDPSC	Kona Community Development Plan Steering Committee
KOONKOK	Ka 'Ohana O Na Kupuna O Kona
HCEOC	Hawaii County Economic Opportunity Council
HL-HCCW	Hawaiian Lifestyles – West Hawaii Community College
MC	Mokuaikaua Church
HCC	Hawaii County Council
KAPA	Kapa Radio
EHES	Ehunuikaimalino Hawaiian Immersion School

CULTURAL IMPACT ASSESSMENT STUDY

by Helen Wong-Smith, M.A., Cultural Resources Specialist with PHRI (Paul H. Rosendahl, Ph.D., Inc.)

ABSTRACT

This assessment is based on a review of a wide range of written material – archaeological reports, government and other historical records, Hawaiian language sources translated into English, and interviews with long-term residents, including native Hawaiians, familiar with the cultural history and resources of Keauholu. The research took place generally between August 2007 and April 2008 and utilized resources at the Hawai'i State Archives, Edwin H. Mo'okini Library of the University of Hawai'i-Hilo, the Hilo Public Library, the PHRI in-house library, online resources, and previous historical and cultural reports and interviews.

INTRODUCTION

Keahuolū has been written in several ways in historic records. In *Place Names of Hawai`i*[4] it is written as "Ke-ahu-o-Lu" and given the interpretive translation of "the heap [cairn] of Lu" without an explanation of who Lu may be. Tangaro translates the name as "Shrine of Lū, a legendary voyager" but does not provide a reference for this translation[5]. The place name has also been written "Ke-`ohu-`olu," which can be translated as "the cool mists." Kaiokekoa, a native Hawaiian resident of the Kekaha region relayed to Kepā Maly in 1994 he recalled his elders pronouncing the place name the second way[6].

Keahuolū is located in the *moku o loko* (district) of Kona, this northern section of Kona was divided into two regions, Kona kai `opua (Maly provides the interpretive translations "Kona of the distant horizon clouds above the ocean[7]) and Kekaha-wai-`ole (the waterless place). Kekaha-wai-`ole-o-nā-Kona spans from Kalaoa ahupua`a (Keāhole Point) to Kealakehe ahupua`a. Keahuolū is located just south of this section, as Keahuolū abuts Kealakehe. Kekaha is described as "a dry, sun-baked land[8]." Sheltered by the abrupt rise of Hualālai, Kekaha receives very little rain below the 1,000-ft elevation contour. Maly provides the following description of residential movement within Kekaha-wai-`ole-o-nā-Kona during the late 1800s and early 1900s in the Hawaiian Newspaper *Ke Hōkū o Hawai`i*:.

> "O ia ka wāe ne`e `ana ka lā iā Kona, hele a malo`o ka `āina i ka `ai kupakupa `ia e ka lā, a o nā kānaka, nā li`I o Kona, pūhe`e aku la a noho i kahakai kāhi o ka wai e ola ai nā kānaka. (It was during the season,

[4] Pukui, Elbert, and Mookini 1974
[5] Tangarō et al. 2006:19 A search in *Hawaiian Mythology* by Martha Beckwith revealed a voyager by the name of Kaulu but none by the name of Lū
[6] Maly IN Wulzen et al. 1996:12
[7] Maly IN O`Hare 1993:Appendix B1
[8] Kelly 1972:2

> when the sun moved over Kona, drying and devouring the land, that the chiefs and people fled from the uplands to dwell along the shore where water could be found to give life to the people[9].

Hawaiian authority and *kumu hula* Pualani Kanaka`ole Kanahele states: "This clearly communicates that the natives of Kekaha-wai-`ole-o-nā-Kona had great knowledge of their land's cycles and its productive abilities. There were springs and brackish water ponds inland from the shore and the ocean was abundant. They planted in the *ma uka* or upland forest and had sufficient amount of rain for their crop. When the rainy season passed, they camped at the shore, grew sweet potato, and fished. Their basic needs were satisfied[10]."

Kekaha has been streaked with ancient and recent (1801 and 1859) lava flows, which contribute to its desolate appearance. Emerson surveyed the area in the 1880s and his map (Reg. Map 1280) denotes "rough pahoehoe [*pāhoehoe],* little vegetation" within Keahuolū.

Ka`iwi Point is the boundary between Keahuolū and Kealakehe. Kanahele reports "Kaiwi Point houses a mamamo ko`a[11] [a shrine to increase the catch of *mamo* or sergeant fish *Abudefduf abdominalis*].

Mahaihale is the southern boundary of Keahuolū, some 1.8 km north of Kukailimoku Point – named after the deity of victory in battle. Between Kukailimoku and the Keahuolū boundary is a narrow strip of land belonging to *ahupua`a* of Lanihau reducing Keahuolū shoreline dramatically. Kukailimoku Pont and the surrounding sand dunes were used in both pre-contact and early historic periods as burial grounds. An 1883 map depicts graves at Kukailimoku and a larger cluster at Kaliliki Point to the south. The surveyor, Jackson, identified a massive masonry tomb as "Kamehameha's Tomb[12]." A 1930 survey identified graves in Lanihau and Keahuolū as do consequent surveys. Neller[13] reported four locations of exposed human remains at the Lanihau/ Keahuolū boundary, and historic period burials were identified at Pāwai Bay by Neighbor Island Consultants in 1973.

MO`OLELO `AINA: NATIVE TRADITIONS AND HISTORIC ACCOUNTS OF KEAHUOLŪ

Kekāhi Mo`olelo Hawai`i (Selected Hawaiian Traditions)

Legendary references to Keahuolū are few. In his report of a reconnaissance survey of the Old Kona Airport area, now a state park in Keahuolū, Earl Neller erroneously ascribes the O'ahu chief Kuali'i to Keahuolū:

> The area around the old Kona airport may also have some connection with the legendary Hawaiian chief Kuali'i. He was said to have been born at Kalapawai in Kailua, and defied the oppression of Lono-ikaika during

[9] Hawaiian orthography will be employed by this author except when directly quoting. For this reason many of the quotations will lack diacritical and other marks as they are presented verbatim.
[10] Kanehele 2001:4
[11] Kanahele 2001:10
[12] Neller 1980:5
[13] Neller 1980:11-13

> the dedication of the heiau at Kawaluna. He is associated with Ku-kaili-moku, the god of victory in battle. Perhaps by coincidence, all of these place names are found in the beach park area[14].

Neller's reference is Beckwith, who states the Kailua referred to is on O'ahu[15]. As Kalapawai is the name of the beach in Kailua, O`ahu, (and memorialized by the Kalapawai Store at the entrance of Kailua Beach Park) it is unlikely Neller's references have anything to do with Kailua on Hawai`i Island. The *heiau* at Kawaluna is located in Waiolani in upper Nu'uanu Valley[16].

A legendary reference to Keahuolū is found in *Ka`ao Ho`oniua Pu`uwai No Ka-Miki* (The Heart Stirring Story of Ka-Miki) translated by Kepā Maly, a legendary account of two super-natural brothers, Ka-Miki and Maka-`iole, who traveled around Hawai`i Island in the period when Pili-a-Ka`aiea was chief of Kona, ca. 12th-13th century). It was originally published in serial form between 1914 and 1917 in the Hilo-based Hawaiian language newspaper *Ka Hōkū o Hawai`i* by Hawaiian historians John H. Wise and John Whalley Hermosa Isaac Kihe. Here are excerpts from Maly's translation:

> ...Within the lands of Keahuolū you saw Hale-pa`u which is also near Ka-pā-wai (The water enclosure). Kapāwai is also known as Makā`eo (Look with anger), and a coconut grove encircled those places. Further on, between the lands of Keahuolū and Kealakehe was the *āhua* (Hillock-plantation mound) of Lae-oniau...[17]
>
> ...The priest who officiated over rituals of Keahuolū and Kealakehe was named Kalua`ōlapauila. He was the priest of the temple Kalihi, which is also called Kalua`ōlapauila. This temple is in the coastal area[18] along the border of Keahuolū and Kealakehe, near the old road into Kailua....[19]
>
> ...The district of Keahuolū and divisions of Lanihau (1 and 2) were under the rule of Kapohuku`imaile (kāne) and Papalūlā (wahine), and Papaumauma was their warriors champion. When Papaumauma competed with Ka-Miki at the contest site `Iwa`awa`a (at Kohana-iki), he was defeated. Papumauma was honorable, and he greatly admired the superior skills of Ka-Miki and asked to turn his status and land rights over to Ka-Miki, but Ka-Miki declined...[20]
>
> *Ka-noenoe* (The mist, fogginess) – The mound-hill called Pu`u-o-Kaloa sits upon the plain of Kanoenoe which is associated with both Keahuolū and Kealakeha. The setline of mists upon Pu`u-o-Kaloa was a sign of pending rains; thus the traditional farmers of this area would prepare their fields. This plain was referenced by Pili when he described to Ka-Miki the extent of the lands which Ka-Miki would over see upon marrying the sacred chiefess Paehala of Honokōhau. The inheritance lands included everything from the uplands of Hikuhia above Nāpu`u and the

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[14] Neller 1980:15
[15] Beckwith 1972:395
[16] Pukui et al. 1974:226
[17] April 2 and 9, 1914
[18] Boundary Commission Testimony places this place at the midpoint of Keahuolū rather than the coast.
[19] April 30, 1914
[20] May 21, 1914

lands of the waterless Kekaha, which spanned from the rocky plain of Kanikū (Keahualono) to the plain of Kanoenoe at Pu`uokaloa[21].

*Pu`u-okaloa* (Mound, or hill of Kaloa) – The narratives of Ka-Miki identify Pu`uokaloa as *"Pu`uokaloa I ka malo o Ka`eha e waiho ala..."* Pu`uokaloa where Ka`eha's loincloth (symbolic of the mists) was spread out[22].

Ka Hōkū o Hawai`i published another legendary account provided by J.W.H.I. Kihe entitled "Nā Ho`onanea o ka Manawa, Kekāhi mau wahi pana o Kekaha ma Kona" (A pleasant passing of time, [stories from] some of famous places of Kekaha in Kona]. This section describing agricultural practices as related to Pu`uokaloa is translated by Maly:

> Pu`u-o-kaloa is a mound-hill site in the lands of Keahuolū – Kealakehe, not far from the shore of Kaiwi and Hi`iakanoholae. During periods of dry weather (ka lā malo`o) when planted crops, from the grassy plains to the `āma`auma`u (fern forest zone), and even the ponds (ki`o waī) were dry, people would watch this hill for signs of coming rains. When the lihau (light dew mists) sat atop the hill of Pu`u-o-kaloa, rains were on the way. Planters of the districts agricultural fields watched for omens at Pu`uokaloa, and it was from keen observation and diligent work that people prospered on the land. If a native of the land was hungry, and came asking for food, the person would be asked:
>
> *Ua ka ua I Pu`uokaloa, ihea `oe?*
> When rains fell at Pu`uokaloa, where were you?
>
> [If the answer was...]
>
> *I Kona nei no!*
> In Kona!
>
> [There would be no sweet potatoes for this person.]
>
> [But if the answer was:]
>
> *I Kohala nei no!*
> In Kohala!
>
> [The person would be given food to eat for they had been away, thus unable to accomplish the planting[23].]

Within S.N. Hale`ole's epic *Ka Mo`olelo o Lā`ieikawai* (The Hawaiian Romance of Lā`ieikawai a short reference to Keahuolū and Lanihau as parents is found in the story of *Hiku and Kawelu*:

> The son of Keaauolu [sic] and Lanihau, who live in Kaumalumalu, Kona, once sends his arrow, called Puane, into the hut of Kawelu, a chiefess of Kona. She falls violently in love with the stranger who follows to seek it,

[21] October 25, 1917
[22] October 25, 1917; Maly 1996:12-13
[23] May 19, 1914; 1996:13

> and will not let him depart. He escapes, and she dies of grief for him, her spirit descending to Milu. Hiku, hearing of her death, determines to fetch her thence. He goes out into mid-ocean, lets down a *koali* vine, smears himself with rancid *kukui* oil to cover the smell of a live person, and lowers himself on another vine. Arrived in the lower world, he tempts the spirits to swing on his vines. At last he catches Kawelu, signals to his friends above, and brings her back with him to the upper world. Arrived at the house where the body lies, he crowds the spirit in from the feet up. After some days the spirit gets clear in. Kawelu crows like a rooster and is taken up, warmed, and restored[24].

Fornander provides a longer version of this tradition providing the father's name as Keahuolū[25].

The origin of the place name Ka`iwi on the shoreline on the boundary of Keahuolū and Kealakehe is presented in this excerpt:

> *Ka`iwī* (The bone) is also called Ka-lae-o-ka-iwi (The point of Ka-iwi) and is the name of a shark shaped stone near heiau of Kalua`ōlapauila. The priest Kalua`ōlapauila had two body forms, one human, as the priest, and the other body form as a shark in which he swam along the shore of Kealakehe and Keahuolū, attacking people. The shark form was named Kaiwi, and the point Ka-lae-o-Kaiwi is named after him[26].

Kanahele provides additional insight to this story adding that Ka`iwi and Kalua`ōlapauila are destroyed by "their" grandmother, Kauluhenuihihikolo, who teaches her grandchildren to call up the fires of Pele to rid the land of this man-eating shark. "Hi`iakanoholae, known today as Ka Lae Keahuolū, was the boundary direction for the lava flow. The protocol for lava is that a course of flow is given and Hi`iakanoholae is the southern limit of the flow. The flow did exactly what it was asked to do with Kaiwi and the characteristic of a Hi`iakaikeale`ī and Hi`iakaikealemoe flow is seen at Kaiwi Point[27]."

Figure 3 provides the location of these and other place names compiled by Lloyd Soehren and presented as *Hawaiian Place Names*[28]. Soehren assigned their locations from Boundary Commission testimonies, surveyor field books, and a myriad of primary resources.

Keahuolū Described in the Journals and Logs of Historic Visitors (1815 to 1902)

The earliest reference to Kailua concerns Kamehameha's residence there after his unification of the islands:

> In 1812, two years after all the islands and finally been united under his rule, Kamehameha returned to Hawai`i island from O`ahu, where he had lived for the past nine years. Kamehameha lived most of his remaining years in Kailua, at his principal residence at Kamakahonu in Lanihau ahupua`a

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[24] Hale`ole 1997:660
[25] Fornander 1919 v5:182-184
[26] Maly 1996:14
[27] Kanahele 2001:10
[28] http://www.ulukau.org/cgi-bin/hpn?

