

# **WAIĀHOLE BEACH PARK MASTER PLAN**

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*Final Environmental Assessment  
and Technical Reports*

**Prepared For**

**Department of Design and Construction**  
City and County of Honolulu  
650 South King Street  
Honolulu, Hawaii 96813

**August 2006**

## TECHNICAL REPORTS

- A. Wetland Resources Inventory for City and County of Honolulu Coastal Parcels  
Waiahole-Waikane Park, O'ahu. AECOS, Inc. August 2000. AECOS No. 824B
- B. Wetland Resources Inventory for City and County of Honolulu Coastal Parcels  
Waiahole-Waikane Park, O'ahu. AECOS, Inc. September 2001. AECOS No. 824C
- C. Concept Plan Waiahole Stream Wetlands Creation and Enhancement.
- D. A Hawaiian Traditional and Cultural Practices Assessment for the Proposed Waiāhole  
Beach Park, Ahupua'a of Waiāhole and Waikāne, Ko'olaupoko, O'ahu.  
(TMK: 4-8-01). Volume I. Cultural Surveys Hawaii, Revised May 2002.
- E. An Archaeological Inventory Survey of an Approximately 21-acre Parcel at Coastal  
Waiāhole, Ahupua'a Ko'olaupoko District, Oahu. (TMK: 4-8-02: 1,2, 4-12). Cultural  
Surveys Hawaii, November 2002.
- F. Archaeological Inventory Survey of an Approximately 9-Acre Parcel in Coastal  
Waiāhole Ahupua'a, Ko'olaupoko District, Island of O'ahu. Cultural Surveys Hawaii,  
May 2005.
- G. Final Report Phase I Environmental Site Assessment and Limited Soil Sampling  
Waiahole Beach Park. The Environmental Company, Inc. January 2003.
- H. Waiahole Beach Park Traffic Assessment. Julian Ng. Incorporated. September 2002.

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Wetland Resources Inventory  
for City & County of Honolulu  
Coastal Parcels  
Waiahole-Waikane Park, O'ahu

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August 7, 2000

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# Wetland Resources Inventory for City & County of Honolulu Coastal Parcels, Waiahole-Waikane Park, O`ahu<sup>1</sup>

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August 7, 2000

DRAFT 1

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## Introduction

This report follows and extends observations made and reported in a previous study entitled *A Natural Resources Inventory of Coastal Parcels at Waiahole and Waikane on Windward O'ahu* by E. Guinther and H. Maybaum of AECOS, Inc. (AECOS, 1995). Specifically, this report attempts to establish which areas of the numerous parcels comprising the proposed Waiahole-Waikane Park are wetlands as defined by the U.S. Army Corps of Engineers (USACOE, 1987) and which of these wetlands possess resource value as wetlands.

Although some rough delineations of wetlands are described herein, the purpose of this survey is not to delineate any wetlands, but to ascertain which areas of the parcels are likely to be jurisdictional wetlands and therefore potentially require delineation and subsequent ACOE involvement in confirmation should plans for park development indicate an impingement on these wetland environments. This approach enables the planning process to proceed aware of potential limitations to development in specific areas, only requiring delineations where it is apparent that a boundary needs to be established either for planning or construction purposes. Further, this approach assures that accepted delineations of jurisdictional waters are still valid when needed (i.e., are within the three-year expiration period established by the ACOE) in the protracted planning and development schedule anticipated for the Waiahole-Waikane Park.

The lands discussed here are all located makai of Kamehameha Highway in the O`ahu District of Ko`olaupoko (windward O`ahu) and in *na Ahupua`a* of Waiahole and Waikane. These lands are coastal parcels along the middle western shore of

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<sup>1</sup> Report prepared for Gerald Park Urban Planner and the City and County of Honolulu for environmental planning of the Waiahole-Waikane Park, Kane`ohe Bay. This report will become the property of the City and County of Honolulu.

Kane`ohe Bay, a Class AA (DOH, 1992) marine water body. Windward O`ahu is a relatively wet area, and low lying coastal parcels are subject to flooding from runoff. Typically, these relatively level lands on the flood plains of flashy, Hawaiian streams, would support extensive coastal wetlands. In fact, it is likely that all of the lands comprising the Waiahole-Waikane Park were at one time or another (on a geological scale) part of a coastal wetland, stream, or nearshore mud flat. The larger parcels represent coastal deltas built out by sediments brought down by Waiahole and Waikane streams. Coastal processes — waves and currents — have also shaped these lands.

## Methods

ABOUT WETLAND DELINEATIONS — The project area was surveyed by a botanist (Dr. E. Funk, CWS) and an aquatic biologist (E. Guinther) in order to establish, using principles espoused in the Army Corps wetlands delineation manual (ACOE, 1987) areas of potential jurisdictional wetlands. For a feature to be considered a jurisdictional wetland, all three of the criteria established to define a wetland must be met. That is, a site satisfying only one or two of the criteria may have some particular wetland resource value or values, but would not be a jurisdictional wetland. The three criteria are 1) inhabited by wetland plants (hydrophytes), 2) having a soil type characteristic of prolonged inundation, and 3) having standing water for at least two weeks during the growing season. In the results discussed below, these three criteria will be continuously referred to. Because the absence of any one of these disqualifies a location as a jurisdictional wetland, it is most efficient to initially survey on the basis of floristic characteristics (distribution of plants known to be wetland indicators versus species known to be upland or fast land indicators). A complete listing of plants identified from the coastal parcels is included as Appendix A, Table A1. This table is expanded from Tables 2 in *AECOS* (1995), with the addition of species observed on the Waiahole Beach Park parcel.

For purposes of conducting wetland delineations, naturally occurring plants are classified by their preference for saturated soil conditions (USFWS, 1988) according to the following definitions:

- OBL — Obligate wetland species; Requires wet conditions; Found 99% of the time in wetland situations.
- FACW — Facultative wetland species; Usually found in wetlands (67-99% of the time).
- FAC — Facultative species; Plants equally likely to be found in wetlands or non-wetlands.
- FACU — Facultative upland species; Usually found in non-wetlands (67-99% of the time).
- UPL — Obligate upland species; Seldom found (1% or less) in wetland situations.

At the project location, on a flood plain near the sea, the criterion of hydrology may not be evident all of the time. That is, some or most sites might appear dry when surveyed, although are easily flooded under the right conditions. During the wetter times of the year, most of the parcels surveyed are subject to some flooding, and depressions can hold water for a considerable amount of time due to the high water table. It is central to the concept of delineating wetlands that wetland soils and wetland plants will develop where periodic flooding and/or a high groundwater table occur over a long period of time or, if periodic, for a sufficient length of time during wet periods. Thus, hydrology alone (e.g., flooding) is an insufficient criterion on which to establish a jurisdictional wetland, although a flooded area does serve to retard runoff to the sea (i.e., protects marine resources) and reduces the risk of flooding in adjacent, higher areas.

THIS REPORT — We intend to release this report as a series of draft documents as the survey process proceeds in order to provide information to the site planners as needed. The first increment covers a survey of the middle parcel, termed the Waiahole Beach Park parcel, and extending from the vicinity of Waiahole Stream (State ID No. 3-2-04) to an unnamed stream (Waianu Stream in some sources; State ID No. 3-2-03).

## Waiahole Beach Park

A field inspection to identify areas where wetland conditions (hydric vegetation, hydric soils, and wetland hydrology) prevail at Waiahole Beach Park was conducted on June 27, 2000. This part of the coastal lands lies between the larger Waiahole and Waikane sections and has been cleared of (mostly) *hau* (*Hibiscus tiliaceus*) and Java plum (*Syzygium cummingi*) by community involvement over the last several years. The “existing” Waiahole Beach Park, consisting of a parking area extending from Kamehameha Highway to close to the shore of Kane`ohe Bay was more or less surrounded by *hau*, has been gradually improved by clearing of larger trees and periodic maintenance of the extensive grassy areas created after grubbing of the site (Figure 1). The parking lot, with cooperation from the City & County, has been isolated from the surrounding land by placement of concrete barriers to restrict off-road vehicular access. An area of unauthorized fill was created adjacent to the parking lot on the east side.

Most of the land that lies between Waiahole Stream and the unnamed stream is indicated on the U.S. Fish and Wildlife wetlands inventory map (USFWS, 1984, 1995) as having two wetland zones sandwiched between upland at the highway and the marine zone (coded M10WL) off the shore. These two wetland zones are coded E2FO3N (immediately behind the shore) and PFO3C (next inland). The USFWS wetland classification codes are defined (USFWS, 1995) as follows:



Figure 1. Waiahole Beach Park, Waiahole Ahupua`a, O`ahu. This view looking southeast from the parking area, shows all of the southern part of park in its presently maintained state. The shore of Kane`ohe Bay is beyond the ironwood trees on the left and Kamehameha Highway is on the right. Waiahole Stream is located within the tall trees in the background.  
The foreground is the unauthorized fill.

SYMBOL	DEFINITION
E2FO3N	Estuarine, intertidal, broad-leaved evergreen, forest (regular, tidal).
PFO3C	Palustrine forest
M1OWL	Marine, subtidal, open water (unknown bottom).

The original “beach park” (the present-day parking area) is shown as upland (not wetland) on the inventory map. Both E2FO3N and PFO3C refer here to hau forest wetlands (AECOS, 1995), and the distinction between the types is not really important, since the boundaries were determined from aerial photographs rather than by testing where estuarine waters became fresh waters.

It is evident from our survey that almost none of this hau wetland exists anymore at the project site. However, the wetland inventory maps do not necessarily describe jurisdictional wetlands, since not all areas indicated as wetlands on the maps were ever subjected to field validation. Nonetheless, recent activities at the beach park suggest a portion of a former wetland might well have been filled. A purpose of the June 27 field inspection was to determine if and how much of this wetland existed until recently and to identify any other wetland sites that might be present on this parcel of land.

The toe of the unauthorized fill is clearly visible south of the parking lot at Waiahole Beach Park. There is evident a topographic change along with a dominance of hydrophytes (i.e. plants that grow in permanently or periodically water saturated soils) beginning below this toe. Three soil pits were dug (Figure 2) along the southern edge of the area dominated by hydrophytes. Each soil pit was flagged and numbered to represent the approximate edge of assessed wetland conditions. It was determined that all three wetland criteria were met at all three pit locations.

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**Pit 1** is located approximately 15 m (49 feet) beyond the toe of the fill. It is the central pit. The hydrophytic vegetation in the vicinity of Pit 1 consists of ‘ae’ae (*Bacopa monnieri*), *Eleocharis geniculata*, both obligate wetland plants (OBL), and jungle rice (*Echinochloa colona* (L.) Link) and California grass (*Brachiaria mutica*), both facultative wetland (FACW) plants. All of these are plant species that are found under wetland conditions from 66% to 99% of the time. At this site hydric soil was found 17 cm (7 inches) below the ground surface. This soil was heavy and pasty with a Munsell Soil Color of 2.5 yr/2.5/0. At 28 cm (11 in) water began seeping into the pit. All three wetland criteria were met at this site.