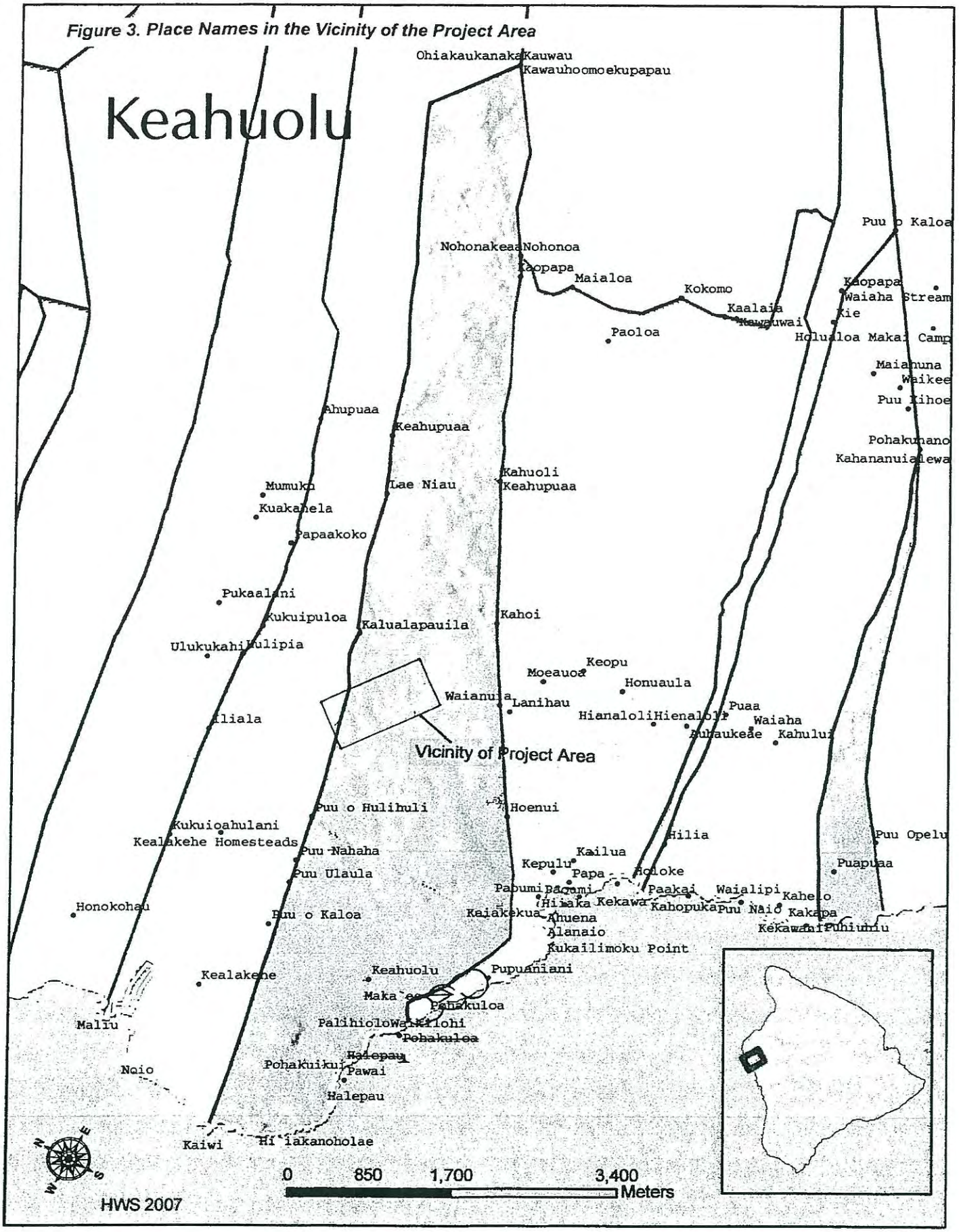

Figure 3. Place Names in the Vicinity of the Project Area

> [Lanihau is between Keahuolū and Hienaloli][29]. The accounts of early visitors at Kailua were, in the main, those of explorers...The *Columbia* came to Kailua Bay five times between 1815 and 1818, and then was sold to Kamehameha for sandalwood. The ship [was] renamed the *Laholile*...
>
> On its first visit to Kailua, in January of 1815, the *Columbia* took on board "hogs, vegetables, rope, and cloth of the country" (Corney 1896:35). Peter Corney, one of its officers, who remained in Hawai`i when the ship was sold and left descendants here, remarked that "island rope" made excellent running rigging[30]. Corney noted that the American ship *Milwood* was then at Kailua, "purchasing sandalwood at the rate of 7 dollars for 133 pounds (a picul)[31]" ...Corney provides a unique and graphic account of the sea traffic at Kailua Bay in the early 1800s.
>
> At the time of Kamehameha's death in May 1819, and for the early months of Liholiho's reign, the court households at Kailua apparently were very large[32].
>
> It was at Kailua in November 1819, approximately six months after the death of Kamehameha, that the "free eating" (*`ai noa*) incident took place, symbolizing the end of the kapu system....The act of "free eating" at Kailua was followed by a general purging and burning of god images from the large heiau[33].

Hawaiian historian Samuel Kamakau offers this reference to the life in the area at the time of Liholiho:

> Many of the old chiefs were alive in Liholiho's day...The sands of Kaiakeakua were worn down like a dromedary's back by the many feet of chiefs and chiefesses tramping over them, and at Kamakahonu could be seen at night the sparkle of lights reflected in the sea like diamonds, from the homes of the chiefs from Kahelo [in Puapua`a *ahupua`a*] to Lanihau. The number of chiefs and lesser chiefs reached into the thousands[34].

At this time M. Gaimard, a member of de Freycinet's expedition, wrote the following description of the Kailua environs:

> In order to reach the mountain that lies to the southeast of the village...we first went across dry fields, where hardly any young growth was visible; but, after reaching a certain elevation; we found much richer terrain where the paper mulberry, breadfruit tree, the mountain apple, tobacco, cabbage, sweet potatoes and yams were cultivated. We were given water of a delicious coolness[35].

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[29] Kelly 1983:3
[30] Ibid:48
[31] Ibid:47
[32] Ibid:5
[33] Ibid:6
[34] Kamakau 1961:221-222
[35] de Freycinet 1978:8

Missionary occupation of Hawai`i had its beginnings at Kailua. Kelly notes that:

> Liholiho...[was] at Kailua when the first band of Protestant missionaries arrived there in April of 1820...the missionaries were granted permission to remain in the kingdom on trial for a year. Two missionary families remained in Kailua, while the rest went on to Honolulu[36].

It was at Kailua that Liholiho entrusted the island to Kuakini, younger brother of Ka`ahumanu and faithful aide of Kamehameha I. Three years into Kuakini's stewardship, the Reverend William Ellis began his tour around the island at Kailua in 1823. This passage from his journal reflects the population and resources of Kailua:

> Kairua, though healthy and populous, is destitute of fresh water, except what is found in pools, or small streams, in the mountains, four or five miles from the shore[37].

Ellis reports the observations made by Reverends Thurston and Bishop who walked the coastline from Kailua toward Ka`iwi Point crossing the entire coastline of Keahuolū:

> The environs were cultivated to a considerable extent; small gardens were seen among the barren rocks on which the houses were built, wherever soil could be found sufficient to nourish the sweet potato, the watermelon, or even a few plants of tobacco, and in many places these seemed to be growing literally in the fragments of lava, collected in small heaps around their roots.
>
> The next morning, Messrs. Thurston, Goodrich, and Harwood, walked towards the mountains, to visit the high cultivated parts of the district. After traveling over the lava for about a mile, the hollows of the 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 vegetable matter and decomposed lava.
>
> Here they enjoyed the agreeable shade of bread-fruit and ohia trees; the latter is a deciduous plant, a variety of Eugenia, resembling the *Eugenia malaccensis*, bearing red pulpy fruit, of the size and consistence of an apple, juicy, but rather insipid to the taste. The trees are elegant in form, and grow to the height of twenty or thirty feet; the leaf is oblong and pointed, and the flowers are attached to the branches by a short stem. The fruit is abundant, and is generally ripe, either on different places in the same island, or on different islands, during all the summer months[38].

The cultivation and environs described above fall within the zone the project area is located and dispenses the assumption this was all barren lava supporting little life.

This type of gardening in lava is called *makaili*[39] when even small pockets of semi-disintegrated lava are utilized, and potatoes are grown by fertilizing with rubbish and by heaping

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[36] Kelly 1983:7
[37] Ellis 1969:29
[38] Ellis 1963:31-32
[39] Fornander 1919-1920, Vol. 6:164

up fine gravel and stones around the vines. Handy writes, "Such cultivation produces inferior potatoes; they are said to be rather tasteless and ridged (*`awa`awa*) or wrinkled[40].

Commodore Wilkes of the U.S. Exploring Expedition said of Kailua in 1840:

> The natives during the rainy season...plant, in excavations among the lava rocks, sweet potatoes, melons, and pineapples... The...staple commodities are sweet potatoes, upland taro, and yams. Sugar cane, bananas...bread-fruit, cocoa-nuts, and melons, are also cultivated. The Irish potato, Indian corn, beans, coffee, cotton, figs, oranges, guavas, and grapes, have been introduced....[Two miles from the coast, in a belt half a mile wide, the bread-fruit...and...taro is cultivated with success...A considerable trade is kept up between the south and north end of this district. The inhabitants of the barren portion of the latter are principally occupied in fishing and the manufacture of salt, which articles are bartered with those who live in the more fertile regions...for food and clothing[41].

CHRONOLOGICAL HISTORY OF RESIDENCY AND LAND OWNERSHIP IN KEAHUOLŪ

The above description of subsistence farming and trading within the land divisions is characteristic of pre-contact Hawaiian culture. With the introduction of a market system and the call for labor to harvest sandalwood, agriculture in the area changed greatly, as did the native population. Early demographics for Keahuolū are difficult to ascertain. Schmitt recorded epidemics for the years 1848 and 1849 as follows:

> Four devastating epidemics occurred in rapid succession in 1848 and 1849: measles, whooping cough, diarrhea, and influenza. Together, these four diseases killed more than 10,000 of the perhaps 87,000 persons in little more than a twelve-month period[42].

Kelly presents population demographics for North Kona between 1836-1980 reflecting what she suspects reflects successes and failures of various commercial agriculture ventures dependent on the rise and fall of world prices of crops[43]:

Year	Population	% Increase/Decrease
1836	5,957	—
1853	4,110	-31.0
1860	3,488	-15.1
1866	3,268	-6.3
1872	2,218	-32.1
1878	1.967	-11.3
1884	1,773	-9.8
1890	1,753	-1.1
1896	3,061	+74.6
1900	3,819	-24.7
1910	3,377	-11.5

[40] Handy 1972:129
[41] Wilkes 1845:4, 91-92, 95-97 IN Kelly 1983:19
[42] Schmitt 1968:37
[43] Kelly 1983:92

During Kuakini's stewardship of the island, walls were built to protect the cultivated lands from the ravages of free-roaming dogs and pigs kept near the coastal habitations[44]. One of these walls was recorded by John Papa I`i at Honua`ula in 1812; I`i writes, "A stone wall to protect food plots stretched back of the village from one end to the other and beyond[45]." Kelly postulates this wall was later incorporated into what became known as Kuakini Wall, which may be traced from its starting point at Palani Road above Kailua Bay to beyond Kahalu`u Bay. It has long been presumed this wall built sometime during Kuakini's governorship (1820-1844) to protect the cultivated uplands from the depredations of cattle, introduced to the island by Captain George Vancouver in 1793. It was not known by this name until after 1855. Until that time it was consistently referred to as the Great Wall, or the Great Stone Wall by surveyors. The Emerson-Kanakanui map of Kailua Town & Vicinity (Reg. Map No. 1676, dated c.1880) identifies it as the "Kuakini Great Wall." The following statement, concerning no doubt Kuakini Wall, was made by the Reverend Albert Baker:

> Just a little above [the stone church at Kahaluu], and continuing all the way to Kailua, is the huge stone wall built in Kuakini's time to keep pigs from the cultivated lands above[46].

In his reconnaissance survey of Keahuolū, Rosendahl (1972) notes, "...the Great Wall of Kuakini...is a historic period structure built during the period A.D. 1830-1840 at the direction of Kuakini, Governor of the Island of Hawaii..." Kelly writes of Kuakini Wall:

> It has long been presumed that this wall was built sometime during the governorship of John Adam Kuakini (1820-1844) to protect the cultivated uplands from the depredations of cattle. However, as the wall is at all points less than a mile from the seacoast, only the food plots in the coastal region would have been protected by it. It probably would have only kept cattle and horses grazing on the kula away from the houselots and small gardens along the shoreline[47].
>
> Unnecessarily high as a barrier to roaming...the Kuakini wall may have been the Pa'aina named as the makai boundary in several claims to land along its course. At times, the wall reaches a height of 8 or 9 feet, which seems cattle or pigs...The fact that the term used in the register of claims is "papipi," which refers to to a wall or enclosure for cattle, not pigs, should answer the question of what kind of animal the wall was meant to restrict in the 1840s. Perhaps in more recent years it served other purposes. Why it is located between the grazing land and the gardens, or why it is so high in places, we can only surmise[48].

In addition to this notable structure were smaller historic walls for similar and boundary purposes. In her report of subsistence lifestyles in Kona, Schilt writes of the *ahupua`a* in this vicinity:

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[44] *Ke Au `Ōkoa*, March 19, 1868
[45] I`i: 1959:111
[46] Baker 1915:83
[47] ibid:75
[48] ibid:76

> 62 historic walls listed....23 walls trending *mauka-makai* pass through the ROW, defining *ahupua`a* boundaries. All are double-faced and core-filled, in good to excellent states of repair. Functioning today as portions of cattle range boundaries, theses walls probably originated in historic times, as early as the mid-1800s, having been built for that purpose[49].

In 1848, during the reign of Kamehameha III, the traditional Hawaiian land ownership system was replaced with a more Western-style system. This radical restructuring was called The Great *Mahele* (division). The *Mahele* separated and defined the undivided land interests of the King and the high-ranking chiefs, and the *konohiki*, who were originally in charge of tracts of land on behalf o the king or a chief[50]. More than 240 of the highest-ranking chiefs and *konohiki* in the kingdom joined Kamehameha III in this division.

Keahuolū was awarded to Anealea Keohokālole (c.1814-1869) who numbered among her offspring King David Kalākaua, Queen Lydia Lili'uokalani, and William Pitt Leleiōhoku (adopted by Ruth Ke'elikōlani). Keohokālole was a great-granddaughter of both Kame'eiamoku and Keaweaheulu two of the important chiefs who supported Kamehameha I in his rise to power[51]. Kame'eleihiwa states, "Keohokālole was regarded by the Kamehameha clan as an *Ali'I Nui* in honor of the great courage and loyalty proffered by her ancestors in their support of Kamehameha[52]." As *Ali'i Nui* Keohokālole held the fifth largest number of *'āina* after the *Māhele* with 50 parcels[53]. She relinquished 48% of her original 96 *'āina* to the *Mō'I* [King] retaining 23 parcels on Hawai'i, 25 on Maui, and two on O'ahu. Of her lands on the island of Hawai'i two-thirds were located in the Kona District[54].