**Pit 2** is closest to Kamehameha Highway and is some 12 m (41 feet) from the toe of the fill. The vegetation at this location is the same as that at the



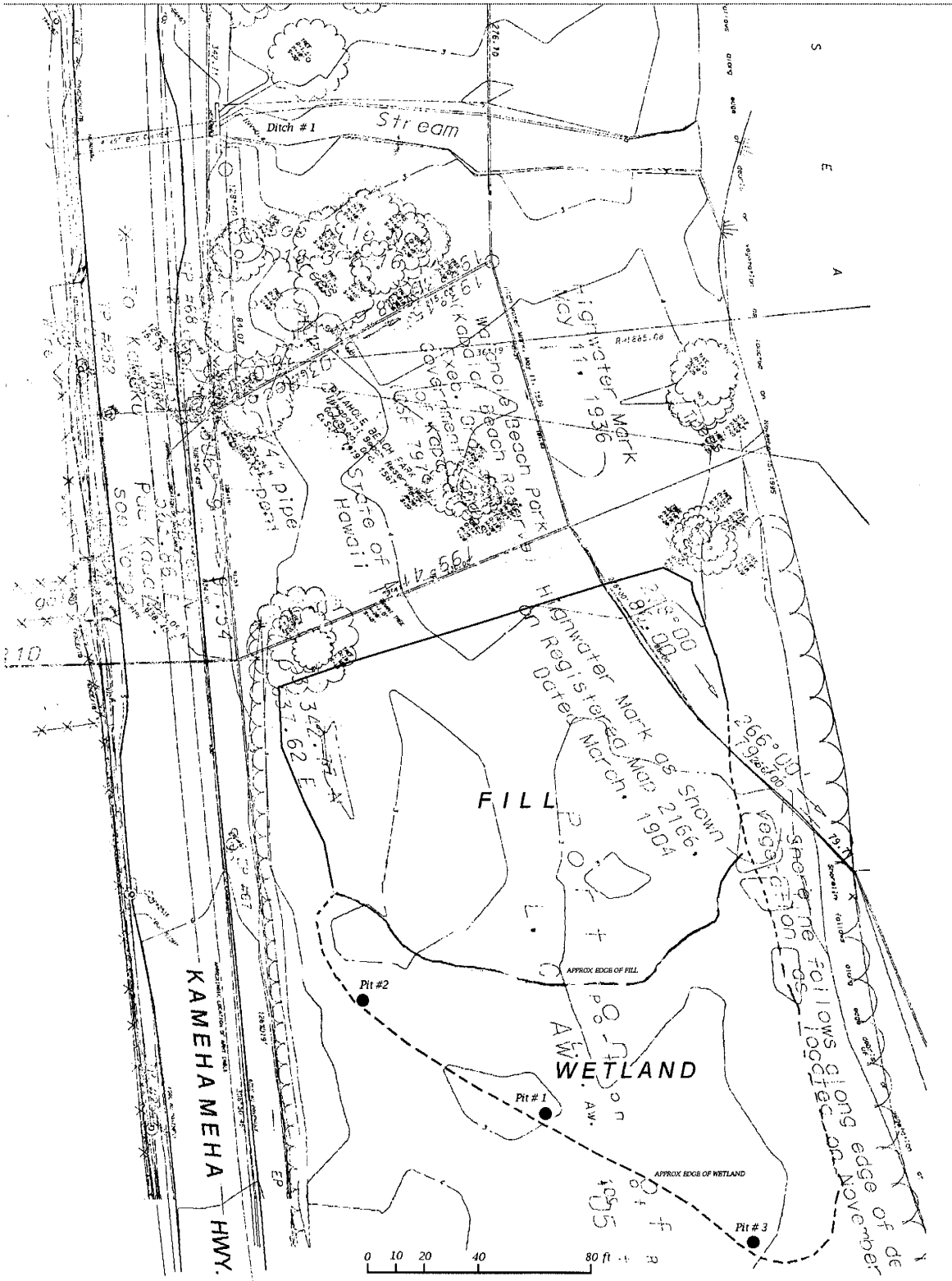


Figure 2. Survey map of the central portion of Waiahole Beach Park showing approximate boundaries of existing and recently filled wetlands.

Pit 1 site. At 43 cm (17 inches) hydric soil similar to that found at Pit 1 was present, i.e. heavy, dark, and pasty with a Munsell Soil Color of 2.5 yr/2.5/0. The saturated soil began to ooze water at 30 cm (12 in) below the surface. All wetland criteria were met at Pit 2 site.

Soil **Pit 3** is nearest the shore and is approximately 44 m (144 feet) from the toe of the fill. Other wetland plants found at Pit 3 in addition to those found in the vicinity of Pits 1 and 2 were false daisy or *Eclipta alba*, *Pycneus polystachyos*, and *Paspalum vaginatum*, all facultative wetland plants. Hydric soil similar to that found in Pits 1 and 2 was present in Pit 3 at 61 cm (24 inches) below the surface. There was water in the pit at this depth. Wetland criteria have been met at Pit 3 site.

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SOUTHEAST CORNER — A low spot near the southern end of the site, just upland of the coastal zone vegetation should also be noted. This spot has also been flagged with blue ribbon. It is a wet area that meets the vegetation criteria for a wetland, but does not qualify on the basis of soil or hydrology. Vegetation coverage is estimated at 80% Hilo grass (*Paspalum conjugatum* — FAC), 10% honohono (*Commelina diffusa* — FACW), and 5 % California grass (FACW). The remainder of the vegetation of this site is a mix of wetland and fastland species, including false daisy (FACW), primrose willow (*Ludwigia octovalvis* — OBL), beach wire grass (*Eleusine indica* — UPL), and sensitive plant (*Mimosa pudica* — UPL). This site has a gravel bottom and appears to be an old drainage ditch or edge of a cultivated field.

DRAINAGE DITCHES AND STREAMS — North from the main parking area at Waiahole Beach Park occur several small drainage ditches that traverse the park site from the highway to the Kane`ohe Bay shore (Figure 3). These features are numbered here 1 through 4, south to north respectively. Included with the descriptions below from our June 27 field survey are observations made at three of these wetland sites on July 30, 2000 (from AECOS, 2000). Included in the AECOS report are spot (one-time) water quality measurements made on July 12 of each of three water bodies.

The drainage ditch closest to the main parking area at Waiahole Beach Park was designated #1. Ditch #1 and its adjoining vegetation are about 15 m across (50 feet). The ditch is surrounded by hau (*Hibiscus tiliaceus*), mangrove (*Rhizophora mangle*), tropical almond or false kamani (*Terminalia catappa*), milo (*Thespesia populnea*) and pandanus trees (*Pandanus tectorius*). The scrub vegetation includes Job's tears (*Coix lachyma-jobi*), honohono, California grass, Hilo grass, seashore paspalum (*Paspalum vaginatum*), maile pilau (*Paederia scandens*), and sour bush (*Pluchea symphytifolia*). At sometime in the past fill was put in on both sides of this ditch. The following description is from AECOS (2000), pp 3-4:

Box culvert draining unknown area mauka of Kamehameha Highway at Waiahole Beach Park. In this area Waiahole and Waikane valleys form a broad coastal plain which is fed by several drainages in addition to Waiahole and Waikane streams. A small wetland exists from just mauka of the culvert to the shoreline of Kane`ohe Bay. Standing water extends from a couple of meters inland of the road seaward for a distance of 2/3 of the distance between the road and the shore of Kane`ohe Bay. The area is relatively open, with mostly small *hau* (*Hibiscus tiliaceus*) plants and California grass (*Brachiaria mutica*), the latter mostly dead presumably because of ditch maintenance spraying. The water here harbors apple snails (*Pomacea canaliculata*), short-fin mollies (*Poecilia mexicana*), tilapia (?*Sarotherodon* sp.), and American bullfrog (*Rana catesbeiana*...). This site can be described as a low quality wetland draining low areas mauka of the highway in Waiahole Valley. Water quality problems noted here are low dissolved oxygen content and somewhat elevated total phosphorus (TP). Ammonia is also elevated. Both high ammonia and low DO are characteristic of stagnant water.

Ditch #2 is approximately 6 m (20 feet) wide with steep banks. There are some *hau*, Java plum, tropical almond, and ironwood (*Casuarina equisetifolia*) trees along the banks along with wedelia, and Queen Emma`s lilly (*Hymenocallis littoralis*). Here again fill has created steep banks along this small ditch.

Ditch #3 was dry except for a limited area right around the culvert that passes under Kamehameha Highway when surveyed on June 27. The only trees present are *hau* and tree heliotrope (*Tournefortia argentea*). Ground covers are wedelia, beach morning-glory (*Ipomoea pes-caprae*), and ivy gourd (*Coccinia grandis*).

Ditch #4 is a flowing stream. Much of the open water is filled with the water fern, *Salvinia molesta*. There are coconut (*Cocos nucifera*), tropical almond, and octopus (*Schefflera actinophylla*) trees along the banks. There occurs some California grass, Johnson grass (*Sorghum halpense*), and *koa haole* (*Leucaena leucocephala*) in the immediate area. This wetland appears to expand laterally between the highway and the beach. The following description is from AECOS (2000), pp 4-5:

This ditch is part of area drainage around an unnamed stream (*Waianu* in some ... records...) that drains the southern part of Waikane Valley. A box culvert drains mauka wetlands through a drainage ditch into a dense forest of *hau* and false *kamani* (*Terminalia catappa*) behind the beach. Mauka of the highway, the ditch is lined with *hau*. The water fern, *Salvinia molesta*, is abundant on water surface, especially where sunlight

hits the water close to culvert; there occurs some California grass in this area as well. Water quality problems noted here are very low dissolved oxygen content, high turbidity, and elevated nutrient content (nitrate, ammonia, TN, and TP). Both high ammonia and low DO are characteristic of stagnant water. The other characteristics indicate inputs of nutrient-rich water such as waste-water from septic systems. Turbidity appeared to be related to runoff from erosion of reddish soils somewhere upstream. Of all the locations surveyed, Station 2 had perhaps the worst water quality overall.

Further on up the highway is found another drainage ditch feeding into a channel that appears to be connected to Waikane Stream (State ID No. 3-2-02). Although essentially part of the Waikane section of the proposed Waiahole-Waikane Park, we include here the description from AECOS (2000, p. 5) for future reference (a future draft of this report will include this area):

This ditch is part of extensive area drainage south of Waikane Stream and may connect to that stream near its mouth. Water appeared stagnant, the ditch surrounded by Java plum (*Syzygium cummingi*) and false kamani, with umbrella sedge (*Cyperus alternifolius*), Job's tears (*Coix lachryma-jobi*), taro (*Colocasia esculenta*), and day-flower (*Commelina diffusa*) abundant in and along banks. Indeterminate poeciliids (top minnows) are present, along with apple snails. Water quality problems noted here are low dissolved oxygen content, very high ammonia and other nutrients (nitrate, TN and TP). Both high ammonia and low DO are characteristic of stagnant water. Generally, elevated nutrients could indicate influence from nearby septic systems. This water body has somewhat better water quality than nearby Station 2, while showing less influence from marine waters (i.e., lower conductivity). Reduced salinity probably reflects the somewhat greater distance from the shore of Kane`ohe Bay of Station 3 than Station 2, and influence on the former of Waikane Stream.

## Discussion

WAI AHOLE BEACH PARK — The existing wetlands on the Waiahole Beach Park section consist of an obscure wetland adjacent to the parking lot and several permanent and semi-permanent bodies of water oriented across the property, connected to drainage ditches and culverts. These latter wetlands provide only very

marginal wetland habitat for native species, but cannot be further reduced in area without increasing the risk of floods to properties mauka of Kamehameha Highway. All of these wetlands are located north of the Waiahole Beach Park parking lot, and could be expanded to enhance both water retention during flood periods and wetland habitat. A useful way to enlarge the wetlands would be to create a low area next to the highway linking several of the ditches together. This would expand wetland habitats, provide opportunities for creating nature trails in the park, provide additional flood protection for mauka areas, buffer influx of sediment laden runoff into Kane`ohe Bay, limit access to this part of property to designated entrance roads, and allow for maintenance by keeping the features relatively narrow and linear. Planting native species might be considered, but would require coordination with those presently maintaining the ditches with herbicide treatments.

The obscure wetland located south of the Waiahole Beach Park parking area has minimal wetland resource value. In all but wetter months, this area is mowed along with the grass covering most of the property on this side, and it is doubtful many would recognize this area as a wetland feature. At one time, the wetland probably supported mostly *hau* and would have looked very different than it does today (Figure 1). The former size of the wetland is unknown. Assuming that the northern boundary was along the edge of the present-day parking area and then using our measurements from there to the southern edge, an area of 2900 m<sup>2</sup> (31,200 ft<sup>2</sup> or 0.716 ac) can be estimated. The area that was recently filled comprises some 1,780 m<sup>2</sup> (19,200 ft<sup>2</sup>) or 61% of the wetland. These are approximations only and probably over estimate the true former size of the wetland and recent fill.

There would be little gained in attempting to recover this wetland, which appears not to have had or presently has only minimal connection to mauka drainage courses (unlike the wetlands described above). Given that there exists numerous opportunities to enhance or create wetlands elsewhere within the proposed Waiahole-Waikane Park, mitigation for the loss of this one wetland should be considered. This would allow all of the area between the existing parking lot at Waiahole Beach Park and Waiahole Stream to be included in a park development. We cannot recommend adding fill to this area without first establishing that there will not be any impact on drainages from lands mauka of the highway.

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## Appendix A.

Table A1. Checklist of plants found in the project area:  
Waiahole section and Waiahole Beach Park.