Keohokālole award for Keahuolū is LCA 8452, Apana 12 (Royal Patent 6851). This award had a total area of 4,071 acres. She conveyed 15,000-20,000 acres of Keahuolū lands with the balance going to her heir, Lili`ūokalani. Attached to the following letter is a list of lands including Keahuolū:

> To Highness, John Young
> Minister of Interior
>
> Greetings:
> This is to inform you and the Privy Council of my desire to convey some of my lands for the Governments one third in the land which remain as mine. Grant me this, of course, with the approval of the Privy Council Below is a list of the lands I wish to convey to the government[55].
>
> To Your Highness, John Young
> Minister of Interior
>
> Greetings:

---

[49] Schilt 1984:44
[50] Chinen 1958:vii and Chinen 1961:13
[51] Kame'eleihiwa 1992:230
[52] ibid.
[53] Kame'eilihiwa 1992:245
[54] Kelly 1983:31
[55] Native Testimony v10:326

> Here is a list of names of my lands which has been left for me pending for an approval of its distribution....Keahuolū ahupuaa, Kona, Hawaii...
>
> With appreciation,
> Keohokalole[56]

The following testimony was given by Awahua, to verify Keohokālole's holding for LCA 8452 in Kona:

> Awahua, sworn, says he knows the house lots claimed by Keohokalole at Kaawaloa, Hawaii. The first one is fenced all round with a stone wall. It is bounded makai by the seashore, on Kailua side by the Government land, mauka by the land of Nahaku, and Awahua, and on the other side by the road. Claimant derived this lot from her ancestors, who held it from very ancient times. There is a stonehouse and several grass houses in it belonging to claimant, besides a tomb.
>
> The second lot is called "Awili," and is fenced all round. It is bounded makai by government road., on Kailua side by the same, mauka the same, on the side next [to] the pali by the road.
>
> Claimant derived this lot from her ancestors, who held it from older times.
>
> Witness knows the three house lots in Kealakekua, claimed by Keohokalole. The first lot is called "Kulou" and is fenced in. It is bounded makai by the sea beach, Kaawaloa side by government land, mauka by the road, south Kona side by a lot belonging to T. Cummings.
>
> The second lot is called "Kaahaloa" [and] it is enclosed all round, and bounded on Kona Hema by a lot belonging to T. Cummings, mauka by the lot of Nakoko, North Kona by an hold heiau, makai by the road.
>
> The third lot is called "Wailokoalii" and is bounded on the South Kona side by an old Heiau , mauka by a Government lot and the lot of Ialua, makai by the sea beach, on the other side by a pali.
>
> Claimant inherited these lots from her ancestors by the mother's side, who possessed them from ancient times. Kekaalua, sworn, says he knows these lots perfectly and confirms in full the testimony by Awahua[57].

Whenever *ali'i* received an entire *ahupua'a*, they were bound to respect the rights of the existing tenants. These tenants, if they filed a claim to The Board of Commissioners to Quiet Land Titles, could continue to cultivate and reside on their parcels. The following testimonies are for such awards granted within Keahuolū:

> Land Commission Award (LCA) 11071 to Aki for .60 acres
> Kuia sworn, He has seen Aki's land that which he had cultivated himself, it is in the *ili* land of Pauaaiki of Keohoeolu [sic] ahupuaa in Hawaii. Section 1, five cultivated kihapais. Section 2, one kihapai not cultivated. Section 6, four

[56] Native Testimony v10:327
[57] Foreign Testimony v3:573

cultivated kihapai. Section 7, one cultivated kihapai. These interest have been made from Kaea, Nahaalualu and Kalekahi at the time of Kamehameha I[58].

LCA 10303 to Maa for 2.25 acres
Mahu sworn, He had seen a whole section of land, however, it is just as he has indicated in his claim that there are eleven taro kihapais, and ten potato kihapais in the *ili* land of Maili of Keahuolū ahupuaa. That land is not cultivated completely, but, Maa had planted seven palm trees. The fruit is for Samuela, both Maa and Samuela have joint interest in the seven fan palm trees. There is also a coconut grove which had been planted by Maa's grandparents for the Chings who owned the land, they were the caretakers. The same had applied to Maa's parents and to him at the present time. The coconuts went to Keohokalole upon the death of Keoua and it has been that way to the present time.

One whole section is salt land and it is still yielding salt...Land passed down to Maa's parents, these to him now. Maa's grandparents received the ili land Maili of Keahuolū during the time of Kamehameha I. Kamauoha had given to Maa the land section of Lanihau ahupuaa in 1848, no one had object to him[59].

LCA 10345 to Nahaalualu (Naalualu) for 2 acres
Kuia sworn, He had seen Naalualu) place that he had cultivated himself in the ili land of Puuokaliu of Keahuolū ahupuaa in Hawaii. Section 1 (boundaries given) one section cultivated. Section 2, four cultivated kihapai, Section 3, one cultivated kihapai, Section 4, four cultivated kihapais...[60]

LCA 10198 to Hailewalewa (Kailewalewa) for 1.30 acres
Mahu sworn, He has seen the place on which Hailewalewa had cultivated with his own hands, it is in Ulelele ili of Keahuolū ahupuaa. Section 1 taro. Section 2, Kaluulu. Land has been cultivated, one land section. On land from Hailewalewa's parents to him. Uncertainty for one section[61].

LCA 8012 to Apiki for 1.10 acres
Mahu, sworn, says he knows the kuleana of Claimant in Kailua, Kona. It consists of five patches of Kalo and a lot of patches of potatoes. The kalo patches form one piece, bounded on Kau side by Lanihau, makai by Papaula's land, Kohala side the same, mauka by Hai's land. The potato land is bounded mauka by Haino's land, Kau side by Lanihau, makai by Kahili's land, Kohala side the same. Claimant derived the land from the Konohiki, before the death of Kuakini, and has held it ever since without disputes[62].

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[58] Native Testimony v4:527
[59] Native Testimony v4:526
[60] Native Testimony v4:527
[61] Native Testimony v4:525
[62] Foreign Testimony v8:676

LCA 7351 to Kahuanui for 2.90 acres
Papaula, sworn says I know the claim of Kahuanui. It is in the ahupuaa of Keahuolū, Kona. It consists of one piece of kalo land, five patches—all lying together. One of these patches if planted with coffee. It is bounded mauka by the land of Kahookohukaneole, Kau by Lanihau, makai by the land Nahaalualu, Kohala by the konohiki. Claimant received this land from his brother in 1846, and his title has never been disputed[63].

Two references to Keahuolū were found in the Hawaiian language newspapers that have been digitized and available online at *Ulukau: Hawaiian Digital Library*[64]. Unfortunately, they provide little insight to land use

Olelo Hoolaha.
O MAUA NA MEA NONA NA INOA Malalo nei, ke hai aku nei maua i na mea a pau; e kii mai i ko oukou mau holoholona, e hele ana Ma Keahuolū a me Lanihau, iloko o keia malama o Dekemaba, 1862, me ka uku kupono. A o na holoholona e loaa ia maua mahope o keia makahiki, e hoopaa ana maua ma kahi kupono, a e uku mai ka mea nana ka holoholona, a o ke kahu paha nana e malama $5 00. A oi aku paha no ke komo hewa, a me ka poino, a me ka luhi i ka ho-a ana; no ka mea, ua pilikia na hoaaina i ka oukou holoholona.

P. KAPAE.[65]
J. NAKEWIKI.
Kailua, Hawaii, Nov. 28. 1862. 56-3t[66]

Announcement.
We are the ones whose names are below, we would like to let everyone know to come and collect your animals that are moving about in the Keahuolū and Lanihau areas in December 1862, with the proper payment. And as for those animals that still remain with us after this year, we will secure them in the proper area, and owner of the animal will pay us, and his keeper will profit $5.00 or more for trespassing and danger, and for roam and the trouble it caused to the land for these animals

Olelo Hoolaha
EIA MA KO'U LIMA KEKAHI WAA UUKU, ua loaa ia'u ma ka moana, ma kahi e kokoke ana I ke awa poe o Pawai, aole he aina, he mau ia kono nae, ua loaa ia'u kela Waa, iloko o na la hope o ka malama o Maraki i hala ae nei. E kii kokie mai ka mea nona keia Waa, me ka uku mai he $15.00, ina aole e kii mai ka mea nona keia Waa, alaila, e lilo no ia'u keia waa, e like me na laau pae.

MAA.
Keahuolū, Kona A., Hawaii, Mei 16, 1865.
5-2t[67]

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[63] Foreign Testimony v8:682
[64] www.ulukau.org
[65] These names are most likely aliases.
[66] *Nupepa Kuakoa*, Vol.1 No. 56, 20 December 1862
[67] *Ke au Okoa*, Vol. 1, No. 6, 29 May 1865

Announcement.
I have a small canoe that I got in the deep ocean, near the round bay of Pawai, not near land, but it did have some fish in the last days of this past March. Whoever this canoe belongs to should come and get it quickly and pay $15.00, if you don't claim your canoe I will possess this canoe as my own like the pieces of wood that just wash ashore.

Correspondence to the Minister of Interior often provides insights to land use and transactions. In a report by J.H. Kalaiheana, dated April 25, 1866, Keahuolū is said to belong to Keohokālole. In a letter dated July 8, 1869 from David K. Kalākaua to his sister, Lili'ūokalani, a detailed description of Keahuolū is provided. Kalākaua writes:

> This land is situated in the District of North Kona, bounded by the ahupuaa of Lanihau (in Kailua) belonging to Prince Lunalilo on the Kau side, and on the Kohala side, by Kealakeha, a government land and Honokohaniki belonging to Keelikolani. Keahuolū runs clear up to 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, bananas &c. Breadfruit trees grow wild as well as the 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.

A letter written by Lili'ūokalani to the Minister of the Interior, dated October 6, 1894, gives permission for a road to run through Keahuolū, and includes orders for the Government to fence both sides of this road.

On a map drafted by J.S. Emerson in the 1880s (Reg. Map 1280), a narrow band of shading running in a north-south direction crosses Keahuolū. This band is at the approximate elevation of 6,250 to 7,250 ft. In Emerson's Field Notebook sketches, this line is identified as the "Commencement of the Forest." The notebook notes that *ma uka* of the forest line, the land is "lava covered with scattering forest and dense masses of *ki* [ti] root[68]." *Ma kai* of the forest line he described as "rocks covered with long grass[69]. Kelly approximates this forest edge at an average elevation of 550 to 650 ft. from Kailua south[70].

As recently as the 20th century existed a small village of *'ōpelu* (Mackerel scad) fishermen who resided at a coconut grove in Keahuolū. Behind this village, known as Makaeo, were several large brackish water ponds where *'ōpae'ula* (*Crangon ventrosus)* thrived. These shrimps were used to mix in the *palu* or chum, used for catching *ōpelu.* Several springs and one well provided potable water. The village, coconut grove, and all the pools but one were destroyed during the construction of the Old Kona Airport[71].

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[68] Kelly 1983:58
[69] ibid:59
[70] ibid:58
[71] Clark 1985:110

Cartographic material depicting Keahuolū was sought at the State Department of Accounting and General Services, Survey Division. A 1929 U.S.G.S. topographic quadrangle indicates a sisal (*Agave sislana*) mill located in Keahuolū. Kelly briefly discusses this crop in her 1983 history of the *Gardens of Kona*, quoting Thrum in 1905: "The McWayne sisal tract consisted of about 500 acres at or near Kailua[72]." Kelly adds, "...how much of this acreage was actually planted in sisal is unclear[73]." In an attempt to locate the cultivated area, various articles were consulted and informant interviews were conducted. Early periodical reports focus on sisal cultivating efforts on O'ahu. However, the earliest mention of McWayne's efforts were found in the *Honolulu Advertiser's* column "History from our Files," which reports for 1918 that "[t]en tons of baled sisal, first of an estimated crop of 200 tons from the McWayne Estate, Kailua, Kona, reached Honolulu for transshipment to San Francisco[74]." Herman D. Nichols, vice-president of Tubbs Cordage Co., suggested in a 1949 editorial that utilization of sisal fiber of wild plants throughout the Territory be explored[75].

Mr. Minoru Inaba was interviewed by the author in February 1990, as he was employed at the sisal mill after he finished the 8th grade in 1921. He said the mill was owned and operated by Luther S. Aungst from 1917 until its closing in 1924. Inaba recollects there were over 1,000 acres in cultivation in the *ahupua'a* of Kealakehe and Keahuolū. The mill, abutting Palani Road, was surrounded by sisal fields. The challenge, Mr. Inaba noted, was getting the sisal from the fields to the mill, as it was very bulky and sharp. Field workers cut the sisal in the field, then bundled and transported it on donkeys to the mill. At the mill the sisal was thrashed, dried, and baled. From Kailua Bay, the bales of dried sisal would be shipped to San Francisco on steamers. Mr. Inaba's job was to dispose of the by-products. Working with the sisal "made his skin itchy," and he wore protective clothing. According to Mr. Inaba, Mr. Aungst played an important role in the development of the Kona district. He started the telephone company that connected Kona with Waimea, and later added Volcano to its line. This phone systems was eventually sold to Mutual Telephone Co., Aungst was also the postmaster and owned a garage in Kona[76].

SELECTED DOCUMENTATION OF THE HISTORY AND ARCHAEOLOGY OF KEAHUOLŪ

Table 2 provides a summary of selected archaeology projects that have been conducted in the study area.