Species	Common name	Status	Abundance	
FERNS				
POLYPODIACEAE				
<i>Phlebodium aureum</i> (L.) J. Sm.	hares-foot fern	nat.	Str	Uncommon
<i>Phymatosorus scolopendria</i> (Burm.) Pic.-Ser.	<i>laua'e</i>	nat.	Str	Uncommon
SALVINIACEAE				
<i>Salvinia molesta</i> Mitchell	giant salvinia	nat.	W	Occasional
THELYPTERIDACEAE				
<i>Christella parasitica</i> (L.) Levl.	wood fern	nat.	KhF	Occasional
DICOTYLEDONES				
ACANTHACEAE				
<i>Asystasia gangetica</i> (L.) T. Anderson	Chinese violet	nat.	KhF	Abundant
AIZOACEAE				
<i>Sesuvium portulacastrum</i> (L.) L.	<i>'akulikuli</i>	<b>ind.</b>	Std	Uncommon
AMARANTHACEAE				
<i>Achyranthes aspera</i> L.		nat.	R	Uncommon
<i>Amaranthus ?lividus</i> L.	prostrate amaranth	nat.	R	Uncommon
<i>Amaranthus spinosus</i> L.	spiny amaranth	nat.	R	Common
APOCYNACEAE				
<i>Plumeria acuminata</i> Ait.	plumeria	orn.	Cv	Occasional
ARALIACEAE				
<i>Schefflera actinophylla</i> (Endl.) Harms	octopus tree	nat.	KhF	Uncommon
ASTERACEAE (COMPOSITAE)				
<i>Ageratum conyzoides</i> L.	<i>maile hohono</i>	nat.	R	Uncommon
<i>Bidens pilosa</i> L.	<i>ki</i>	nat.	R	Occasional
<i>Conyza bonariensis</i> (L.) Cronq.	hairy horseweed	nat.	R	Uncommon
<i>Crassocephalum crepidioides</i> (Benth.) S. Moore		nat.	R	Occasional
<i>Eclipta alba</i> (L.) Haask.		nat.	GW	Occasional
<i>Emilia fosbergi</i> Nicolson	Flora's paintbrush	nat.	R	Occasional
<i>Pluchea symphytifolia</i> (Mill.) Gillis	sourbush	nat.	R	Occasional
<i>Sigesbeckia orientalis</i> L.	small yellow crown-beard	nat.	R	Uncommon
<i>Sonchus oleraceus</i> L.	<i>pualele</i>	nat.	R	Common
<i>Wedelia trilobata</i> (L.) Hitchc.	wedelia	nat.	KhF	Abundant
BORAGINACEAE				
<i>Heliotropium ?curassavicum</i> L.	seaside heliotrope	<b>ind.</b>	R	Uncommon
<i>Tournefortia argentea</i> L. fil.	tree heliotrope			Occasional
CARICACEAE				
<i>Carica papaya</i> L.	papaya	nat.	R	Uncommon
CARYOPHYLLACEAE				
<i>Drymaria cordata</i> (L.) Willd. ex Roem. & Schult.	<i>pipili</i>	nat.	Str	Uncommon

Table A1 (continued).

Species	Common name	Status	Abundance	
<b>CASUARINACEAE</b>				
<i>Casuarina equisetifolia</i> L.	common ironwood	nat.	Std	Occasional
<b>COMBRETACEAE</b>				
<i>Terminalia catappa</i> L.	false <i>kamani</i>	nat.	Std	Common
<b>CONVOLVULACEAE</b>				
<i>Convolvulus arvensis</i> L.	field bindweed	nat.	G	Occasional
<i>Ipomoea alba</i> L.	moon flower	nat.	SmF	Abundant
<i>Ipomoea indica</i> (J. Burm.) Merr.	<i>koali 'awa</i>	nat.	R	Occasional
<i>Ipomoea obscura</i> (L.) Ker-Gawl	small, hairy bindweed	nat.	R	Uncommon
<i>Ipomoea pes-caprae</i> (L.) R. Br.	<i>pohuehue</i>	<b>ind.</b>	Std	Uncommon
<i>Merremia tuberosa</i> (L.) Rendle	wood rose, <i>pilikai</i>	nat.	SmF	Uncommon
<b>CUCURBITACEAE</b>				
<i>Coccinea grandis</i> (L.) Voigt.	scarlet-fruited gourd	nat.	R	Occasional
<i>Momordica charantia</i> L.	wild bitter melon	nat.	R	Occasional
<b>EUPHORBIACEAE</b>				
<i>Aleurites moluccana</i> (L.) Wild.	<i>kukui</i> (seedlings)	<b>pol.</b>	SmF	Uncommon
<i>Chamaesyce hirta</i> (L.) Millsp.	garden spurge	nat.	R	Common
<i>Chamaesyce hypericifolia</i> (L.) Millsp.	graceful spurge	nat.	R	Common
<i>Codiaeum variegatum</i> (L.) Bl.	croton	orn.	Cv	Uncommon
<i>Ricinus communis</i> L.	castor bean, <i>pa'aila</i>	nat.	R	Uncommon
<b>FABACEAE</b>				
<i>Canavalia cathartica</i> Thouars	<i>maunaloa</i>	nat.	G	Occasional
<i>Crotalaria</i> sp.	rattlepod	nat.	R	Uncommon
<i>Desmodium incanum</i> DC	Spanish clover	nat.	KhF	Common
<i>Indigofera spicata</i> Forssk.	creeping indigo	nat.	R	Uncommon
<i>Leucaena leucocephala</i> (Lam.) deWit	<i>koa haole</i>	nat.	KhF	Abundant
<i>Mimosa pudica</i> L.	sensitive plant	nat.	R	Common
<i>Paraserianthes falcataria</i> (L.) I. Nielsen	albizia	nat.	SmF	Uncommon
<i>Pithecellobium dulce</i> (Roxb.) Benth.	<i>'opiuma</i>	nat.	R	Uncommon
<i>Vigna marina</i> (J. Burm.) Merr.	beach pea	<b>ind.</b>	Std	Uncommon
<b>GOODENIACEAE</b>				
<i>Scaevola sericea</i> Vahl	beach <i>naupaka</i>	<b>ind.</b>	Std	Occasional
<b>MALVACEAE</b>				
<i>Abutilon grandifolium</i> (Willd.) Sweet	hairy abutilon	nat.	R	Uncommon
<i>Hibiscus tiliaceus</i> L.	<i>hau</i>	<b>?ind.</b>	Std Str	Abundant Abundant
<i>Malvastrum coromandelianum</i> (L.) Garck	false mallow	nat.	R	Occasional
<i>Sida rhombifolia</i> L.		?nat.	R	Uncommon
<i>Thespesia populnea</i> (L.) Sol. ex Corrêa	<i>milo</i>	<b>?ind.</b>	Std	Common
<b>MORACEAE</b>				
<i>Artocarpus communis</i> Forst.	breadfruit, <i>'ulu</i>	<b>pol.</b>	Cv	Uncommon
<i>Ficus microcarpa</i> L. fil.	Chinese banyan	nat.	Str	Uncommon
<b>MYRTACEAE</b>				



*Syzygium cumini* (L.) Skeels Java plum nat. SmF Abundant  
 Table A1 (continued).

Species	Common name	Status	Abundance	
<b>OXALIDACEAE</b>				
<i>Oxalis corymbosa</i> DC	pink wood sorrel	nat.	R	Uncommon
<b>ONAGRACEAE</b>				
<i>Ludwigia octovalvis</i> (Jacq.) Raven	primrose willow	<b>?pol.</b>	Str, G	Occasional Uncommon
<b>PASSIFLORACEAE</b>				
<i>Passiflora suberosa</i> L.	<i>huehue haole</i>	nat.	R	Uncommon
<b>RHIZOPHORACEAE</b>				
<i>Rhizophora mangle</i> L.	American mangrove	nat.	Std	Abundant
<b>RUBIACEAE</b>				
<i>Paederia scandens</i> (Lour.) Merr.	<i>maile pilau</i>	nat.	SmF	Abundant
<b>SCROPHULARIACEAE</b>				
<i>Bacopa monnieri</i> (L.) Wettst.	water hyssop	<b>ind.</b>	GW	Uncommon
<b>SOLANACEAE</b>				
<i>Solanum americanum</i> Mill.	<i>popolo</i>	<b>?ind</b>	R	Uncommon
<b>ULMACEAE</b>				
<i>Trema orientalis</i> (L.) Blume	gunpowder tree	nat.	SmF	Uncommon
<b>VERBENACEAE</b>				
<i>Citharexylum caudatum</i> L.	fiddlewood	nat.	SmF	Uncommon
<i>Lantana camara</i> L.	lantana	nat.	R	Uncommon
<i>Stachytarpheta jamaicensis</i> (L.) Vahl	Jamaican vervain	nat.	R	Occasional
<b>MONOCOTYLEDONES</b>				
<b>AGAVACEAE</b>				
<i>Cordyline fruticosa</i> (L.) A. Chev.	ornamental ti	orn.	Cv	Uncommon
<b>ARACEAE</b>				
<i>Alocasia cucullata</i> (Lour.) Schott	Chinese taro	orn.	SmF	Occasional
<i>Alocasia macrorrhiza</i> (L.) Schott	'ape	<b>pol.</b>	Str	Uncommon
<i>Colocasia esculenta</i> (L.) Schott	taro, <i>kalo</i>	<b>pol.</b>	Str	Uncommon
<i>Epipremnum pinnatum</i> (L.) Engl.	pothos	nat.	KhF	Uncommon
<i>Syngonium auritum</i> (L.) Schott	nephtyitis	orn.	KhF	Abundant
<i>Syngonium ?podophyllum</i> Schott	nephtyitis	orn.	KhF	Common
<i>Philodendron selloum</i> C. Koch		orn.	KhF	Uncommon
<i>Philodendron andrianum</i> Devansaye		orn.	KhF	Uncommon
<b>ARECACEAE</b>				
<i>Cocos nucifera</i> L.	coconut palm, <i>niu</i>	<b>pol.</b>	Std	Occasional
<b>COMMELINACEAE</b>				
<i>Commelina diffusa</i> Burm f.	<i>honohono</i>	<b>ind.</b>	G	Occasional
<b>CYPERACEAE</b>				
<i>Cyperus alternifolius</i> L.	umbrella sedge	nat.	Str	Uncommon
<i>Eleocharis geniculata</i> (L.) Roem. & Schult.		nat.	GW	Abundant
<i>Pycnus polystachyos</i> (Rottb.) P. Beauv.		<b>ind.</b>	GW	Occasional

Table A1 (continued).

Species	Common name	Status	Abundance	
<b>LILIACEAE</b>				
<i>Hymenocallis littoralis</i> (Jacq.) Salisb.	Queen Emma's lily	orn.	Std Uncommon	
<b>MUSACEAE</b>				
<i>Musa x paradisiaca</i> L.	banana	pol.	R Abundant	
<b>PANDANACEAE</b>				
<i>Pandanus tectorius</i> S. Parkinson ex Z	hala	?ind.	Std Occasional	
<b>POACEAE (GRAMINEAE)</b>				
<i>Brachiaria mutica</i> (Forssk.) Stapf	California grass	nat.	GW Abundant	
<i>Cenchrus echinatus</i> L.	common sandbur	nat.	R Uncommon	
<i>Chloris radiata</i> (L.) Sw.	plushgrass	nat.	R Occasional	
<i>Coix lachryma-jobi</i> L.	Job's tears, <i>pu'ohe'ohe</i>	nat.	Str Common	
<i>Cynodon dactylon</i> (L.) Pers.	Bermuda grass	nat.	R Common	
<i>Digitaria insularis</i> (L.) Mez ex Ekman	sourgrass	nat.	R Occasional	
<i>Echinochloa colona</i> (L.) Link	jungle rice	nat.	R, GW Occasional	
<i>Echinochloa crus-galli</i> (L.) P. Beauv.	barnyard grass	nat.	R Uncommon	
<i>Eleusine indica</i> (L.) Gaertn.	wiregrass	nat.	R Occasional	
<i>Oplismenus hirtellus</i> (L.) P. Beauv.	basketgrass	nat.	KhF Abundant	
<i>Panicum maximum</i> Jacq.	Guinea grass	nat.	R Abundant	
<i>Paspalum conjugatum</i> Bergius	Hilo grass	nat.	KhF Common	
<i>Paspalum dilatatum</i> Poir	Dallis grass	nat.	R Occasional	
<i>Paspalum vaginatum</i> Sw.	seashore paspalum	nat.	Std Occasional	
<i>Pennisetum purpureum</i> Schumach.	Elephant grass	nat.	Str Abundant	
<i>Schizostachyum glaucifolium</i> (Rupr.) Munro	'ohe, bamboo	pol.?	Str Uncommon	
<i>Setaria verticillata</i> (L.) P. Beauv.	bristly foxtail	nat.	R Uncommon	
<i>Sorghum halpense</i> (L.) Pers.	Johnson grass	nat.	R Common	
<i>Sporobolus indicus</i> (L.) R. Br.	West Indian dropseed	nat.	R Occasional	
<b>ZINGIBERACEAE</b>				
<i>Hedychium flavescens</i> N. Carey	yellow ginger	nat.	Cv Occasional	

<b>KEY</b>
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Status = distributional status

end. = endemic; native to Hawaii and found naturally no where else.

ind. = indigenous; native to Hawaii, but not unique to the Hawaiian Islands.

nat. = naturalized, exotic, plant introduced to the Hawaiian Islands since the arrival of Cook Expedition in 1778, and well-established outside of cultivation.

orn. = exotic, ornamental; plant not naturalized (not well-established outside of cultivation); includes crop plants cultivated for food.

pol. = Polynesian introduction before 1778.

Abundance = abundance ratings are for the vegetation type at this site only.

Uncommon - a plant species observed less than five times;

Occasional - a plant that was observed regularly, but was not abundant;

Common - a plant considered an important part of the vegetation and observed numerous times.

Abundant - plants found in large numbers, dominant or locally dominant.

Vegetation Type Classification Codes = vegetation type where species most abundant.

Table A1 (continued).

Cv - cultivation; gardens on residential properties;  
G, GW - grassland, grass dominated wetland;  
KhF - koa-haole forest;  
R - ruderal (relatively recently disturbed sites);  
SmF - *Syzygium* mixed forest;

Std - strand (sea shore);  
Str - riparian (stream and stream banks).  
W – wetland; in water; obligate aquatic plant.

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# Wetland Resources Inventory for the City & County of Honolulu Coastal Parcel at Waiahole, O`ahu<sup>1</sup>

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September 28, 2001

DRAFT 1

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## Introduction

This report follows and extends observations made and reported in a previous study entitled *A Natural Resources Inventory of Coastal Parcels at Waiahole and Waikane on Windward O'ahu* by E. Guinther and H. Maybaum of AECOS, Inc. (AECOS, 1995). Specifically, this report attempts to establish which areas of the southernmost parcel (Waiahole) comprising the proposed Waiahole-Waikane Park are wetlands as defined by the U.S. Army Corps of Engineers (USACOE, 1987) and which of these wetlands possess resource value as wetlands.

Although some rough delineations of wetlands are described herein, the purpose of this survey is not to specifically delineate any wetlands, but to ascertain which areas of the parcels are likely to be jurisdictional wetlands and therefore potentially require delineation and subsequent ACOE involvement in confirmation should plans for development on the land indicate an impingement on these wetland environments. This approach enables the planning process to proceed aware of potential limitations to development in specific areas, only requiring delineations where it is apparent that a boundary needs to be established either for planning or construction purposes. Further, this approach assures that accepted delineations of jurisdictional waters are still valid when needed (i.e., are within the three-year expiration period established by the ACOE) in the protracted planning and development schedule anticipated for the Waiahole-Waikane Park.

The lands discussed here are all located makai of Kamehameha Highway and along or south of Waiahole Stream (State ID No. 3-2-04), in the O`ahu District of Ko`olaupoko (windward O`ahu), within the *ahupua`a* of Waiahole. These lands are

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<sup>1</sup> Report prepared for Gerald Park Urban Planner and the City and County of Honolulu for environmental planning of the Waiahole-Waikane Park, Kane`ohe Bay. This report will become the property of the City and County of Honolulu.

coastal parcels along the middle western shore of Kane`ohe Bay, a Class AA (HDOH, 1992) marine water body. Windward O`ahu is a relatively wet area, and low lying coastal parcels are sometimes subject to flooding from runoff. Typically, these relatively level lands on the flood plains of flashy, Hawaiian streams would support extensive coastal wetlands. In fact, it is likely that all of the lands comprising the Waiahole-Waikane Park parcels were at one time or other (on a geological scale) part of a coastal wetland, stream, or nearshore mud flat. This larger, southern parcel represents a delta building out into Kane`ohe Bay with the sediment brought down from the hinterland by Waiahole Stream. Coastal processes, such as waves and nearshore currents, have also shaped the land.

## Methods

ABOUT WETLAND DELINEATIONS — The project area was surveyed on October 24, 2000 by a botanist (Dr. E. Funk, CWS) and an aquatic biologist (E. Guinther) in order to establish, using principles espoused in the Army Corps wetlands delineation manual (ACOE, 1987) areas of potential jurisdictional wetlands. For a feature to be considered a jurisdictional wetland, all three of the criteria established to define a wetland must be met. That is, a site satisfying only one or two of the criteria may have some particular wetland resource value or values, but would not be a jurisdictional wetland. The three criteria are 1) inhabited by wetland plants (hydrophytes), 2) having a soil type characteristic of prolonged inundation, and 3) having standing water for at least two weeks during the growing season. In the results discussed below, these three criteria will be continuously referred to. Because the absence of any one of these disqualifies a location as a jurisdictional wetland, it is most efficient to initially survey on the basis of floristic characteristics (distribution of plants known to be wetland indicators versus species known to be upland or fast land indicators). A complete listing of plants identified from the coastal parcels is included in AECOS (1995).

For purposes of conducting wetland delineations, naturally occurring plants are classified by their preference for saturated soil conditions (USFWS, 1988) according to the following definitions:

- OBL — Obligate wetland species; Requires wet conditions; Found 99% of the time in wetland situations.
- FACW — Facultative wetland species; Usually found in wetlands (67-99% of the time).
- FAC — Facultative species; Plants equally likely to be found in wetlands or non-wetlands.
- FACU — Facultative upland species; Usually found in non-wetlands (67-99% of the time).
- UPL — Obligate upland species; Seldom found (1% or less) in wetland situations.

At the project location, on a flood plain near the sea, the criterion of hydrology may not be evident all of the time. That is, some or most sites might appear dry when surveyed, although are easily flooded under the right conditions. During the wetter times of the year, most of the parcels surveyed are subject to some flooding, and depressions can hold water for a considerable amount of time due to the high water table. It is central to the concept of delineating wetlands that wetland soils and wetland plants will develop where periodic flooding and/or a high groundwater table occur over a long period of time or, if periodic, for a sufficient length of time during wet periods. Thus, hydrology alone (e.g., flooding) is an insufficient criterion on which to establish a jurisdictional wetland, although a flooded area does serve to retard runoff to the sea (i.e., protects marine resources) and reduces the risk of flooding in adjacent, higher areas. These are more correctly regarded as riparian values.

THIS REPORT — We intend to release our reports as a series of draft documents as the survey process proceeds in order to provide information to the site planners as needed. The first increment (AECOS, 1999) covered a survey of the middle parcel, termed the Waiahole Beach Park parcel, and extending from the vicinity of Waiahole Stream (State ID No. 3-2-04) to an unnamed stream (Waianu Stream in some sources; State ID No. 3-2-03). This increment encompasses the southernmost or Waiahole parcel.

## Waiahole Parcel

Most of this land lies between Waiahole Stream and the interfluvial or ridgeline that defines the southern boundary of Waiahole Valley. It consists of a hill slope along the southern end and low-lying, low-sloping ground associated with the valley floor and lower stream reach of Waiahole Valley. Three distinct habitats were explored in October on this site: 1) modified or seasonal wetland, 2) hau forest, and 3) riparian or streamside vegetation. See *AECOS* (1995) for a description of other habitats that are present.

HISTORICAL WETLANDS — U.S. Fish and Wildlife wetlands inventory maps (USFWS, 1984, 1995; see Figure 1) describe three wetland areas in addition to the offshore reef flat zone coded M10WL and M1RFIL. One area is essentially the geologically most recent delta of the stream and comprises two wetland zones coded E2FO3N and PFO3C. The outer zone is an estuarine wetland extending from the mouth of the stream inland about halfway to Kamehameha Highway bridge; the other zone lies behind the estuarine wetland. As noted in our previous reports (*AECOS*, 1995; 2000), both E2FO3N and PFO3C seem to refer here to hau forest, and the distinction between the types is not particularly important, since the boundaries were very likely determined from aerial photographs rather than by testing where

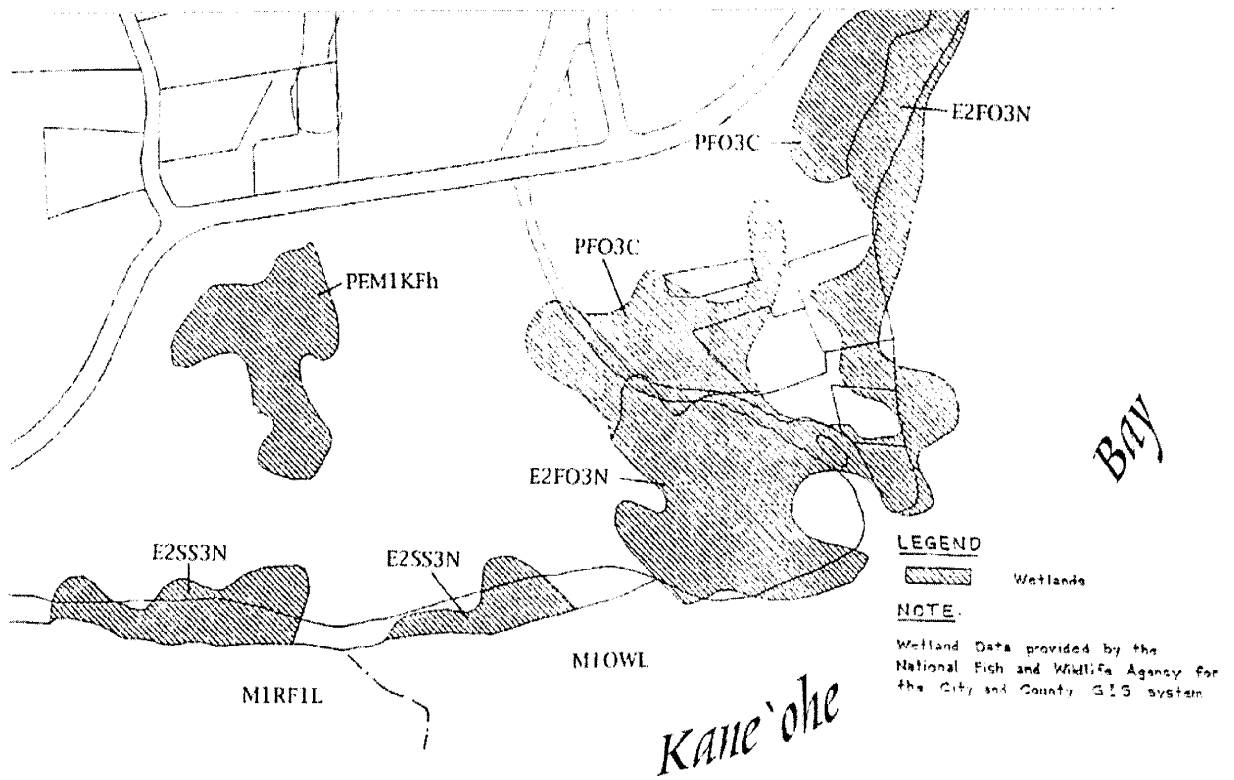


Figure 1. Portion of USFWS wetlands inventory map of the Waiahole parcel.