An island-wide description of sites was published by Henry Kinney in the earlier part of the 20th century. Kinney writes of the Keahuolū shoreline:

> From the point where the Honokohau Trail leaves Kailua a poor trail leads makai over the lava to the lighthouse. Hence it continues along the beach for a couple of miles. After passing several old stone mausoleums, the trail passes an abandoned grass house where is a stone wall, the remnants of the heiau Keohuulu [sic]. Still further north is a coconut grove, where there were several kuula here, one particularly powerful one, the idol of which is still remembered as having been in a fair state of preservation, only one arm missing, when a Christian pries took it from the cave where it was kept. Since

[72] Thrum 1905:185
[73] Kelly 1983:89
[74] *Honolulu Advertiser* July 31, 1948, editorial page
[75] *Honolulu Advertiser* September 20, 1949
[76] pers. comm. February 1 and 8, 1990

Table 2. Selected Archaeological Projects Within Keahuolū

Year	Author	Scope	Zone	Findings
1919	Stokes	*Heiau* Survey	Coastal/Inland	3 *heiau*
1930	Reinecke	Reconnaissance Survey	Coastal	12 sites primarily habitation platforms & enclosed yards
1970	Emory	Site Inventory	Coastal/Inland	2 *heiau* discussed
1970a	Newman	Inspection	Coastal	Historic burials and "bait cups"
1972	Bevacqua	Reconnaissance Survey	Coastal	9 sites
1973	Neighbor Island Consultants	Reconnaissance Survey	Coastal	Historic burials located
1975	Sinoto	Reconnaissance Survey	Coastal	7 sites – temporary structures
1978	Ching	Reconnaissance Survey	Coastal	59 sites – salt pans, cave shelters, paving, cairns
1979	Rosendahl	Reconnaissance Survey	Coastal	4 complexes, 2 modified sinkholes, 2 wall sections, 1 cairn, 1 rock shelter, 2 petroglyph areas, 1 walled enclosure
1980	Estioko-Griffin & Lovelace	Reconnaissance Survey	Coastal	35 sites – caves, petroglyphs, burials, house sites
1980	Folk	Reconnaissance Survey & Test Excavations	Coastal	21 sites in 3 *kipuka* – 7 pavements, 3 caves, 2 platforms, 4 historic/recent campsites, 1 burial/shrine, animal enclosure, 3 habitation areas
1980	Neller	Reconnaissance Survey	Coastal	
1983	Soehren	Survey	Inland	Sisal plantation remnants
1983	Rosendahl	Survey	Inland	2 sites – agricultural and habitations, possible ceremonial and burial. One site was later found destroyed
1984	Schilt	Field Work	Coastal/Inland	Kuakini Highway realignment crossing 24 *ahupua'a*. Within Keahuolu – cairn and modified outcrop
1990	Donham	Reconnaissance Survey	Coastal/Inland	239 sites – *pāhoehoe* quarry, agricultural excavations, rock mounds, modified blisters or outcrop, the majority interpreted as agricultural features
1989	PHRI	Inventory Survey	Inland	Sites indicate relatively intensive agricultural activities
1990	PHRI	Inventory Survey	Inland	32 sites – agricultural/boundary-related, temporary habitation
1993	O'Hare & Rosendahl	Inventory Survey	Inland	18 sites – agricultural, temporary habitation, burial, historic dump, transportation feature, quarry and marker
1993	PHRI	Field Inspection	Inland	16 sites – ceremonial and burials
2007	Haun	Inventory Survey and Assessment	Inland	5 sites – agricultural, temporary and permanent habitation

> then, say the inhabitants, the fishing has been comparatively poor. In the grove are two cocoanut stumps which served as gallows for the first execution conducted by hanging in Hawaii. A chief, Kekuakahaku was the victim...Beyond the main [coconut] grove are a few isolated trees near the edge of the flow. Here was the heiau of Pauai, and here the trail ends[77].

The area in which Pauai *heiau* is located is known as Pāwai. Research by the Lili'uokalani Trust has determined that Pāwai is an abbreviation of Papawai and this is the name the Trust uses. Papawai's literal meaning is water stratum. It is also known as Bean's Beach[78].

In his 1919 report on *heiau* on the island, Stokes reports the following sites within Keahuolū:

> Ko'a of Halepau, in Halepa'u Section...A small fishing heiau on the pahoehoe, 100 feet north-west of Keahuolū. Well preserved walls, 4 feet high (Site #10-27-2139)
>
> Heiau of Kawaluna...on the beach, a quarter mile from the boundary of Lanihau, in a section (ili) called Pawai. An enclosure, the walls of which have been carefully rebuilt, without opening. The interior was filled with loose stones piled up without arrangement. The local informant stated that an old fisherman was in the habit of offering fish in this heiau. Asked as to the resulting luck, the answer was that it was not as much as that of other fishermen, perhaps because the offering was made at a heiau instead of the ko'a (Halepa'u) nearby.
>
> Heiau of Palihiolo, at Waikilohi, at or near the boundary of Keahuolū and Lanihau, North Kona; on the beach in an old coco-palm grove; this is an insignificant pen, 25 by 29 feet in size with small, thin walls built on the upper slopes of the beach. Coral has been spread over the floor as a paving. The only interest attaching to the place is the account given by a very old native living in the grove. He said that Palihiolo was formerly a heiau for human sacrifice [luakini], and that it was rebuilt by Kalakaua's orders before the latter left for the United States (ca 1890). The old native also said that Kalakaua promised to have a sacrifice at Palihiolo on his return from America, but that he died in that country[79]. The old native was very insistent on the truth of his statements. It might be mentioned that the surrounding grove of palms is where Kalakaua's grandfather was hanged for murder[80]. Other information from the old native is given here for convenience, that this king ordered the rebuilding of the two heiaus of Kawaluna and Palihiolo where human sacrifices were formerly offered, and the ko'as of Halepa'u and Maka'eo....It might be remarked that these four structures have the appearance of having been rebuilt in recent times[81].

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[77] Kinney 1913
[78] Clark 2000
[79] Kalākaua died on January 20, 1891 in San Francisco attributed to Bright's disease. Baliley:1975:302
[80] Kamanawa, Kalākaua's paternal grandfather was hung for murdering his ex-wife Kamoku'iki by giving her poison in a cup of *'awa*. Kamanawa was the first public execution under the 1840 laws.
[81] Stokes 1919

Ko'a of Maka'eo...This is a small pen, 200 feet from the sea and about half a mile to the southeast of Palihiolo.

In 1930 John Reinecke conducted a survey of Hawaiian sites on the Island and reported on sites in Keahuolū. Comments for these sites [in parentheses] were provided by Earl Neller in 1980:

Site 4. A group of masonry platform graves on the sand beach. (Referred to as "graves of chiefs" in Jackson's 1883 Field Notes, p.32)

Site 5. Remains of a platform of large stones. Near this is a notable group of petroglyphs. There is also a hole with a ring around it, a form of carving which I have found elsewhere, but what it represented is hard to say—perhaps a *kohe*. There are also *papamū*[82]: a clear one 16 x 13; a very fine one with evenly arranged holes 1½ in diameter; and a third too dim to make out the rows, but there must have been about 12 each way.

Site 6. A large masonry tomb or powder magazine with very massive walls. (Note; This is probably the structure referred to as "Kamehameha's Tomb" in George Jackson's 1883 Field Notes, p.30)

Site 7. ON the beach, the ruins of a platform and pen of boulders; on the *pāhoehoe* back of this, a small house platform of *pāhoehoe* fragments. (This could be Stoke's "*Ko'a of Maka'eo*")

Site 8. Remains of a medium-sized platform, sand-covered. From its position, it may be a fishing *heiau*. By it is an old *papamū*, 12 x 11. (This could be Stoke's "*Ko'a of Maka'eo*")

Site 9. Group of ruins centering about the ponds of Makeo. (This site has been largely destroyed by construction of the old Kona Airport.) About 200' NW of Site 8 is a modern pen, and by it a large coral-strewn platform (perhaps Stoke's "*Heiau of Palihiolo*") and the remains of a very old pen. Back of that, among *kiawe*, are five house platforms, all but one being coral-strewn, two enclosures which seem to be walled house sites, and two very old house platforms. The small fishpond is divided into seven sections. It is now shallow and muddy, but was once carefully walled up—a feature common to the brackish ponds along this coast. Even yet they are occasionally cleansed of their scum. Between it and the large pond is a small platform like a *puoa* [*pū'o'a*][83]. The marsh contains one large pond, with many small pools land waterholes, some of them walled round.

Site 10. Well-built walled platform, walls 3½' wide and 3' high; inside dimensions 12 x 11½; floor about 6" off the ground. A small platform near. (This site destroyed by construction of old Kona Airport – EN)

Site 11. Near the house at Makeo, on the beach: a very dim *papamū*, 7 x 6, and a petroglpyh. (This site probably destroyed)

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[82] Stone on which the checker-like game, kōnane, was played
[83] Tower, steeple, pyramid, peak; house for depositing a corpse

Site 12. A series of yard walls by the house of Makeo:

a. House site in the yard of the present residence. (This site probably destroyed)
b. Modern house site with brackish pool behind.
c. Pen, probably once surrounding a water pool.
d. House, platform and pool.
e. Old, small house platform on a knoll. Farther on is a pen and three old, small house platforms, and perhaps a *puoa.*

Site 13. Modern house platform and graveyard. (This could be Stoke's *Kawaluna Heiau*)

Site 14. Three small old house platforms; canoe landing; a modern house platform with an old house site in the same lot; a pen (about 50' x 35') containing a platform, chiefly a mass of rough, large stones—uses unknown.

In 1970 Kenneth Emory prepared an inventory of known sites for parts of the Big Island including Keahuolū. [Comments in parentheses by Earl Neller]

3841 (D9-4) Lanihau, Kailua-Kona, SW of old airport. Petroglyphs, located in three clusters, totaling 75 units, includes dots, circles, diagrams, and triangular and linear figures. (This site is probably the one southeast of the old airport)

3842 (D10-1) Waikilohi beach at Keahuolū. Palihiolu Heiau, and enclosure 25 by 29 feet with a coral pavement, not located.

3843 (D10-2) Pawai beach at Keahuolū. Kawaluna Heiau, an enclosure used until recently by fishermen as a *ko'a* or fishing shrine, not located.

Also in 1970 Thomas Stell Newman made a field inspection for State Parks and reported on a few sites [comments in parentheses by Earl Neller]:

10-27-2000 Lanihau Petroglyphs. Southeast of runway. Traditional Hawaiian stick figures; about 15 figures, on a *pāhoehoe* blister. Recommend valuable (This site on fringe of Bishop Museum's Site #3841)

10-27-2001 Lanihau Papamu. 50 meters *ma kai* of runway. A single human stick figure petroglyph holding something in right hand. A large *pāpamu* of 11 by 12 rows of holes. Nearby is a very small *kōnane* board of 3 by 4 rows of holes. Condition good. This site is important. (This seems to be part of Reinecke's "Site 8")

10-24-2002 House & burials. Located 100 meters west of *pāpamu*, site 2001. 25 meters *ma kai* of the runway. Rectangular enclosure, 5 by 6 meters, stacked stone walls about.5 meters high, walls partly collapsed, artifact collectors have excavated a portion of the interior; no midden seen. 10 meters north of enclosure are two graves, slab-lined crypts barely visible, about 2 x 4 meters. The central area of both graves is filled with small rubble (This could be part of Reinecke's "Site 9." It could also be Stoke's Palihiolo Heiau)[84]

[No site number] A modern burial area lies off the west end of the main runway and I suspect there are still living relatives for those buried there. Numerous bait cups or holes ground in the rocks just back of the high tide mark are to be found all along the beach but it would not appear to be in any danger from construction. (This is probably Reinecke's "Site 13")

A walk-through archaeological survey of the Queen Lili'uokalani Village – Unit 3 Tract[85], some 100 acres, was conducted in September 1972 by Paul Rosendahl. The subject parcel is located on the *ma kai* side of Palani Road. Fourteen archaeological features were found including five stone walls, two platforms, two stone mounds, two stone-walled enclosures, one foot trail, one small cave shelter, and one road causeway. Rosendahl noted "none have any real excavation potential, none are features of outstanding structural or other characteristics, and none have any real known historical interest, value, or significance[86]." Two stone walls were recommended to be preserved for their scenic value.

In 1975 Aki Sinoto surveyed a road corridor in coastal Keahuolū. He identified seven sites, all small, semi-permanent or temporary structures associated with coastal marine activities[87].

Lloyd Soehren conducted a reconnaissance survey of two parcels near Kamakahonu in Lanihau 1st August 1976. Soehren identified a "*kuaiwi* or low mounding of small stones into a row containing scattered pebbles of waterworn coral" which he considered an *ahupua'a* boundary marker between Lanihau and Keahuolū[88]. This "windrow extended some 300 yards eastward before it is obliterated, and is coincident with the present boundary. It continues to the west, prolonging the line toward the shore rather than following the present, deviant boundary which parallels the shore for some distance. The antiquity of the feature is unknown, but almost certainly predates European contact[89]." These two parcels are both *ma kai* of Kuakini Highway outside of the present project area.

An archaeological survey of a section *ma kai* of the Queen Ka'ahumanu Highway near the Old Kona Airport, also owned by Lili'ūokalani Trust, was conducted in November 1978. Fifty-nine sites with 140 separate features were discovered. Most of the features were concentrated along the coast and were subject to ocean damage. Although small cave shelters along the coast and slightly inland contained cultural deposits and were deemed to have value for excavation and subsequent historic interpretation, it was noted the inland portion of the parcel was devoid of

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[84] Palihiolo Heiau was later placed within Lanihau and assigned SIHP Site #2002 with several burials identified by Newman.
[85] TMK 7-4-08
[86] Rosendahl 1972:7
[87] Sinoto 1975:3
[88] Soehren 1976:1
[89] ibid.

significant remains. The single exception was Site 6540, which consisted of a cluster of occupation features including platforms, paved areas and cave shelters[90].

An additional reconnaissance survey of a c. 20-acre parcel, where the QLT Education Center is located, was conducted by Folk in 1980, revealing no sites. However within three *kipuka* near the shore Folk documented seven pavements, three caves, two platforms, four historic campsites, a burial or shrine, a historic animal enclosure, and three habitation areas[91].

In January 1983, Lloyd Soehren conducted an archaeological survey on a Keahuolū parcel (TMK 7-4-08:001) *ma uka* of the Queen Ka`ahumanu Highway and adjoining Queen Lili`ūokalani Village, between 800 and 1000 feet elevation. Soehren identified the parcel as part of the former sisal plantation. He did not identify any archaeological sites save the entrance to a small lava tube near the west boundary, which he deemed void of any Hawaiian cultural activity.

Theresa Donham, working for Paul H. Rosendahl, Inc. (PHRI), conducted an archaeological inventory survey for a portion of the current project area (TMK 3-7-04-08:Por 2, 12) between 1989 and 1990. Two hundred thirty-seven newly identified and two previously recorded sites containing a total of 1,810+ component features were identified. Twenty-five sites were assessed as having value as examples of site types and were recommended for interpretive development. All but two of the 25 sites are within an area designated as an archaeological preserve by QLT. Eight of the 25 sites were assessed as having provisional cultural value due to the possible presence of burials. Two of the 25 sites, Māmalahoa Trail and Kuakini Wall, were assessed as having interpretive and cultural values. Six cave sites were recommended for preservation the due to the presence of human skeletal remains[92].

Haun & Associates recently conducted archaeological surveys for Queen Lili`ūokalani Trust. A survey of TMK:7-4-015:15, a c. 5-acre parcel, was conducted in March 2007. A survey of TMK: 7-4-015:14, a 3.982-acre parcel, was conducted in May 2007. No archaeological sites were identified in the former survey area, and five sites with seven features were identified in the latter. The features were interpreted as agricultural, temporary and permanent habitation; no features were recommended for preservation[93].

PHRI recently conducted two archaeological projects in the vicinity. One was an archaeological survey and cultural impact assessment study for a proposed extension of Ane Keohokalole Highway[94]. During the survey, nine previously identified archaeological sites were re-identified within the proposed corridor route. These sites had been initially identified in 1990 (Donham 1990). No new sites were identified. The other project was a an archaeological survey and cultural impact assessment study in connection with preparation of an Environmental Impact Statement (EIS) for the Kona Non-Ceded Lands project area[95]. During the survey, 12 archaeological sites were re-identified and re-located. The 12 sites had been previously identified during an archaeological survey conducted in 1990 (Donham 1990).

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[90] Archaeological Research Center Hawaii (Ching) 1978:1
[91] Folk 1980:21-22
[92] Jensen 1992:1
[93] Haun May 2007:ii
[94] Corbin and Wong-Smith 2008
[95] Corbin and Wong-Smith 2007

INFORMANT INTERVIEWS

Informant information for the current project is from interviews conducted for a number of previous cultural impact assessments prepared for Keahuolū, and from follow-up interviews conducted recently. Only information from the interviews that is pertinent to this study is presented here.