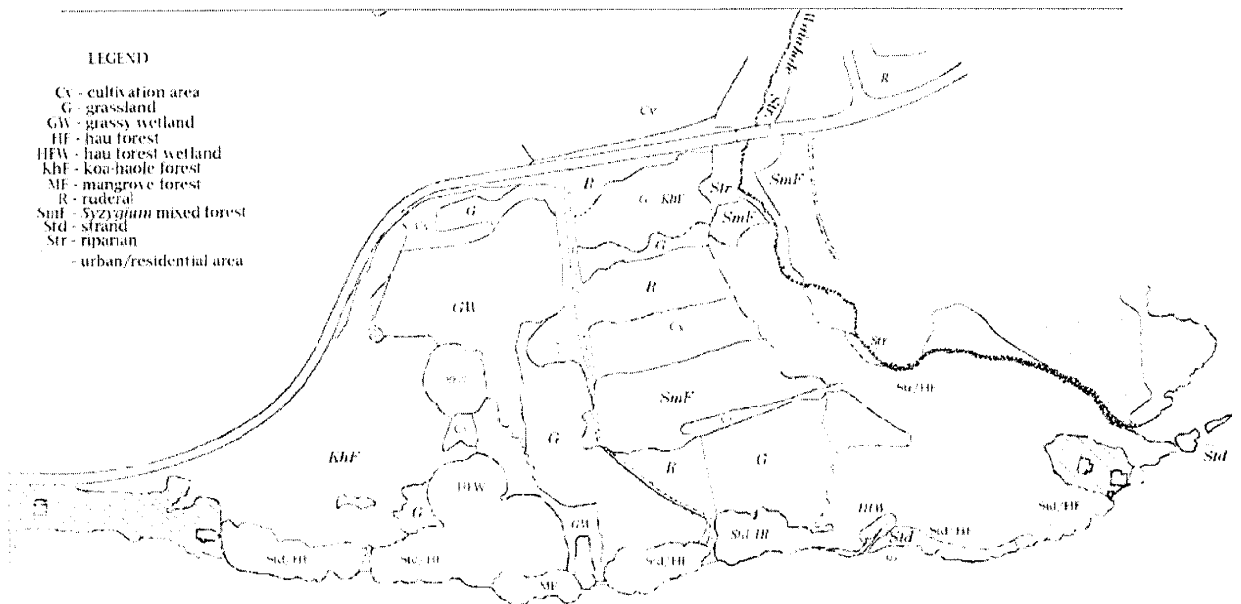


Figure 2. Vegetation types distribution map based on an aerial photograph (after AECOS, 1995).

where estuarine waters became fresh waters. Another wetland type lies along the shore of Kane`ohe Bay to the south of the stream mouth, consisting of two areas of coastal wetlands coded E2SS3N. This type refers to hau (*Hibiscus tiliaceus*) and mangrove (mostly *Rhizophora mangle* with *Bruguiera gymnorrhiza*) formations at the shore. Finally there is indicated a somewhat isolated wetland coded PEM1KFh in the interior part of the parcel. This is a grassy area not associated with either the stream or the ocean. These various USFWS wetland classification codes are defined (USFWS, 1995) as follows:

SYMBOL	DEFINITION
E2FO3N	Estuarine, intertidal, broad-leaved evergreen, forest (regular, tidal).
E2SS3N	Estuarine, intertidal, broad-leaved evergreen scrub/shrub (regular, tidal)
PEM1KFh	Palustrine, persistent, emergent vegetation (semi-permanent, diked, artificial impoundment)
PFO3C	Palustrine forest
M1OWL	Marine, subtidal, open water (unknown bottom).
M1RF1L	Marine, subtidal, coral reef

The remainder of the parcel is shown as upland (not wetland) on the wetland inventory map.

The vegetation map (Figure 2) presented in AECOS (1995) for this parcel also provides an indication of current boundaries of these various wetlands, although mostly what is clearly evident (because of dark shading) is the hau forest boundary. Since hau is a wetland indicator species, this map suggests more extensive wetlands now occur along the shore. This may be the case because agricultural activities on the property have ceased, and clearing of trees is no longer practiced. Nonetheless, in many places where hau occurs at the shore, a distinct bank is present that would mark the end of tidal influence (i. e., jurisdictional boundary) with the tree itself spreading branches inland over non-wetland. Small areas of mangrove indicate where tidal waters extend a short distance inland.

Neither the vegetation maps nor the wetland inventory maps necessarily describe jurisdictional wetlands, since not all areas indicated as wetlands on the maps were ever subjected to field validation. A purpose of the October 24 field inspection was to determine if and how much of the indicated wetlands actually exist and to identify any other wetland sites that might be present on the parcel.

What may be a modified or seasonal wetland is found on the broad open area in the middle to southern part of the site and is mostly now covered with California grass (*Brachiaria mutica*), with other weedy species such as lantana (*Lantana camera* L), sensitive weed (*Mimosa pudica*), *Bidens alba*, and *Ipomoea obscura*. and others coming in. California grass is a facultative wetland species, which means it is found



in wetlands 67% to 99% of the time. Therefore, this seasonal or modified wetland (USFWS area coded PEM1KFh) would meet the ACOE wetland criterion for hydrophytic vegetation. However, a twenty-five inch deep soil pit, dug in the lowest part of the site, revealed no water or even wet soil. Hence the wetland hydrology criteria was not met. Dampened soil from the soil pit revealed Munsell Soil Color of 10yr3/1 that does meet the hydric soil criteria, but since the area was dry and dusty, the result is questionable. Much of the area is used as a pasture for horses and some parts show evidence of having been plowed. To be classified as a wetland all three ACOE criteria must be met. We therefore conclude that this area is no longer a wetland, but an area that is flooded infrequently, is disturbed by agricultural activities, and is isolated from any regular source of water.

Just east (makai) of the above described "pasture" occurs an area of hau and some tall grassland that was observed to be wet during the 1995 survey (AECOS, 1995); this area was much drier in October 2000. It is possible that this area is fed by a spring, although no clear evidence of such was seen in October. Four years of drought have changed the water regime of the area. The hau forest, broken at one point, extends all the way to the ocean shore. There is evidence within this forest of old drainage ditches or auwai, and it is possible that much of this wetland feature south of Waiahole Stream is part of the former auwai system that now terminates on the mauka side of Kamehameha Highway. Hau, like California grass is a FACW wetland species, so the hydrophytic wetland vegetation criterion is met within the hau forest and grassland here. A twenty-four inch soil pit revealed soil with a Munsell soil color of 2.5yr 3/4 with mottles. Inland the soil pit was dry, but near the shore the soil was wet and spongy. The soil criteria as well as the hydrology criteria are both met along the shore of the hau forest and extending inland. For the inland portion, the correct USFWS code would be PFO3C (palustrine forest), and this forested area should be regarded for the time being as a wetland — one that may recover in wetter times (if spring-fed) or may disappear altogether without functional restoration of the man-made auwai.

The third habitat found on this site is a riparian or stream side vegetation. Found along Waiahole Stream, in this case, it is composed of very big trees, some more than sixty feet in height. The canopy layer is made up of monkey pod (*Samanea saman*), gun powder tree (*Trema orientalis*), banyan (*Ficus microcarpa*), and some mangrove trees near the shore. The understory story along the stream banks is intermittently covered by hummocks of big grasses such as Guinea grass (*Panicum maximum*) and elephant grass (*Pennisetum purpureum*). There are patches of ginger (*Hedychium* spp.), occasional passion vine (*Passiflora edulis*), and downy wood fern (*Thelypteris dentata*). A few garden escapees such as *Monstera deliciosa* and *Xanthosoma roseum* Schott are to be found around abandoned home sites.

This riparian vegetation gives way downstream to a more distinctly wetland assemblage of hau and seashore paspalum (*Paspalum virginicum*), the latter mostly found in more open areas at the stream mouth. Much of the USFWS inventory wetland, especially on the left or north bank is, in fact a mixture of riparian forest or disturbed land which extends all along Waiahole Stream from about the trail ford up to Kamehameha Highway. The plants are mostly FAC and FACU species. (Some of this area is discussed in *AECOS*, 2000). This habitat type includes most of the land designated in the inventory as PF03C along Waiahole Stream. The makai or seaward area, designated E2FO3N, is dominated by hau (FACW). Although quite dry during the October 2000 survey, the hau forest should be treated as a jurisdictional wetland. Coverage by hau approaches 100%, soils are Pearl Harbor clay (USDA-SCS, 1972), and Waiahole Stream over-topping its summer season channel provides for adequate hydrology.

## Discussion

WAIAHOLE STREAM PARCEL — Several previously inventoried wetlands on the Waiahole Parcel were assessed for wetland indicators. Although delineations of wetland boundaries were not made, a general rule for this parcel emerges: areas dominated by hau and/or mangrove are probably jurisdictional wetlands. An area near the center of the parcel that has been used for agriculture and pasturing has some characteristics of a jurisdictional wetland, but appears highly modified and isolated. Just makai of this feature, natural springs may be responsible for maintaining a grove of hau in a swath that extends to the coast. This forested area should be considered a wetland for present planning purposes. Both areas (the pasture and the hau forest) likely provide certain wetland values, such as retention and filtering of runoff water and therefore should not be filled or constructed upon. However, these areas could be maintained in a more open state without compromising the resource values.

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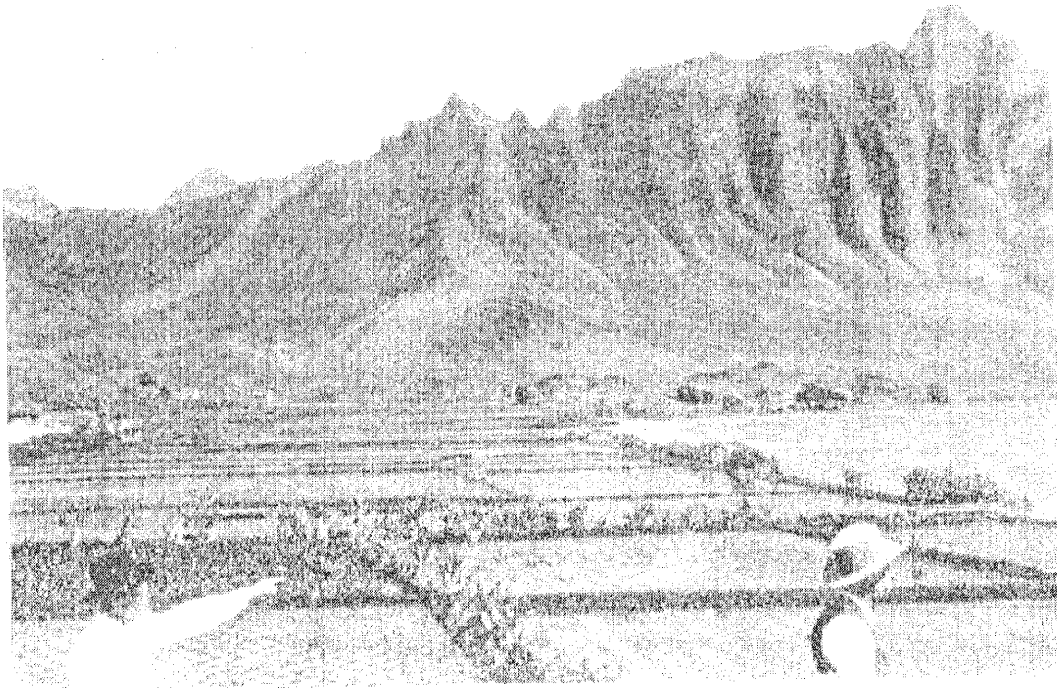
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# CONCEPT PLAN

## WAIAHOLE STREAM WETLANDS CREATION AND ENHANCEMENT



### INTRODUCTION

This document, prepared by Eric Guinther of AECOS Inc. with consideration of input from local informants and community members described in Bushnell et al. (2002), is a presentation of concepts for wetlands enhancement and creation on C&C property in Waiahole Valley (TMK: 4-8-01). The concepts presented combine several desirable goals:

- to expand wetland habitat for native wetland birds and plants,
- to develop a community *lo'i kalo* (taro) project to enhance cultural and educational values,
- to achieve water cleansing of Waiahole watershed runoff to protect coral reefs in Kane`ohe Bay,
- to replace a wetlands loss previously proposed for an adjacent C&C park parcel,
- to improve the viewplane from Kamehameha Highway in a culturally meaningful manner, and
- to provide substantial public benefit from a significant property investment made by the C&C and the Federal Government in acquiring this coastal parcel.

The concepts involve both creation and enhancement of wetlands. Establishing the present status of parts of the property with respect to designation as wetlands may

appear to be a technicality since it is being proposed to maintain wetland use; however, "creating" a wetland out of non-wetland is wetland creation, whereas making a wetland out of existing wetland, no matter how poor the resource value of that wetland, constitutes wetland enhancement. This distinction is only really important to one of the goals expressed above: that of replacing wetland lost through fill at the adjacent County park site. The concepts also combine both man-made (or more correctly, managed) and natural wetlands. *Lo'i kalo* or taro fields are wetlands of substantial cultural importance and demonstrated value to endangered waterbirds such as *koloa* and *alae`ula*, species that thrived when taro was grown extensively in the Islands. However, the concepts also offer natural wetlands to further enhance habitat for these birds and to trap any sediment generated by planting and harvesting in the *lo'i*.

## BACKGROUND

Because the property is mostly the delta (stream mouth deposit) of Waiahole Stream, it is logical to assume that over many thousands of years wetlands have come and gone in natural processes that formed this land out of the marine cove that occupied the same area following flooding of the ancient valley when sea level rose during the Holocene. It is believed that this sea level rise reached a maximum of about + 1.5 m (5 ft above present sea level) between 2000 and 5000 year ago (Fletcher & Jones, 1996). The ancient cove at the mouth of Waiahole Stream gradually filled with deposits of sediment brought down by the stream, and over and through these deposits, the stream meandered and changed location creating backwaters and wetlands. As the area was settled by Hawaiians over 1000 years ago, the rich soils and ample water resources of the valley stream supported conversion of all of the coastal plane into *lo'i kalo* (Miyagi, 1963; see Photo 1 taken in 1909 of the coastal plain at Hakipu'u).

In modern times, the *lo'i*, in the lowlands at least, were first converted to rice, then later to truck crops (Figure 1), or abandoned (see Bushnell et al., 2002). In this process, wetlands either disappeared as *'auwai* bringing water to areas removed from the stream were abandoned, or remained in pockets where water was still provided from springs or flooding from the stream. Wetlands on the property were designated in a national inventory of wetlands prepared by the USFWS (Figure 2). The property was more recently surveyed (AECOS, 2001) in an attempt to establish which of these indicated areas could be designated as jurisdictional wetlands today based upon the methodologies promulgated by the ACOE (USACOE, 1987).

The City and County of Honolulu purchased, in 1996 (officially May 10) using ICTEA funds, the approximately 38-acre parcel encompassing the mouth of Waiahole Stream and extending south from the Stream to Kamehameha Highway where the highway rounds the point (Hanakea) marking the southern edge of Waiahole Valley. The purpose of the purchase was to protect coastal views of Kane`ohe Bay along the Waiahole-Waikane highway corridor. The parcel is adjacent to a narrower parcel owned by the C&C and now being developed as an expansion of Waiahole Beach Park. Because ICTEA funds were used to preserve a highway viewplane, uses of the Waiahole coastal land must preserve or enhance the view from the highway. Converting a portion of the property into wetlands (both natural and agricultural *lo'i*) would be compatible with these requirements.

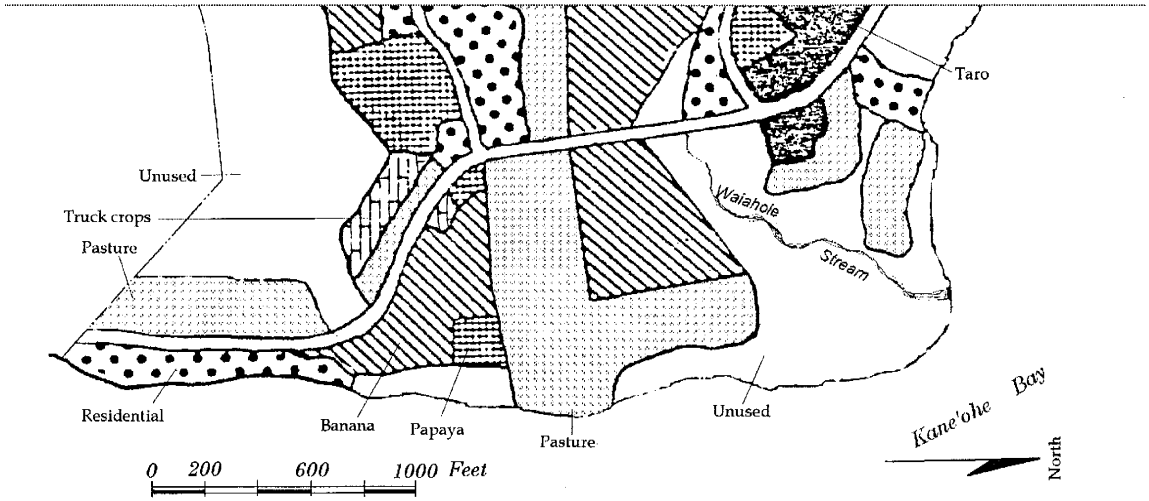


Figure 1. Map of the *makai* portion of Waiahole Valley showing land uses as described by Miyagi (1963).

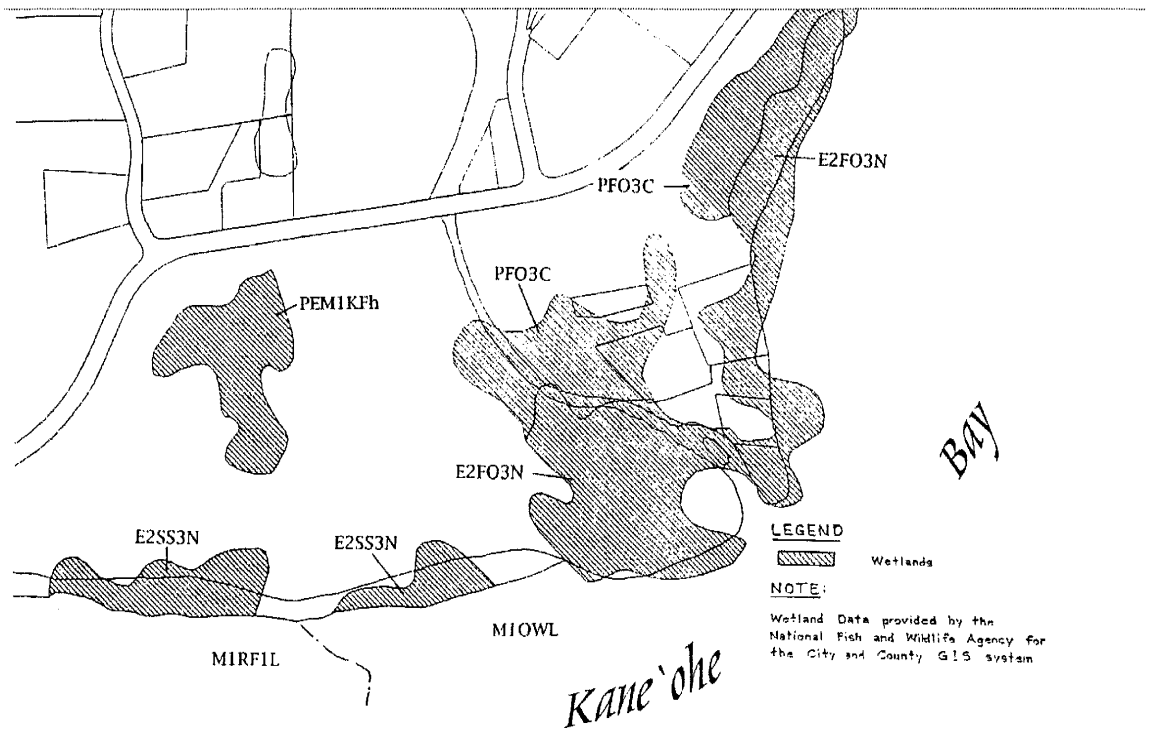


Figure 2. C&C map of the Waiahole parcels with overlay of National Wetland Inventory Maps (USFWS, 1984).

During clean-up and clearing of adjacent park lands, fill was inadvertently placed on an area that would be define as federal jurisdictional "wetlands" (AECOS, 2000). The property under development in this case included several drainage swales, and during informal discussions with the U.S. Army Corps it was proposed that these drainages be

enlarged to create wetlands to replace the acreage filled. These wetlands would replace some habitat and would be a considerable improvement over the wetland lost (completely covered by *hau* in recent decades). However, their small size and limited drainage area suggest only limited wetland values would have been realized.

The ICTEA parcel has long been of interest to the community as a place where formerly extensive taro fields could be restored. All of the low lying land here was once in taro and the ancient *`auwai* were functional up to modern times (Photo 2), supplying the fields with water from Waiahole Stream. Taro was grown in *lo`i* across the highway from Waiahole Poi Factory (north side of Waiahole Stream) up until a few decades ago (Miyagi, 1963; J. Reppun, pers. Comm; see Figure 1). The *`auwai* system south of the stream presently delivers stream water to a point just across the highway from the parcel and could be restored with minimal expense. Water presently arriving at the highway is shunted back into Waiahole Stream at the Highway bridge; but inspection of the *`auwai* on the property shows some water is presently passing under the highway through a culvert pipe. The State is preparing plans to replace the highway bridge and could easily incorporate a pipe or siphon to carry the water from the *auwai* on the *mauka* side of the road to the proposed *lo`i* on the *makai* side.

## CONCEPTS

Once the *auwai* is made functional, and water delivered to the C&C parcel, *lo`i kalo* would be developed on the nearly level land following more or less the old pattern (see Photo 2) of fields lying along the south side of the stream. Water from the growing of taro — that is the effluent from the *lo`i* and perhaps additional water if sufficient volume can be supplied — would be used to flood other areas *makai* of the *lo`i*, and thereby encourage development into wild or natural wetlands. Some of these areas are former wetlands that no longer have any reliable supply of water (presently would not be jurisdictional wetlands). Ponds would be created by scooping out the soil to establish open water against the tendency of wetted soil to develop a thick cover of Para grass and obliterate wetland bird habitats.

Further *makai* there occurs an area of *hau* forest that has developed on the deposited soils of the modern stream delta at the mouth of Waiahole Stream. This forest land is important to spreading freshet flows out before they reach Kane`ohe Bay, but the trees and sediment deposits also represent areas seldom if ever visited by the stream anymore. Only very extreme storm events cause the stream to flow outside its banks. Selective clearing and perhaps creation of several new channels could cause these lands to be reoccupied by both stream and tidal waters of Waiahole. Indeed, there is almost no other place on the Island of O`ahu where there exists as much potential for developing a coastal wetland at the mouth of a significant drainage system, restoring the ecology and geohydrology that existed in abundance along entire windward coast up until about a century ago.

At Waiahole, the land exists encumbered (cannot be developed), the parcel is of sufficient size to accommodate a significant restoration that would benefit both wildlife and water quality in the adjacent marine environment (which is a coral reef dominated embayment of unique marine resource value); there is substantial community interest in the region for partnering with the C&C to maintain the area; and significant additional partners and matching funds (from EPA, U.S. Fish & Wildlife, NOAA, and NRCS)