Mahealani Pai

Mahealani Pai, Cultural Specialist for Kamehameha Investment Corporation [Bishop Holding Corporation], is a descendent of an *'ohana* who traces their residence in the Kona district to the 1700s, specifically to Honokōhau-Kaloko. He is widely recognized as a cultural practitioner and authority representing the Royal Order of Kamehameha at many public hearings. He is also a contributor to published works, e.g., *Islands in Captivity: The International Tribunal on the Rights of Indigenous Hawaiians* and *All Our Relations: Native Struggles for Land and Life*[96]; and is tireless advocate for the preservation of Hawaiian sites and practices.

Mahealani's *`ohana* resided near the shoreline of Keahuolū during the 1930s, moving there from Honokōhau. They fished Keahuolū waters for *`ōpelu* and *aku*, selling their catch to George Kailiwai *mā*. Mahealani's young father found temporary employment at the sisal mill *ma uka* of the present Queen Ka`ahumanu Highway. Mahealani's grandfather utilized sisal for the making of *kaula* (rope), and he dyed the rope, and used it to secure and hang fishing implements.

Mr. Pai noted that *alahe`e* (*Canthium odoratum*) which was used for the batten of traditional thatched structures, was gathered in the *ma uka* lands of Keahuolū. Mahealani's concern for the present project is that cultural resources like *kauila* (*Alphitonia ponderosa* ), *uhiuhi* (*Mezoneuron kauaiense*), and *alahe`e* (*Canthium odoratum*) be preserved.

Mr. Pai was able to provide information on several places and geographical features in Keahuolū. Mahealani noted a trail his mother would utilize as recently as the 1950s. Starting in Kailua between the current Taco Bell and a car rental agency office, the trail went through Keahuolū onto Kealakehe and Honokōhau. When the seas were *mālie* (calm) they would take the canoe to reach Honokōhau, but when the seas were rough, they would take this trail. The home of Kaelemakule was located at the Kailua end of this trail.

Pai said that Makaeo is the place name for the stretch of area formerly known as the Kailua Kona Airport, where cattle were held before being shipped out on the steamer *Humu`ula*. Makaeo was identifiable by a large coconut grove.

A landmark known as *Pohakūloa* is located south of patches of sand beaches owned by Queen Lili`ūokalani Trust, stands as a lone sentinel for locating a nearby *`ōpelu ko`a*. The *'ōpelu ko`a* is known as *Halepao'o,* for the jumping fish *`o`opu* (general name for fishes included in the families Eleotridae, Gobiidae, and Blennidae).

Mr. Pai also noted that Kalualapauila Heiua is located on the northern *ma uka* boundary of the Kealakehe and Honokohauiki, in the vicinity of La'iopua near the Kealakehe Homestead [this would place the *heiau* outside the current project area]. If this *heiau* can be identified, he notes, it too should be preserved.

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[96] Churchill, W. et al. 2005; Laduke, W, 1999

Clarence A. Medeiros, Jr.

Clarence A. Medeiros, Jr. is a descendant of several well-known *kama`āina* families of the Kona region. The son of Clarence A. Medeiros, Sr. and Pansy Wiwoole Hua Medeiros, his grandparents include Frank C. Medeiros and Violet Mokuohai Parker and Charles Hua, Sr. and Annie Man Sing Zen Hua Weeks. He has familial ties to the lands of Honokua, South Kona, and Haleki`i and Kanaueue, North Kona. Both of his parents were native speakers. His mother, an accomplished weaver, is a descendent of native fishermen and canoe builders. His father descended from two renowned canoe builders, John Mokuohai and Charlie Mokuohai Parker. Clarence Sr. repaired rock walls in Kona and Kohala, including the walls of the National Parks of Pu`uhonua o Hōnaunau and Pu`ukoholā. Clarence Sr. was recognized as a cultural and historical resource, and it was from him and Earl Leslie, Sr. that Clarence Jr. learned much of his knowledge of Hawaiian cultural practices and history.

Clarence, Jr. continues to harvest *maiapilo* or *pilo* (*Capparis sandwichiana)* within Keahuolū for the plant's medicinal properties. During an interview on December 17, 2007 he stated the *pilo* grew readily on the area currently being cleared by Queen Lili`ūokalani Trust, near the Queen Ka`ahumanu Highway [*makai* of the current project area]. According to Clarence, *pilo* does grow *ma uka* of the highway and up to the 300' elevation, but at these elevations it is mixed in with other shrubs and harder to procure. Clarence, Jr. also referred to the sisal plants in Keahuolū used to make rope. Provided with maps of the project areas, Clarence voiced his concern that the environment will be compromised and the *pilo* will be endangered.

Clement "Junior" Kanuha

Clement "Junior" Kanuha is a *kama`āina* of Kona, active in perpetuating Hawaiian practices. He has represented cultural practitioners and cultural descendants on the west side of the island as a member of the West Hawai`i Fisheries Council, at Burial Council hearings, and at many other cultural/environmental organizations. He has assumed the role of caretaker of Keolonahihi *heiau* in Kailua. "Junior" was provided maps of the current subject parcel. During conversations with him on November 9 and December 17, 2008 Junior did not mention any specific cultural practices or sites within the project areas.

Ulalia Ka`ai-Berman

Ulalia Ka`ai-Berman is a *kupuna* with the Department of Education's Kūpuna Hawaiian Studies Program. A child of Ernest Kakihoku Ka`ai and Josephine Ulalia `Ikuwā Ka`ai, her family has over 70 years of residential ties with North Kona. Learned of the *mo`olelo* of Keahuolū from A`ala Roy Akoa between 1970-1981, she is knowledgeable regarding the fishing and farming traditions of the area. During conversations with Ms. Berman she noted the cultural practice of gathering grasses for thatching and the building a hālau at Pāwai in Keahuolū.

Cultural information pertinent to the current project area is presented in the following table:

Table 3. Summary of Cultural Knowledge of Informants

Informant	Relation	Reporter	Site	Notes
Mahealani Pai	`Ohana traces vicinity residency to the 1700s	H.W. Smith	Maka`eo, Pohakūloa near an *`ōpelu ko`a*, Kalualapauila *heiau*. Cultural plants: *alahe`e, kauila, uhiuhi.*	Kalualapauila Heiau on the boundary of Kealakehe and Honokohauiki at La`iopua.
Peter Keka	Kona kama`āina	Kanahele[97]	Maliu Point	Aka Pu`uoina
			Kaukauholo is the name of the beach and cliff area within Keahuolū	
			Hale La`ī o Hi`iaka is synonymous with Hi`iakanoholae and Keahuolū Point	
			Pu`ukaloa	A small *ahu* near a guava tree in Keahuolū
			Hale o Pao`o	Keka considers Pāwai and Papawai different locations. The latter is a flat area *ma uka* of Makaeau rock out side of the old airport, which was made of red cinders.
			Ka`iwi Point	There was an abundance of *pili* grass here.
Michael Ikeda	Employee of QLT & Kona resident for 30 years	PHRI	Areas where lobsters, *āholehole, mamamo and `opelu* can be found	
Clarence Medeiros, Jr.	Kona kama`āina	PHRI	From 300 ft. elevation and below is found the endemic plant *Maiapilo* or *pilo* (*Capparis sandwichiana*)	This plant used for medicinal purposes and is vulnerable. He continues to gather *pilo* for medicinal uses.
			Sisal plant also found in Keahuolū	His father was employed by QLCC and would harvest sisal to use for thatching.
			Repaired boundary and retainer walls in 1974 during the widening and resurfacing of Palani Road from the Palani Junction to Kuakini Hwy.	
Ulalia Ka`ai-Berman	Kupuna	H.W. Smith	Keahuolū	Gathering of grasses for thatching

[97] Kanahele 2001:30-31

SUMMARY AND RECOMMENDATIONS

The cultural impacts to any locale in Hawai`i are not always readily evident. What might be assessed by Western eyes as "barren land" may be a rich resource to Hawaiians; for example, trails would be highly valued, the land may yield harvesting material like *pili* grass, or may have spiritual aspects having to do with the wind or other natural phenomenon.

Based on previous and the current research, permanent prehistoric populations in Keahuolū appear to have been present along the coast, the midlands were used for temporary habitation and were crossed by trails linking the coast to the uplands, and the uplands were used for agricultural cultivation.

The documentary information on Keahuolū indicates several *heiau* along the coast, along with several probable permanent residential sites with enclosed yards. Sources reveal the preponderance of burials in coastal areas, and in particular in sand dunes. Further inland, caves, lava blisters and other modified features revealed human remains less frequently. Inland there are sites and features indicative of dryland agriculture substantiated by Mahele testimonies of *kalo*, potato, and limited coffee cultivation. Features indicating temporary habitation were also identified. In the upper elevations, there was a substantial increase in rock mounds, particularly faced mounds and modified lava blisters collaborating with the tradition of increased agricultural activities *ma uka*, where the moisture increases. Documentary information indicates Keahuolū was exposed to far less livestock grazing than Kealakehe to the north. The lesser grazing activity increases the likelihood of cultural sites to remain intact or to suffer less degradation.

Reviewing the information presented in this cultural impact assessment – historical documentation, archaeological surveys and research, and oral reminiscences – reveal only a few cultural activities in the project area. For Keahuolu, contemporary or continuing cultural practices include gathering of ocean resources and specific plants from the 300-foot elevation seaward. The current project area is not within this seaward area. One cultural practitioner has spoken of the availability and the gathering of *pili*, and in the literature are general references to features such as the wind. Halepao'o, an *'ōpelu ko'a*, is referenced at Pāwai.

Based on the findings of this assessment, the current project area development will have little effect on Hawaiian cultural resources, beliefs, and practices.

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APPENDIX A:

THE PRESENT STUDY SCOPE AND METHODOLOGY IN RELATION TO CULTURAL IMPACT ASSESSMENT ISSUES AND THE OEQC GUIDELINES

CULTURAL IMPACT ASSESSMENT AND OEQC GUIDELINES

To understand the cultural impact assessment issue, particularly as it is addressed by the present study, a summary review of the intent and evolution of the OEQC guidelines is necessary. The guidelines evolved out of what are commonly referred to as "PASH/Kohanaiki" issues – issues relating to native Hawaiian traditional and customary access and land use rights as they were reasserted by a State Supreme Court decision in August 1995 and further clarified in its 1998 decision in State v. Hanapi – and the need for appropriate means to address these issues within the State environmental impact review process. For a good discussion of the issues and options involved, the "Report on Native Hawaiian Traditional and Customary Practices Following the Opinion of the Supreme Court of the State of Hawai'i in Public Access Shoreline Hawai'i v. Hawai'i County Planning Commission" prepared by the PASH/Kohanaiki Study Group (1998) should be consulted.

Initial attempts to address various issues relating to native Hawaiian traditional and customary access and land use rights within the framework of the State environmental impact review process were made in the form of proposed changes to the State EIS law as contained in Chapter 343 (HRS). These attempts to require a formal cultural impact assessment failed to pass the State legislature in 1996 and 1997.

A subsequent, second attempt to address various issues relating to native Hawaiian traditional and customary access and land use rights was made in the form of proposed changes in the "Administrative Rules" for compliance with Chapter 343 (DOH Title 11, Chapter 200). This attempt to require an explicitly defined cultural impact assessment also failed, as the governor declined to approve the proposed amendments.

The third attempt to address various issues relating to native Hawaiian traditional and customary access and land use rights within the State environmental impact review process resulted in the current OEQC "Guidelines for Assessing Cultural Impacts" (OEQC 1997b). Draft guidelines were initially issued for public review and comment on September 8, 1997. The Environmental Council formally adopted the guidelines in their final form on November 19, 1997.

The relationship of the OEQC guidelines to the State Supreme Court "PASH decision" was clearly stated on the front page of the September 8, 1997 issue of the OEQC bulletin, *"The Environmental Notice,"* when the draft guidelines were first issued for public review and comment:

> For years, a controversy has simmered over developer's responsibility to perform a "Cultural Impact Study" prior to building a project. The recent Supreme Court "PASH" decision reaffirmed the state's duty to protect the gathering rights of native Hawaiians. In light of these events, the Environmental Council has drafted a guidance document to provide clarity on when and how to assess a project's impacts on the cultural practices of host communities.

It should be noted that the guidelines for cultural impact assessment are meant to include consideration of all the different groups comprising the multi-ethnic community of Hawai'i; however, this inclusiveness is generally understated, and the clear emphasis is meant to be upon aspects of native Hawaiian culture.

More than 20 letters were received by OEQC in response to the publication of the draft guidelines, and relevant comments were said to have been incorporated into a final version of the guidelines (OEQC n.d.). The Environmental Council formally adopted the final guidelines (OEQC 1997b) on November 19, 1997. The final guidelines are virtually identical to the draft guidelines initially published on September 8, 1997, and the degree to which any of the received comments on the draft guidelines were considered prior to issuance of the final guidelines is uncertain. In fact, the overall process through which the guidelines were prepared and adopted brings out several important questions relating to such topics as (a) the source or basis utilized for the content of the guidelines, (b) the background and qualifications of the preparer(s) of the guidelines, (c) the criteria to be used for the adequacy of cultural impact assessment studies prepared in response to the guidelines, and (d) the legal question of how compliance can be required when the standards are guidelines.

According to the Chair's Report contained in *The 1997 Annual Report of the Environmental Council*, the Cultural Impacts Committee drafted the guidelines:

> The Committee drafted guidelines recommending a methodology to assess the impact of proposed actions on cultural resources, including Native Hawaiian cultural resources, values, and beliefs. The guidelines also specify the contents of a cultural impact assessment.
>
> To prepare the Guidelines, the Committee reviewed public testimony and solicited input from interested parties. Expertise from the DLNR's Historic Preservation Division as well as Federal regulations governing the "Protection of Historic Properties" were used to model the draft guidelines.
>
> The draft cultural impact guidelines were published for review and comment in the Sept. 8 *Environmental Notice*, and over 20 letters were received. Relevant comments were incorporated into a final draft version of the guidelines, which were adopted as a policy document by the Environmental Council on November 19, 1997 (OEQC n.d.:5).

Direct inquiries to OEQC (Gary Gill, then-Director) and SHPD (Dr. Holly McEldowney, then-Staff Specialist in the History and Culture Branch) provided additional background information relating to the formulation of the cultural impact assessment guidelines. The principal author or compiler of the guidelines was Arnold Lum, Esq., a member of the Environmental Council's Cultural Impacts Committee. Mr. Lum was also a staff attorney at the Native Hawaiian Legal Corporation. OEQC staff also assisted in the preparation of the guidelines. Several internal drafts were prepared, reviewed, and revised. Preparation of the guidelines relied to some degree upon National Register Bulletin No. 38, *Guidelines for Evaluating and Documenting Traditional Cultural Properties* (Parker and King 1990) for basic content information. Other sources, including the SHPD draft rules for conducting ethnographic surveys and dealing with traditional cultural properties (DLNR n.d.), were consulted; in fact, a copy of the SHPD draft rules was provided to OEQC and the Cultural Impacts Committee by then-SHPD Administrator, Dr. Don Hibbard. Professional staff in the SHPD-History and Culture Branch took part in the preparation and review of the guidelines. Certainly the inclusion of such professional anthropological and historical expertise in the preparation of the guidelines was appropriate; however, much of the professional advice on the extent to which detailed expectations – regarding study scope, content, methodology, documentation, and impact assessment – should be explicitly addressed in the guidelines was apparently discounted.