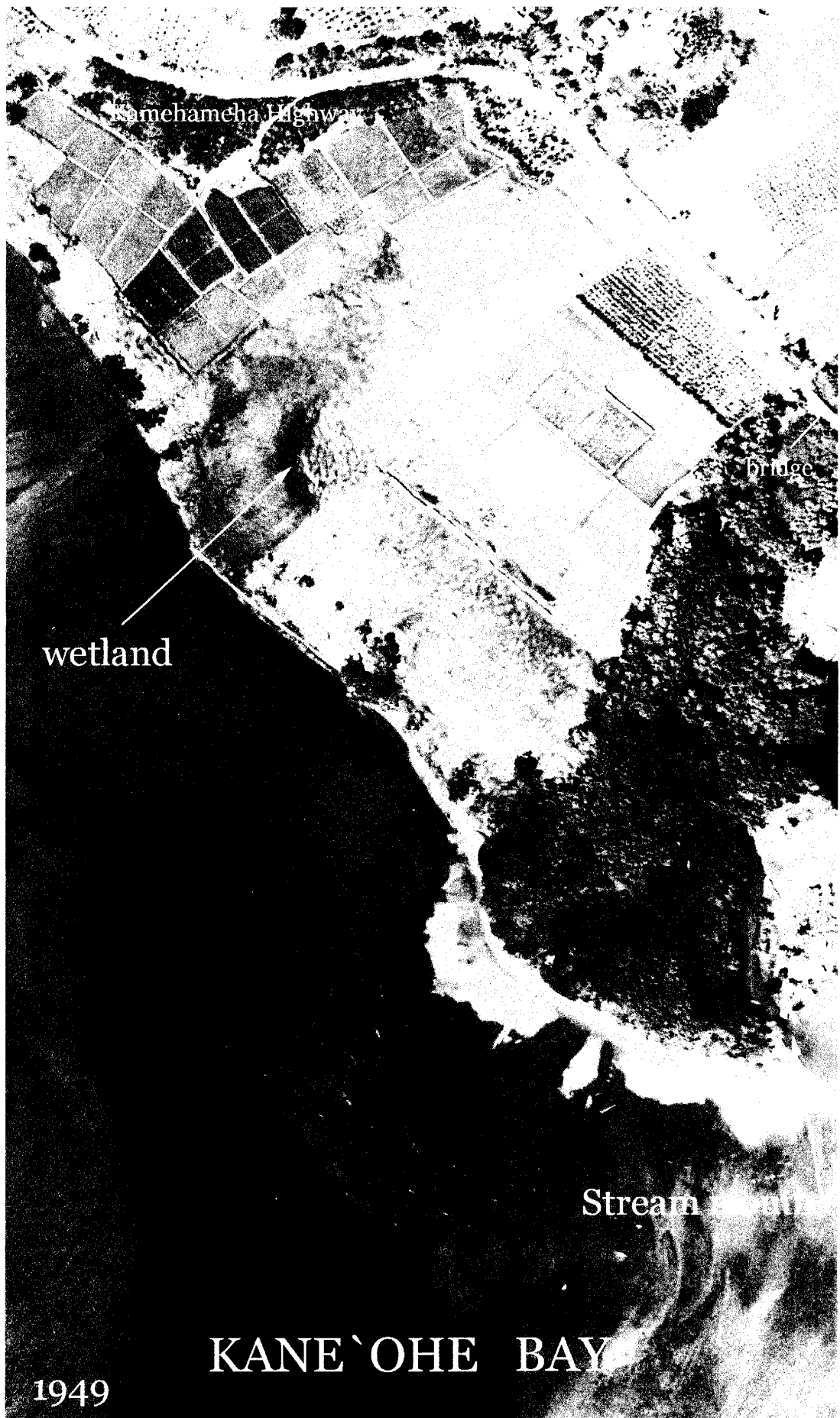
would be likely forthcoming if the project goals are realistic, yet sufficiently grand to make a difference

PHOTO 2 – An aerial view of the proposed project site as it appeared in 1949. North is towards the lower right corner. This photograph shows clearly a number of features present after *lo`i kalo* and then rice paddies were abandoned, revealing several things about the land obscured by trees in more recent aerial photographs (see Figure 3, site vegetation map, after AECOS, 1995). The layout of the fields in 1949 is likely the same as or close to that of the old *lo`i*, although the crops being grown in 1949 are papaya and vegetables. What appears to be an *`auwai* can be seen parallel to the highway, delivering water to fields in the southern part of the property (upper left). The *`auwai* shown on earlier maps of this parcel (Hawai`i Territory Survey Reg. Map 2166; see Bushnell, 2002, p. 90) can be seen beside the access road, but seems to be no longer delivering a constant flow of water (may be in use to irrigate the fields intermittently).

The nature of the undeveloped areas lacking trees is uncertain, but appears to be grassland or pasture as it was in the 1960s (Miyagi, 1963) and forward, with the darker area representing wetter land and perhaps a shallow pond ("wetland"). This wet area corresponds to wetlands still present on the property (see AECOS, 1995, 2001; in part the "PEM1KFh" area shown in Figure 2 above), fed by the spring discussed in Bushnell et al, 2002, pp. 119-120).

Waiahole Stream can be seen at the highway bridge, then again flowing to the north and west just outside the dense growth of trees (riparian vegetation). It is evident from sediment deposits off the shore that the stream previously exited through the middle of the trees and only "recently" (perhaps 100 years BP) opened a new mouth on the west side of the delta. Looking at the sediment deposited in the Bay there is evidence that the stream mouth exited in a more central position, and this channel of the stream is indicated on a 1903 Territorial Survey map (Hawai`i Territory Survey Reg. Map 2166; see Bushnell, 2002, p. 90).





Kamehameha Highway

bridge

wetland

Stream

# KANE`OHE BAY

1949

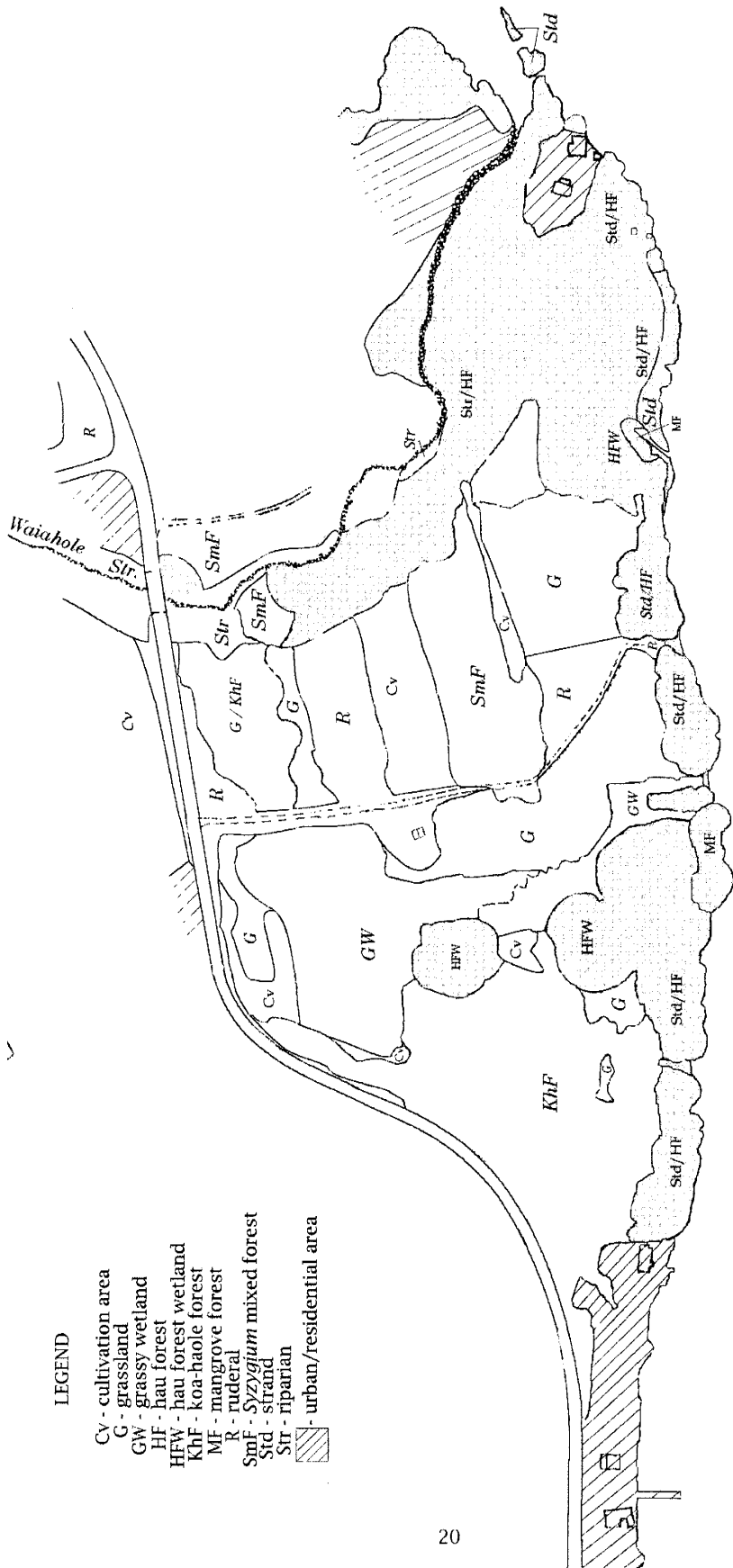


Figure 3. Vegetation map of the Waiahole parcel.

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**A Hawaiian Traditional and Cultural Practices Assessment for the  
proposed Waiāhole Beach Park, *Ahupua`a* of Waiāhole and Waikāne,  
Ko`olaupoko, O`ahu**

**(TMK 4-8-01)**

***DRAFT***

Volume I

Prepared for

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## ABSTRACT

In this study, Cultural Surveys Hawaii, Inc. conducted a Hawaiian traditional cultural practices assessment for 78 acres in the Waiāhole and Waikāne coastal flatlands for the Waiāhole Beach Park Expansion. A concerted effort was made to contact knowledgeable informants of the area. Nine knowledgeable individuals were identified and interviewed. In addition to the interviews conducted, research was carried out at the Hawai'i State Archives, the Bureau of Land Conveyances, the Hawai'i State Survey Office, the State Historic Preservation Division, with Waihona.com and the Cultural Surveys Hawai'i Library.

Research and community consultation for this area suggest Waiāhole and Waikāne Ahupua`a are extremely rich in cultural traditions. Written sources document the area's connection to the Kumulipo, a creation story of Hawai'i. Legendary figures such as Māui, Hi'iaka, Kamapua`a, Laka, Kāne, Hua`a, Kapunohu, Olopana appear in the historic documentation relating to the two *ahupua`a*. Waikāne was noted as a *pu`u honua*, a place of refuge in Ko`olaupoko. Waiāhole is listed as one of several *ahupua`a* given first to the *kahuna* Lonoawohi and later to the *kahuna* Lonomauki. The many place names documented for Waiāhole and Waikāne reflect the areas colorful history of gods, demi-gods, famed *ali`i* and *kahuna* who have become a part of the spirit of the place.

Many Hawaiian families still live in Waiāhole and Waikāne. After initial consultations suggested there were many knowledgeable individuals living in the area, it was decided to focus the consultations on the study area, and families who had specific knowledge of the study area. The individuals consulted and interviewed described many traditions and practices, some which have faded, others which are still very alive and others which had faded, but are now being revived.

Fishing traditions and gathering ocean resources remain strong in the area. Almost everyone consulted talked about fishing, crabbing or gathering shellfish or *limu* along the shoreline of the study. Two fishponds and five *`auwai* were identified in the study area. Many community members would like to see taro growing in the study area once again. A *hau* grove, considered sacred by some, was identified. Also in Waiāhole was a *pohaku o kāne*, or family altar. Five areas of burials in the study area were identified during interviews and community consultation. Although plants were not stressed during interviews, a few informants pointed out plants which they felt held significance.

Traditions pertaining to the less tangible realm of the spirits were also shared by informants. Several had stories about spirits, *`aumakua*, ghosts, *akualele* or fire balls, *pō kāne* or night marchers and giant men.

In consultation with the people of Waiāhole and Waikāne several specific recommendations were developed in the course of this study which may serve to guide beachpark development.

## ACKNOWLEDGMENTS

We would particularly like to thank Mr. George Hoaeae, Mr. Calvin Hoe, Ms. Elizabeth Mahoe, Ms. Incarnation Manatad, Mr. James Medeiros, Mr. Alfred Morita, Mr. "Don" Felix Pacyau, Jr., Ms. Diane Obedoza-Ahrens, Mr. Richard Paglinawan and Mr. Emil Wolfgramm for giving their time and sharing their knowledge of the traditions of Wai āhole and Waikāne. We also wish to acknowledge the valuable information given by Mr. Cy Bridges, Councilman Steve Holmes, Mr. Raymond Kamaka, Mr. Colin Kippin of the Office of Hawaiian Affairs, Ms. Monica Koikoinui, Alejandra and Cookie Lagapa, Ms. Moana Lee, Candido and Sharon Manatad, Dr. Holly McEldowney and Mr. Nathan Napoka of the State Historic Preservation Division, Mr. John Reppun, Joe and Pat Royes, Ms. Hannah Salas, Mr. Russell Santos, Ms. Nadine Tokuzato of Waikāne Store and Ms. Susan Holly Wada of the Queen Lili`uokalani Children's Center. This work would not have been possible without the aid of these people. All errors are the responsibility of Cultural Surveys Hawaii.

Interviews were conducted by Kristina W. Bushnell and Rodney Chiogioji. Background research was primarily conducted by David W. Shideler and Mr. Todd Tulchin. Mr. Matthew Yap of Punahou School participated in research in support of this project. Drafting was carried out by Daria Creed and Mr. Tulchin. Dr. Vicki Creed was helpful on several aspects of this project. Cultural Surveys work was under the overall guidance of Hallett H. Hammatt.