The most recent attempt to address various issues relating to native Hawaiian traditional and customary access and land use rights within the State environmental impact review process resulted in the amendment to *Chapter 343 (Haw.Rev.Stat.),* as amended by H.B. No.2895, H.D.1 of the Hawai'i State Legislature (2000) and approved by the Governor as *Act 50* on April 26, 2000. While no specific administrative rules for the implementation of this amendment have been adopted, it is generally accepted that the *Guidelines* previously prepared and adopted by the State Office of Environmental Quality Control (OEQC 1997) are meant to provide general compliance guidance.

The OEQC *Guidelines* consist of three basic sections. The first section is an introduction which notes the various statutory and other bases for addressing potential impacts upon cultural resources within the context of the environmental assessment review process, and "...encourages preparers of environmental assessments and environmental impact statements to analyze the impact of a proposed action on cultural practices and features associated with the project area" (OEQC 1997:1). The second section of the guidelines discusses methodological considerations for conducting cultural impact assessments, and presents a recommended six-step protocol to be followed by the assessment preparers. The third section of the guidelines outlines eleven topics or "matters" that a cultural assessment should address; these topics basically represent the desired content and organization of a cultural impact assessment report.

As "guidelines," the OEQC Guidelines would seem to have neither the specific statutory authority of law, nor the regulatory authority of administrative rules. As guidelines, they can be regarded as providing general guidance; that is, they represent general suggestions and recommendations as to how to approach the assessment of potential cultural impacts. The guidelines provide little or no guidance relative to many important questions, perhaps the most significant of which would be the following:

1. How would project-specific determinations be made as to whether or not a cultural impact assessment study might even be necessary or appropriate – given the specific nature and location of a proposed project;

2. If a cultural impact assessment study is to be conducted, how does one determine what constitutes an appropriate project-specific level of effort – that is, the general scope of work or objectives for the study, and the specific tasks or activities required to accomplish successfully the scope of work or objectives;

3. What criteria are to be used for determining the credibility and reliability of potential cultural information sources (generally referred to as "informants" or "knowledgeable individuals");

4. If specific cultural practices, beliefs, or features are definitely identified as being associated with a project area, what criteria are to be applied for evaluating (a) the descriptive adequacy and (b) the cultural authenticity of the identified practices, beliefs, or features;

5. If specific culturally authentic practices, beliefs, or features are definitely identified as being associated with a project area, what criteria are to be used for assessing the nature and extent of potential impacts of a proposed project on the identified practices, beliefs, or features – that is, "no effect," "no adverse effect," or "adverse effect;"

6. If a project is determined to have potentially adverse impacts upon specific identified culturally authentic practices, beliefs, or features, what criteria are to be used for evaluating the adequacy and appropriateness of alternative potential mitigation actions;

7. Within the purview of what regulatory office or agency would the review and acceptance or rejection of a completed cultural impact assessment study legitimately fall; and

8. What standards or criteria are to be used to evaluate the overall adequacy or acceptability of a completed cultural impact assessment study?

Consideration of these questions, and their implications, has direct relevance to the present cultural impact assessment study. These implications relate most importantly to (a) the level of study effort believed appropriate for the project-specific context, and (b) the rationale adopted for both the study overall, as well as for the identification and evaluation of any identified cultural practice claims, the assessment of potential project-specific impacts, and the formulation of any specific recommendations for further study or other mitigation actions.

BASIC GUIDANCE DOCUMENTS

Several references are available to serve as basic guidance documents for carrying out cultural impact assessment studies of various scopes and intensities. The principal sources are the following:

1. The OEQC Guidelines for Assessing Cultural Impacts (OEQC 1997);

2. The Native Hawaiian Rights Handbook (MacKenzie 1991), and more specifically the discussions of traditional and customary rights contained in the two chapters on access rights (Lucas 1991a) and gathering rights (Lucas 1991b);

3. The Report on Native Hawaiian Traditional and Customary Practices Following the Opinion of the Supreme Court of the State of Hawai'i in Public Access Shoreline Hawaii v. Hawai'i County Planning Commission prepared by the PASH/Kohanaiki Study Group (1998);

4. The text of several relevant decisions of the Hawai'i Supreme Court, including the decision commonly referred to as the "PASH decision" (1995), and the more recent decisions in State of Hawai'i v. Alapa'i Hanapi (1998) and Ka Pa'akai o Ka 'Aina et al. v. Land Use Commission, State of Hawai'i et al. (2000);

5. The federal regulations of the Advisory Council on Historic Preservation for the National Register of Historic Places (CFR 1981) and the Protection of Historic Properties (CFR 1986);

6. National Register Bulletin No. 38, Guidelines for Evaluating and Documenting Traditional Cultural Properties (Parker and King 1990); and

7. Recently approved versions of the State Historic Preservation Division (SHPD) administrative rules (effective December 11, 2003), including Chapter 275: Rules Governing Procedures for Historic Preservation Review for Governmental Projects Covered Under Sections 6E-7 and 6E-8, HRS (DLNR 2002a), and

8. Chapter 284: Rules Governing Procedures for Historic Preservation Review to Comment on Chapter 6E-42, HRS, Projects (2002b), as well as an earlier draft Chapter 284--Rules Governing Procedures for Ethnographic Inventory Surveys, Treatment of Traditional Cultural Properties, and Historical Data Recovery (DLNR n.d.).

While the general nature and content of the first four referenced sources are self-explanatory, further comment should be made regarding the final three items. In the absence of any formally adopted administrative rule specifically addressing the treatment of traditional cultural properties, SHPD currently utilizes National Register Bulletin No. 38, *Guidelines for Evaluating and Documenting Traditional Cultural Properties* (Parker and King 1990), as its principal source of guidance for reviewing and evaluating the adequacy and acceptability of traditional cultural property study reports prepared in connection with various permit applications for which SHPD regulatory review is required. Bulletin No. 38 provides detailed guidance for the assessment of traditional cultural properties within the framework of the National Register significance criteria evaluation process (NPS 1990).

The SHPD draft administrative rule relating to ethnographic surveys and traditional cultural properties (DLNR n.d.) has existed in finalized draft version since at least early 1997; however, it has never been circulated openly, much less formally provided for public review, comment, and eventual adoption by the Department of Land and Natural Resources. This situation is unfortunate because the draft rule goes well beyond National Register Bulletin No. 38 in providing detailed guidance for conducting traditional cultural property studies, and more specifically for dealing with the identification, evaluation, and documentation of native Hawaiian traditional cultural properties and their associated cultural practices and beliefs.

In the absence of any formally adopted administrative rule specifically addressing the treatment of traditional cultural properties, SHPD can also be said to basically follow the federal regulations of the Advisory Council on Historic Preservation for guidance in the evaluation of significance – as contained in Section 60.4 ("Criteria for evaluation") of the "National Register of Historic Places" (CFR 1981), and for guidance in the assessment of potential effects – as contained in Section 800.9 ("Criteria of effect and adverse effect") of the "Protection of Historic Properties" (CFR 1986).

PRESENT STUDY SCOPE AND METHODOLOGY

The scope of work and methodology for the current project is based on the general assumption that the level of study effort appropriate in any project-specific context should involve the consideration of several factors, the most relevant of which are the following: (a) the probable number and significance of known or suspected cultural properties, features, practices, or beliefs within or associated with the specific project area; (b) the potential number of individuals (potential informants) with cultural knowledge of the specific project area; (c) the availability of historical and cultural information on the specific project area or immediately adjacent lands; (d) the physical size, configuration, and natural and human modification history of the specific project area; and (e) the potential effects of the project on known or expected cultural properties, features, practices, or beliefs within or related to the specific project area.

Consideration of these factors within the specific nature and context of the proposed project, it was thought the most appropriate level of study for an adequate assessment of potential cultural impacts would be a limited assessment study. Based on the location, project size, number and quality of sites, this study assumes that (a) potential cultural impact assessment issues would be low, (b) the results of the archaeological survey for the project would confirm both the limited number and scope of cultural resources within or in the vicinity of the project area, and (c) in the instance that any legitimate cultural impact assessment issues should arise during the environmental review period, they could be addressed

adequately within the framework of the review process (i.e., from Draft to Final Environmental Impact Statement).

Consideration of these factors within the specific nature and context of the proposed project indicated that the relatively greater levels of study effort that can be characterized as identification or documentation studies would be inappropriate and excessive. The distinctive characteristics of an identification study are that it would be restricted to (a) the identification of native Hawaiian or other ethnic group cultural practices, beliefs, properties, features, or exploitable natural resources associated with and/or present within or related to the specific project area that are currently being conducted by and/or known to individual cultural practitioners or groups, and (b) the collection of information reasonably sufficient so as to define the general nature, location, and likely authenticity of identified cultural claims. An identification study would not involve the considerably greater level of study effort – both calendar months and hours of labor – needed to carry out a full documentation study. The distinctive characteristics of the latter, which would commonly be referred to as a full ethnographic or oral history study, would be (a) the collection of detailed information regarding identified native Hawaiian or other ethnic group cultural practices by means of formal oral history interviews which are usually tape recorded and transcribed, and (b) the analysis and synthesis of all collected data – from interviews, as well as relevant historical documentary and archival research – within the general cultural-historical context of traditional native Hawaiian or other ethnic group culture and the defined specific geographical area of a specific project.

The overall rationale guiding the present limited assessment study has been that the level of study effort should be commensurate with the potential of the proposed project for making any adverse impacts upon any native Hawaiian or other ethnic group cultural practices currently conducted by cultural practitioners within the project area. The study presented in this report is believed to comprise a reasonable approach for the assessment of potential cultural impacts within this specific project area.

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CFR (US Code of Federal Regulations)

1981 36 CFR Part 60: National Register of Historic Places. (Including Part 60.4: Criteria for evaluation.)

~~1986~~1986 36 CFR Part 800: Protection of Historic Properties. (Including Part 800.9: Criteria of effect and adverse effect.)

DLNR (Department of Land and Natural Resources, State of Hawai`i)

2002a Chapter 275: *Rules Governing Procedures for Historic Preservation Review for Governmental Projects Covered Under Sections 6E-7 and 6E-8, HRS.* Hawaii Administrative Rules; Title 13, Department of Land and Natural Resources; Subtitle 13, State Historic Preservation Division Rules. (October) (Effective December 11, 2003)

2002b Chapter 284: *Rules Governing Procedures for Historic Preservation Review to Comment on Chapter 6E-42, HRS, Projects.* Hawaii Administrative Rules; Title 13, Department of Land and Natural Resources; Subtitle 13, State Historic Preservation Division Rules. (October) (Effective December 11, 2003)

n.d. Chapter 284: *Rules Governing Procedures for Ethnographic Inventory Surveys, Treatment of Traditional Cultural Properties, and Historical Data Recovery.* Hawaii Administrative Rules; Title 13, Department of Land and Natural Resources; Subtitle 13, State Historic Preservation Division. (Draft rule; 1997)

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APPENDIX D

BOTANICAL SURVEY

Botanical Survey

of the

Queen Lili‘uokalani Village Subdivision Offsite Sewer Line Corridor North Kona, Island of Hawai‘i

by

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Report prepared for

Belt Collins Hawai‘i Ltd.
Honolulu, Hawai‘i

January 2008

INTRODUCTION

The study site comprises a proposed 50 ft-wide corridor route extending from Keanalehu Drive eastward about 3615 ft to Palani Road (Fig. 1). The construction of the pipeline requires a botanical survey, especially since there are federally listed, threatened and endangered plant species occurring in the general vicinity. The site is currently covered with a scrubby vegetation dominated by native and alien shrub and tree species on lava flows of various ages.

A botanical survey was carried out by Char and Associates in 1989 on the area that is adjacent to the sewer line corridor, but that survey included a much larger area comprising 1100 acres, some of it extending west of the present study site and makai of the Queen Ka'ahumanu Highway. Another botanical survey was carried out in 2007 on an affordable housing project parcel (Whistler 2007), which is contiguous with the sewer line corridor. A third botanical survey (Whistler 2008) was carried out later in the same year for a reservoir for the same affordable housing project, and its access road covers part of the present sewer line corridor.

The objectives of the current field study were to provide a general description of the vegetation types present (particularly any sensitive types of vegetation that may harbor rare plant species), to make a checklist of all native and naturalized vascular plants found, and to search for threatened and endangered species.

METHODOLOGY

Before the fieldwork was carried out, a review of the literature was undertaken by the Principal Investigator (PI). The current status of any endangered species previously reported from the general area was checked using the official database of threatened and endangered species (USFWS 2005). This list is identical to the State of Hawai'i list of threatened and endangered plant species. In addition, information about threatened and endangered plant species found in the area was extracted from the Hawai'i Natural Heritage Program database (Anon. 2005) of federally listed plant species, and is presented here in the form of a map of these collections and sightings (Fig. 2).

After the literature review, a botanical field survey was conducted along the 50 ft-wide corridor by a two-person botanical team consisting of the PI (Art Whistler) and a Field Assistant (Beate Neher) on 15 December 2007. All plant species encountered during the survey were recorded, along with an indication of their frequency. Particular care was taken in 'a'a areas, since this type of habitat is where native species, including threatened and endangered plants, are most likely to occur. These notes were combined into a comprehensive checklist of all plants found along the corridor (see Table 2 in the Appendix). Notes were also taken on vegetation types present, indicating the dominance and frequency of the plant species found there. These were later analyzed and written up to form the vegetation section below. All the species encountered during the fieldwork were familiar to the field team and were identified in the field.

THE VEGETATION

Only two types of vegetation can be recognized along the corridor: (1) Managed Land Vegetation; and (2) *Schinus/Psydrax* Scrub. These are described below.

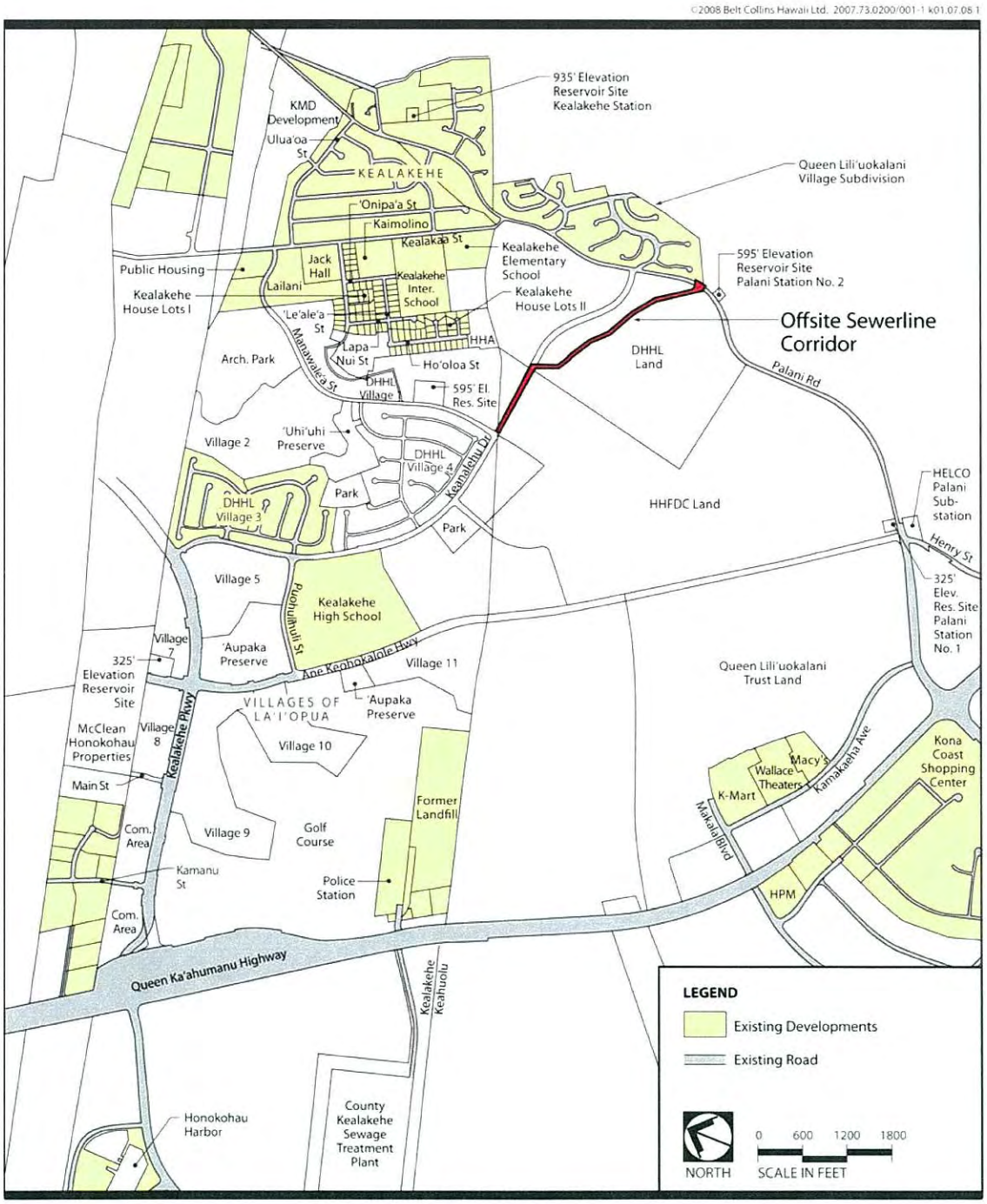

Fig. 1. The Queen Lili'uokalani Subdivision sewer line corridor.

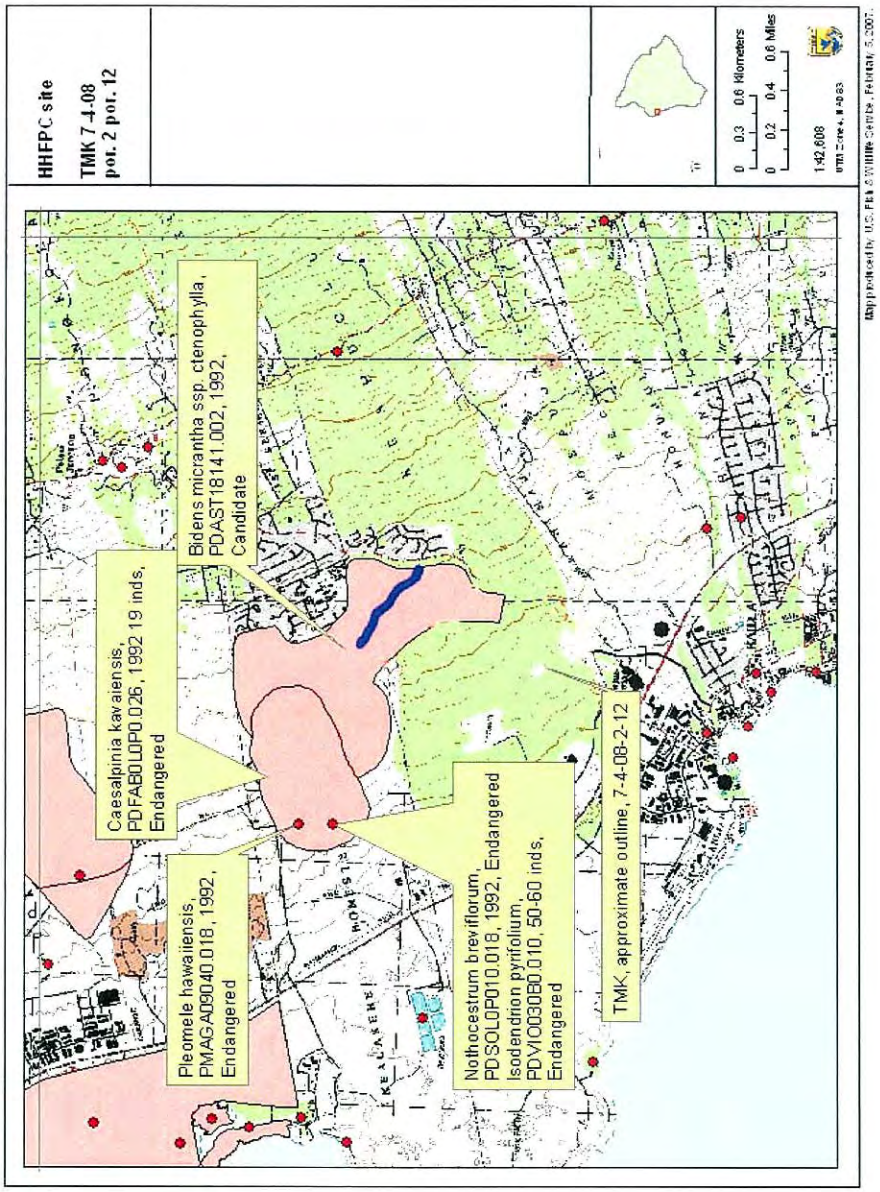

Fig. 2. Hawai'i Natural Heritage Program map of federally listed plant species in the area, with sewer line route in blue.

(1) Managed Land Vegetation

This comprises land that is under periodic or frequent management, such as dirt roads or recently bulldozed tracks. It is a relatively minor component of the overall vegetation on the sewer line corridor, where it comprises a short, recently bulldozed track dominated mostly by weeds, particularly the alien subshrub coffee senna (*Senna occidentalis*), fountain grass (*Pennisetum setaceum*), koa haole (*Leucaena leucocephala*), and talinum (*Talinum triangulare*). One unusual plant was found in the bulldozed track, auhuhu (*Tephrosia purpurea*), which is an ancient Polynesian introduction to Hawai'i and uncommon in part of Hawai'i.

(2) *Schinus/Psydrax* Scrub

This is the type of vegetation that covers nearly the whole extent of the sewer line corridor (Fig. 3). It is the same vegetation described by Char and Associates (1989) as "*Canthium*/ Christmas Berry Shrubland" (*Canthium* is the old name for *Psydrax*). It is also the same vegetation described by Whistler (2007, 2008) under the same name. It is dominated by three tree species, the alien Christmas berry (*Schinus terebinthifolius*), the indigenous alahe'e (*Psydrax odoratum*), and the alien koa haole (*Leucaena leucocephala*). Christmas berry was the overall dominant, followed by alahe'e, with lesser amounts of koa haole. Other occasional-to-uncommon tree and shrub species found here include the endemic mamane (*Sophora chrysophylla*), the indigenous 'a'ali'i (*Dodonaea viscosa*), the indigenous 'ilima (*Sida fallax*), Polynesian-introduced noni (*Morinda citrifolia*), and the alien autograph tree (*Clusia rosea*). A single individual of strawberry guava (*Psidium cattleanum*) was found along the route; this species is often dominant upslope in much wetter, disturbed areas. The endemic subshrub *Bidens micrantha* ssp. *ctenophylla* is also present, but is very uncommon in the corridor.

The ground cover in this vegetation is variable. In some places the lava rock is nearly devoid of herbaceous species, particularly in shady places under a dense canopy of Christmas berry. In other places, particularly in clearings, shrubs and herbs dominate (Fig. 4), particularly *Pennisetum setaceum* (fountain grass) and air plant (*Kalanchoë pinnata*). Other species mixed with these two include the alien shrubs lantana (*Lantana camara*), indigo (*Indigofera suffruticosa*), and partridge pea (*Chamaecrista nictitans*), and the alien grass Natal redtop (*Rhynchelytrum repens*). Two vines are also present, the indigenous huehue (*Cocculus trilobus*), which is common, and the alien rosary pea (*Abrus precatorius*), which is occasional. Two native herbs occur here, spurflower (*Plectranthus parviflorus*) and 'ala'ala-wai-nui (*Peperomia leptostachya*), both of them uncommon.

This vegetation is classified as disturbed because of the high number of alien species present. The main disturbance is caused by fires that periodically sweep through the vegetation. Additionally, goats probably occur in the area and affect its vegetation by grazing. The current vegetation somewhat matches the description of the "Lowland Dry Shrublands" noted in Wagner et al. (1999). It was described as being open and not exceeding 10 ft in height, and as occurring in leeward situations on most of the main islands from 330 to 2000 ft elevation.

THE FLORA

Forty-two plant species (see Table 2 in the Appendix) were recorded along the corridor. This includes nine native plant species—two endemic and seven indigenous species (Table 1). Indigenous plants are species that are native to a region or place, but are also found elsewhere. Endemic plants are species restricted to a single region or area, i.e., in the case of Hawai'i, they are found only in Hawai'i. In biodiversity terms, the endemic status is the more important of the two categories, since if a species belonging to it is endangered or threatened in Hawai'i, it would likewise be classified globally. Indigenous species, however, can be rare in Hawai'i, but may be common elsewhere in the Pacific. Over 90% of the native plants in Hawai'i are endemic, one of the highest rates in the world. The majority of the species encountered during the survey are naturalized "alien" plants that were accidentally or intentionally introduced to Hawai'i, but which have now become established in the islands and can spread on their own.

Table 1. Native species recorded along the sewer line corridor.

Species	Common Name
Endemic Species	
Bidens micrantha ssp. *ctenophylla*	----------
Sophora chrysophylla	mamane
Indigenous Species	
Cocculus trilobus	huehue
Dodonaea viscosa	a'ali'i
Peperomia leptostachya	'ala'ala-wai-nui
Plectranthus parviflorus	spurflower
Psydrax odoratum	'alahe'e
Sida fallax	'ilima
Waltheria indica	'uhaloa

DISCUSSION

A total of 42 plant species was recorded along the corridor, with nine of them native—two endemic and seven indigenous. No species federally listed as threatened or endangered were found. One endemic subshrub found at the reservoir site, *Bidens micrantha* ssp. *ctenophylla*, was at one time considered a candidate species for one of these categories, but it has no current protected status. It occurs in other places north of Kona, where it is sometimes found even in disturbed places such as quarries (Whistler 2006). It is shown in the Hawai'i Natural Heritage Program Database map (Fig. 2) as occupying the area of the reservoir site, and this was found to be true. It is, however, very uncommon at the site.

Several threatened or endangered species have been reported in the area of the sewer line corridor, and are shown on the Hawai'i Natural Heritage Program database map (Fig. 2). Uhiuhi (*Caesalpinia kavaiensis*) was recorded north of the corridor, but it was not found during the

present study nor in the Keahuolu housing project studies (Whistler 2007, 2008). There is a single record of hala pepe (*Pleomele hawaiiensis*) collected in the uhiuhi area northwest of the corridor in 1992, but it was not seen by Char and Associates (1989) in the larger area south of this population nor during the earlier Keahuolu studies. There is a relatively large population at Kaloko a few miles north of the current study site (Whistler 2006). 'Aaea (*Nothocestrum brevifolium*) was found in 1992 near the record of hala pepe, but it was not seen by Char and Associates (1989) in the larger area south of this population, nor during the earlier Keahuolu studies. At about the same point, a population of about 50 to 60 individuals of aupaka (*Isodendrion pyrifolium*) was found in 1992, but this shrub was not seen by Char and Associates in the larger area south of this population, nor during the earlier Keahuolu studies. Consequently, no endangered or threatened species are found in the corridor.

No sensitive types of vegetation were found. Such types of vegetation include wetlands and dryland forest. No wetland could occur at the reservoir site due to the dry, lava-covered surface at the site. Dryland forest with sensitive plant species occurs at Kaloko to the north of the present study site, but none was encountered at the study site itself.

CONCLUSIONS AND RECOMMENDATIONS

Based upon the survey, there are two kinds of vegetation along the corridor: (1) Managed Land Vegetation; and (2) *Schinus/Psydrax/Leucaena* Scrub. Neither of these is comprised predominantly of native species. None of the nine native plant species, out of a total of 42 species, recorded along the corridor are federally listed as "threatened" or "endangered." No areas of wetlands or undisturbed native vegetation occur at the site. Consequently, there are no botanical impediments to carrying out the proposed sewer line construction.

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APPENDIX

Table 2. Checklist of Plant Species found in the sewer line corridor

The following is a checklist of the vascular plants inventoried during the field studies on the Queen Lili'uokalani Village Subdivision Offsite Sewer Line Corridor. The plants are divided into three groups, Ferns (including fern allies), Monocots, and Dicots. Within these groups, the species are presented taxonomically by family, with each family and each species in the family in alphabetical order. The taxonomy and nomenclature of the ferns follow Palmer 2003 and the flowering plants (Monocots and Dicots) follow Wagner *et al.* (1999). In most cases, common English and/or Hawaiian names listed here have been taken from St. John (1973) or Porter (1972).

For each species, the following information is provided:

1. Scientific name with author citation.
2. Common English and/or Hawaiian name, when known.
3. Biogeographical status. The following symbols are used.
   E = endemic (found only in Hawai'i).
   I = indigenous (native to Hawai'i as well as other geographic areas).
   P = Polynesian introduction (introduced to Hawai'i by Polynesians before the advent of the Europeans).
   X = Introduced or alien (not native, introduced to Hawai'i, either accidentally or intentionally, after the advent of the Europeans).

Species	Common Names	Status[1]
FERNS AND FERN ALLIES		
NEPHROLEPIDACEAE (Sword Fern Family)		
Nephrolepis multiflora (Roxb.)	hairy swordfern	X
POLYPODIACEAE (Common Fern Family)		
Phymatosorus grossus (Langsd. & Fisch.) Brownlie	laua'e	X
AGAVACEAE (Agave Family)		
Agave sisalana Perr.	agave	X
MONOCOTS		
POACEAE (Grass Family)		
Melinus minutiflora P. Beauv.	molasses grass	X
Panicum maximum Jacq.	Guinea grass	X
Pennisetum setaceum (Forssk.) Chiov.	fountain grass	X
Rhynchelytrum repens (Willd.) C.E. Hubb.	Natal redtop	X

Species	Common Names	Status[1]
	DICOTS	
ANACARDIACEAE (Mango Family)		
Schinus terebinthifolius Raddi	Christmas berry	X
APOCYNACEAE (Periwinkle Family)		
Catharanthus roseus (L.) G. Don	Madagascar periwinkle	X
ASTERACEAE (Sunflower Family)		
Bidens micrantha Gaud. ssp. *ctenophylla* (Sherff) Nagata & Ganders	----------	E
BIGNONIACEAE (Bignonia Family)		
Jacaranda mimosifolia D. Don	jacaranda	X
CLUSIACEAE (Mangosteen Family)		
Clusia rosea Jacq.	autograph tree	X
CRASSULACEAE (Stonecrop Family)		
Kalanchoë pinnata (Lam.) Pers.	air plant	X
CUCURBITACEAE (Gourd Family)		
Coccinea grandis (L.) Voigt	ivy gourd	X
EUPHORBIACEAE (Spurge Family)		
Aleurites moluccana (L.) Willd.	candlenut, kukui	P
FABACEAE (Pea Family)		
Abrus precatorius L.	rosary pea	X
Acacia farnesiana (L.) Willd.	klu	X
Chamaecrista nictitans (L.) Moench	partridge pea, lau-ki	X
Desmodium incanum DC.	Spanish clover	X
Desmodium tortuosum (Sw.) DC.	Florida beggarweed	X
Indigofera suffruticosa Mill.	indigo, ‘iniko	X
Leucaena leucocephala (Lam.) de Wit	koa haole	X
Senna occidentalis (L.) Link	coffee senna	X
Sophora chrysophylla (Salisb.) Seem.	mamane	E
Tephrosia purpurea (L.) Pers.	auhuhu	P
LAMIACEAE (Mint Family)		
Plectranthus parviflorus Willd.	spurflower	I
MALVACEAE (Mallow Family)		
Sida fallax Walp.	‘ilima	I
MENISPERMACEAE (Moonseed Family)		
Cocculus trilobus (Thunb.) DC.	huehue	I
MYRTACEAE (Myrtle Family)		
Psidium cattleianum Sabine	strawberry guava	X
Psidium guajava L.	guava	X
OCHNACEAE (Ochna Family)		
Ochna thomasiana Engl. & Gilg	Mickey-mouse plant	X

Species	Common Names	Status[1]	Site 1	Site 2
PASSIFLORACEAE (Passionflower Family)				
Passiflora suberosa L.	----------	X		
PHYTOLACCACEAE (Pokeweed Family)				
Rivina humilis L.	rouge plant	X		
PIPERACAEAE (Pepper Family)				
Peperomia leptostachya Hooker & Arnott	‘ala‘ala-wai-nui	I		
PORTULACACEAE (Purslane Family)				
Talinum triangulare (Jacq.) Willd.	talinum	X		
RUBIACEAE (Coffee Family)				
Morinda citrifolia L.	Indian mulberry, noni	P		
Psydrax odoratum (Forst. f.) A. C. Sm. & S. Darwin	alahe‘e	I		
SAPINDACEAE (Soapberry Family)				
Dodonaea viscosa Jacq.	‘a‘ali‘i	I		
STERCULIACEAE (Cacao Family)				
Waltheria indica L.	‘uhaloa	I		
VERBENACEAE (Verbena Family)				
Lantana camara L.	lantana	X		
Stachytarpheta cayennensis (Rich.) Vahl	blue rat’s-tail	X		
Stachytarpheta dichotoma (Ruiz & Pav.) Vahl	owi	X		

Status[1]: I = Indigenous. E = Endemic. X = Alien (introduced). P = Polynesian introduction.

Fig. 3. *Schinus/Psydrax* Scrub vegetation along the corridor.

APPENDIX E

AVIFAUNAL AND FERAL MAMMAL SURVEY

AVIFAUNAL ANDA FERAL MAMMAL SURVEY OF THE PROPOSED QUEEN LILI'UOKALANI VILLAGE SUBDIVISION OFFSITE SEWER LINE CORRIDOR, NORTH KONA, ISLAND OF HAWAII

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21 July 2008

INTRODUCTION

The purpose of this report is to provide the findings of a two day (16, 17 July 2008) field survey of the proposed Queen Lili'uokalani Village Subdivision Offsite Sewer Line Corridor in North Kona, Island of Hawaii. In addition to the data obtained from the field survey, relevant published and unpublished sources are also noted in the report. These sources add a broader perspective of the wildlife resources in this region of the island. In particular data are compared with two earlier studies (Bruner 1989, 2008) that I conducted in this area and surrounding lands. The goals of the survey were:

1- Document the species of birds and mammals observed along the proposed sewer line corridor.

2- Note the natural resources available to wildlife along the proposed sewer line corridor.

3- Devote special attention to documenting the presence and possible use of this portion of the property by native and migratory species particularly those that are listed as threatened or endangered.

SITE DESCRIPTION

The proposed sewer line corridor is presently covered in dense, second growth forest composed of primarily alien (non-native) species of trees, brush and grass. This proposed sewer line corridor does not differ in its appearance and array of plants from that seen throughout the surrounding property (Fig.1).

SURVEY PROTOCOL

The field survey was conducted over two consecutive days (16, 17 July 2008). Avian data were collected in the early morning and late in the day when birds are most active and more easily detected. The proposed sewer line corridor was covered on foot and all birds seen or heard were noted. Observations of mammals were limited to visual sightings. No attempts were made to trap mammals in order to obtain relative abundance estimates. The evening of 16 July 2008 was devoted to a search for the presence of the endangered Hawaiian Hoary Bat (*Lasiurus cinereus semotus*). A Petterson Elektronic AB Ultrasound Detector D 100 was used to listed for echolocating bats at several sites on and near the proposed sewer line corridor.

Weather during the survey was mixed with clear mornings and cloudy afternoon/early evening. The winds were light which made for easy detection of

vocalizing birds. Scientific and common vernacular names used in this report follow Honacki et al. (1982), and Pyle (2002).

RESULTS AND DISCUSSION

Native Land Birds:

No native land birds were observed on this survey. This was also the case in the earlier surveys (Bruner 1989, 2008). The only species that might on occasion occur in this area are the endangered Hawaiian Hawk or 'Io (*Buteo solitarius*) and the Hawaiian Short-eared Owl or Pueo (*Asio flammeus sandwichensis*) (Pratt et al. 1987, Hawaii Audubon Society 2005). Pueo are not listed as endangered or threatened on the island of Hawaii, however, the State of Hawaii does list the Pueo population on Oahu as endangered.

Native Waterbirds:

No native waterbirds were found and none would be expected at this location. No wetland habitat was found on the survey.

Seabirds:

No nesting seabirds were seen on the survey nor would any be expected to nest in this area due to predators and human disturbance. Some species might on rare occasion be seen flying over the property, (pers. observ.).

Migratory Birds:

No migratory shorebirds were observed. No habitat suitable for shorebirds currently occurs along the proposed sewer line corridor.

Alien (Introduced) Birds:

Only nine alien species were detected along the proposed sewer line corridor as opposed to 19 species on the surrounding property (Bruner 2008). Table One notes these species along side those recorded during the Bruner (1989 and 2008) survey. None of these birds are listed as threatened or endangered. No unexpected alien species were discovered on the survey.

Mammals:

Only one Small Indian Mongoose (*Herpestes javanicus*) was observed on the survey. No rats (*Rattus spp,*), Mice (*Mus musculus*), or cats (*Felis catus*) or pigs (*Sus* scrofa) were seen, but do occur in this area. No endangered Hawaiian Hoary Bats were detected by the ultrasound device during a night search of the property on 16 July 2008. The Hawaiian Hoary Bat generally roosts solitarily in trees. They forage for flying

insects in a wide variety of habitats including forests, agricultural lands, urban areas, as well as over bays and ponds (Tomich 1986, Kepler and Scott, 1990, Jacobs 1991, 1993, and Reynolds et al. 1998).

EXECUTIVE SUMMARY AND CONCLUSION

The birds and mammals found were those to be expected in this region of the Island of Hawaii and conformed to two earlier surveys of this area and surrounding lands (Bruner 1989, 2008). The endangered 'Io and the non-endangered Pueo occur in man-altered as well as native habitats throughout the Big Island. None were recorded on this or the Bruner (1989 and 2008) surveys. The endangered Hawaiian Hoary Bat is more often seen on the Island of Hawaii and Kauai but is much less common on the other islands. No bats were detected on the earlier (Bruner 1989, 2008) surveys nor on this survey. The habitats along the proposed corridor are not unusual or unique. Similar lands occur throughout this region. The proposed sewer corridor may produce some small, local increases and decreases in the populations of alien birds.

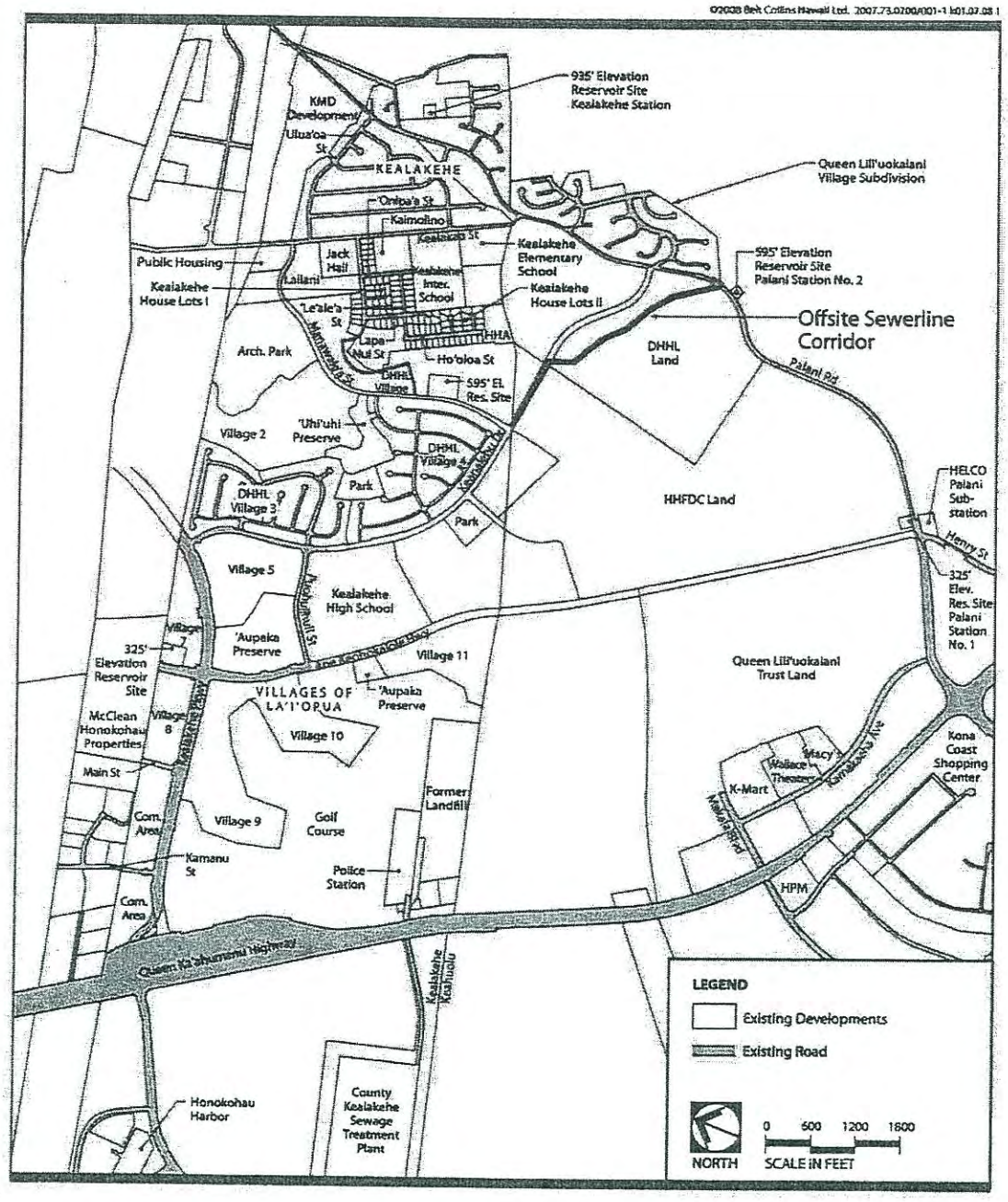

Fig. 1. The Queen Lili'uokalani Subdivision sewer line corridor.

TABLE ONE

Alien (introduced birds) found on the field survey of the proposed sewer line corridor conducted on 16, 17 July 2008 at the Queen Lili'uokalani Village Subdivision Offsite Sewer Line Corridor, North Kona, Island of Hawaii. Alien species recorded on the Bruner (1989 and 2008) survey of this area and surrounding lands are also shown for comparative purposes. An "*" indicates name changes, a "+" indicates presence and A "-" not observed. The 2008a column refers to species recorded on the proposed sewer line corridor.

Common Name	Scientific Name	2008a	2008	1989
Gray Francolin	*Francolinus pondicerianus*	+	+	+
Black Francolin	*Francolinus francolinus*	+	+	+
Red Junglefowl*	*Galllus gallus*	-	+	+
Ring-necked Pheasant	*Phasianus colchicus*	-	-	+
Wild Turkey	*Meleagris gallopavo*	-	+	-
Spotted Dove	*Streptopelia chinensis*	+	+	+
Zebra Dove	*Geopelia striata*	+	+	+
Parrot	*Psittacula spp*	-	-	+
Barn Owl	*Tyto alba*	-	+	+
Japanese White-eye	*Zosterops jaaponicus*	+	+	+
Common Myna	*Acridotheres tristis*	+	+	+
Saffron Finch	*Sicalis flaveola*	-	+	-
Yellow-billed Cardinal	*Paroaria capitata*	+	+	+
Northern Cardinal	*Cardinalis cardinalis*	+	+	+
House finch	*Carpodacus mexicanus*	+	+	+
Yellow-fronted Canary	*Serinus mozambicus*	-	+	-
House Sparrow	*Passer domesticus*	-	+	+
Lavender Finch	*Estrilda caerulescens*	-	-	+
African Silverbill**	*Lonchura cantans***	-	+	+
Nutmeg mannikin	*Lonchura punctulata*	-	+	+
Java Sparrow	*Padda oryzivora*	-	+	-

* Feral Chicken in 1989 study
**Warbling Silverbill in 1989 study
***Lonchura malabarica* in 1989 study

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