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## GLOSSARY OF HAWAIIAN TERMS

Definitions excerpted from Pukui & Elbert (1986)

ahu	Heap, pile, collection, mound, mass; altar, shrine, cairn; a traplike stone enclosure made by fishermen for fish to enter.
ahupua`a	Land division usually extending from the uplands to the sea, so called because the boundary was marked by a heap ( <i>ahu</i> ) of stones surmounted by an image of a pig ( <i>pua`a</i> ).
akua	God, goddess, ghost, devil, image, idol, corpse.
akule	Big-eyed or goggle eyed scad fish ( <i>Trachurops crumenophthalmus</i> ).
`alihakaua	General, commander in battle, strategist.
ali`i	Chief, chiefess, officer, ruler, monarch, peer, headman, noble, aristocrat, king, queen, commander.
`ama`ama	Mullet ( <i>Mugil cephalus</i> ), a very choice indigenous fish.
`auku`u	Black-crowned night heron ( <i>Nycticorax nycticorax hoactli</i> ).
`aumakua	Family or personal gods, deified ancestors who might assume the shape of [animals or plants].
`auwai	Ditch, canal.
`auwana	Var. spelling of `auana, to wander.
`awa	The kava ( <i>Piper methysticum</i> ), a shrub 1.2 to 3.5 meters tall with green jointed stems and heart shaped leaves, native to Pacific islands, the root being the source of a narcotic drink of the same name used in ceremonies.
`e`epa	Extraordinary, incomprehensible, abnormal, deceitful, peculiar, as persons with miraculous powers; such persons.
haoles	White person, American, Englishman, Caucasian; American, English.
hau	A lowland tree ( <i>Hibiscus tiliaceus</i> ), found in many warm countries, some spreading horizontally over the ground forming impenetrable thickets.
hīnāle`a	To blow favorably, as wind.
hōlua	Sled, especially the ancient sled used on grassy slopes, the sled course.
huki	To pull or tug, as on a rope; to draw, stretch, reach.

hukilau	A seine; to fish with the seine.
i`a	Fish or any marine animal, as eel, oyster, crab, whale.
`ili	Land section, next to importance of <i>ahupua`a</i> and usually a subdivision of an <i>ahupua`a</i> .
imu	Underground oven.
kahu	Honored attendant, guardian, nurse, keeper of `unihipili bones, regent, keeper, administrator, warden, caretaker, master, mistress.
kahuna	Priest, sorcerer, magician, wizard, minister, expert in any profession (whether male or female).
kahuna nui	High priest and councilor to a high priest; office of the councilor.
kama`āina	Native born, one born in a place, host; native plant; acquainted, familiar. <i>Lit.</i> , land child.
kapu	Taboo, prohibition; special privilege or exemption from ordinary taboo; prohibited, forbidden; sacred, holy, consecrated; no trespassing, keep out.
kīkepa	Tapa or sarong worn by women under one arm and over the shoulder of the opposite arm.
kōlea	Pacific golden plover ( <i>Pluvialis dominica</i> ), a migratory bird which comes to Hawai`i about the end of August and leaves early in May for Siberia and Alaska.
kuahu	Alter.
kūkae	Excreta, dung, feces.
kula	Plain, field, open country, pasture. An act of 1884 distinguished dry or <i>kula</i> land from wet or taro land.
kuleana	Right, privilege, concern, responsibility, title, business, property, estate, portion, jurisdiction, authority, liability, interest, claim, ownership, tenure, affair, province.
kulikuli	Noise, din; noisy, deafening, inharmonious; a noise. Be quiet! Keep still! Shut up!
kūmū	Bottom, base, foundation, basis, title (as to land), main stalk of a tree, trunk, handle, root (in arithmetic); basic; hereditary, fundamental.

kūpe`e Bracelet, anklet; fetters, menacles, handcuffs; to put or tie on bracelets, anklets, fetters; to hog-tie.

kū`ula Any stone god used to attract fish, whether tiny or enormous, carved or natural, named for the god of fishermen.

lānai Porch, veranda, balcony, booth, shed.

lehua taro A variety of taro used for red *poi*.

lele A detached part or lot of land belonging to one `ili, but located in another `ili.

lo`i Irrigated terrace, especially for taro, but also for rice; paddy.

loko i`a taro Combination fishpond and taro patch.

luau Hawaiian feast.

makai On the seaside, toward the sea, in the direction of the sea.

mauka Inland, upland, towards the mountains.

Menehune Legendary race of small people who worked at night, building fishponds, roads, temples.

mo`o Lizard, reptile of any kind, dragon, serpent; water spirit.

mo`olelo Story, tale, myth, history, tradition, literature, legend, journal, log, yarn, fable, essay, chronicle, record, article; minutes, as of a meeting.

mo`opuna Grandchild; great-niece or -nephew; relatives two generations later, whether blood or adopted; descendent, posterity.

`ohana Family, relative, kin group.

olonā A native shrub (*Touchardia latifolia*) with large, ovate, fine-toothed leaves, related to the *māmaki*.

`ono Delicious, tasty, savory.

`ōpae General name for shrimp.

`opu To dive into the water, feet first, without making a splash, an ancient sport.

Paliuli A legendary land of plenty and joy, said to be on Hawai`i, where chiefs' children were raised; now a place name on several islands. *Lit.*, green cliff.

papa Flat surface, stratum, plain, reef, layer, level, foundation.

pau	Finished, ended, through, terminated, completed, all done.
poepoe	Round, rounded, circular.
pōhaku	Rock, stone, mineral, tablet.
poi	Poi, the Hawaiian staff of life, made from cooked taro corms.
pua`a kai	Certain fish used as substitute for pig offering.
punahele	A favorite or pet; to treat as a favorite; favoritism.
pu`uhonua	Place of refuge, sanctuary, asylum, place of peace and safety.
`ulu maika	Stone used in <i>maika</i> game.
wahine	Woman, lady, wife.
wai	Water, liquid, or liquor of any kind other than sea water.
wahi pana	Legendary place.
wauke	The paper mulberry ( <i>Broussonetia papyrifera</i> ), a small tree or shrub, from eastern Asia, known throughout the Pacific for its usefulness.

## I. INTRODUCTION AND SCOPE OF WORK

### A. Project Background

At the request of the Department of Design and Construction, City and County of Honolulu, Cultural Surveys Hawaii, Inc. conducted a Hawaiian traditional and cultural practices assessment of an approximately 78-acre parcel situated in the traditional land divisions, or *ahupua`a* of Waiāhole and Waikāne, District of Ko`olaupoko, Island of O`ahu. The parcel is situated on the seaward, or *makai* side of Kamehameha Highway and extends to the shoreline of Kāne`ohe Bay. The parcel at Waiāhole (TMK 4-8-01,02.) comprises approximately 38 acres, and the parcel at Waikāne (TMK 4-8-03: por.1, 12, 13, 14, 15, 16, 20, 21, 22, 23, 42) comprises approximately 40 acres. Both parcels have been acquired by the City and County of Honolulu for future expansion of the Waiāhole Beach Park.

The purpose of this Traditional Practices Assessment is to consider the effects the proposed park development may have on native Hawaiians as it pertains to the culture and their right to practice traditional customs. The Hawai`i State Constitution, Article XII, Section 7 protects “all rights” of native Hawaiians that are “customarily and traditionally exercised for subsistence, cultural and religious purposes”.

In addition, the Hawai`i State Constitution, Article XII, Section 7, protects “all rights” of native Hawaiians that are “customarily and traditionally exercised for subsistence, cultural and religious purposes”.

This assessment is meant to be informational, for the purpose of disclosing any cultural impacts to native rights and practices the proposed development might have on Hawaiian culture. The Scope of Work (SOW) was designed to meet the cultural impact concerns of the Office of Hawaiian Affairs (OHA), the Office of Environmental and Quality Control (OEQC) and any other state and county agencies involved in the review process for the proposed project.

In 1997, the Office of Environmental and Quality Control issued Guidelines for Assessing Cultural Impacts. The Guidelines discuss the types of cultural practices and beliefs that might be assessed.

The types of cultural practices and beliefs subject to assessment may include subsistence, commercial, residential, agricultural, access-related, recreational, and religious and spiritual customs. The types of cultural resources subject to assessment may include traditional cultural properties or other types of historic sites, both man-made and natural, including submerged cultural resources, which support such cultural practices and beliefs.

Most recently, H.B. No. 2895 was passed by the 20<sup>th</sup> Legislature, and approved by Governor Cayetano as Act 50 on April 26, 2000. The bill acknowledges that



“... the past failure to require native Hawaiian cultural impact assessments has resulted in the loss and destruction of many important cultural resources and has interfered with the exercise of native Hawaiian culture. The legislature further finds that due consideration of the effects of human activities on native Hawaiian culture and the exercise thereof is necessary to ensure the continued existence, development, and exercise of native Hawaiian culture.”

This bill issues a directive that “... environmental assessments or environmental impact statements should identify and address effects on Hawai`i’s culture, and traditional and customary rights.”

The process for evaluating cultural impacts is constantly evolving. There continues to be gray areas and unresolved issues pertaining to traditional access and gathering rights for native Hawaiians. Act 50 is an attempt to balance the scales between traditional lifestyles and development and economic growth.

## **B. Scope of Work**

The following Scope of Work was proposed for satisfying requirements related to Native Hawaiian Gathering Rights and their applicability to the project area.

1. Examination of historical documents, Land Commission Awards, historic maps, with the specific purpose of identifying traditional Hawaiian activities including gathering of plant, animal and other resources or agricultural pursuits as may be indicated in the historic record.
2. A review of the existing archaeological information pertaining to the sites on the property as they may allow us to reconstruct traditional land use activities and identify and describe the cultural resources, practices and beliefs associated with the parcel and identify present uses, if appropriate.
3. Conduct oral interviews with persons knowledgeable about the historic and traditional practices in the project area and region. We anticipate 4-6 formal interviews and more informal interviews.
4. Preparation of a report on items 1-3 summarizing the information gathered related to traditional practices and land use. The report will assess the impact of the proposed action on the cultural practices and features identified.

## **C. Methodology**

Historical documents and maps were researched at the Hawai`i State Archives, Hawai`i State Survey Office, State Historic Preservation Division library and files, Bureau of Land Conveyances, Bishop Museum Photo Collection and the Cultural Surveys Hawaii’s library.

Hawaiian organizations, agencies and community members were contacted in order to identify potentially knowledgeable individuals with cultural expertise and/or knowledge of the study area and the surrounding vicinity. A discussion of the consultation process can be found in the following section on "Community Consultations". Please refer to Table 3 for a complete list of individuals and organizations contacted.

#### **D. Study Area Description**

The study area consists of two adjacent parcels located in the *ahupua`a* of Waiāhole and Waikāne, District of Ko`olaupoko, Island of O`ahu (Figures 1-6). The parcel at Waiāhole (TMK 4-8-01,02) comprises approximately 38 acres. The study area consists of the majority of the flat coastal lands of Waiāhole and Waikāne *makai* of the Kamehameha Highway. The study area is bounded on the south by the Waiāhole-Ka`alaea *ahupua`a* boundary, on the north by the Waikāne Congregational Church property boundary (TMKs 4-8-03:por.2, 4), on the east by the Kāne`ohe Bay and on the west, by the Kamehameha Highway.

These parcels are situated at the *makai* end of the Waiāhole and Waikāne Stream valleys, both of which originate on the windward slopes of the Ko`olau Mountain range. The majority of the terrain is gently sloping to nearly flat and consists predominately of flood plains less than forty feet above sea level. The valleys consist of numerous intermittent streams and several that flow year-round, including the Waikāne and Waiāhole streams.

Two soil types are present in the study area; Pearl Harbor Clay in the northern and southern portions and Hanalei silty clay in the central portion. The Pearl Harbor Clay permeability is very slow, and the soil is difficult to work with. On the other hand, the Hanalei silty clay is very fertile and permeability is moderate (Foote *et al.* 1972:Sheet 58).

Temperatures within the study area range from an average (mean) minimum of 60 degrees Fahrenheit to an average maximum of 85 degrees Fahrenheit (Kapaka Makai Station - 10 feet above mean sea level). Rainfall averages between 60 and 80 inches per year (Juvik and Juvik 1998:56).

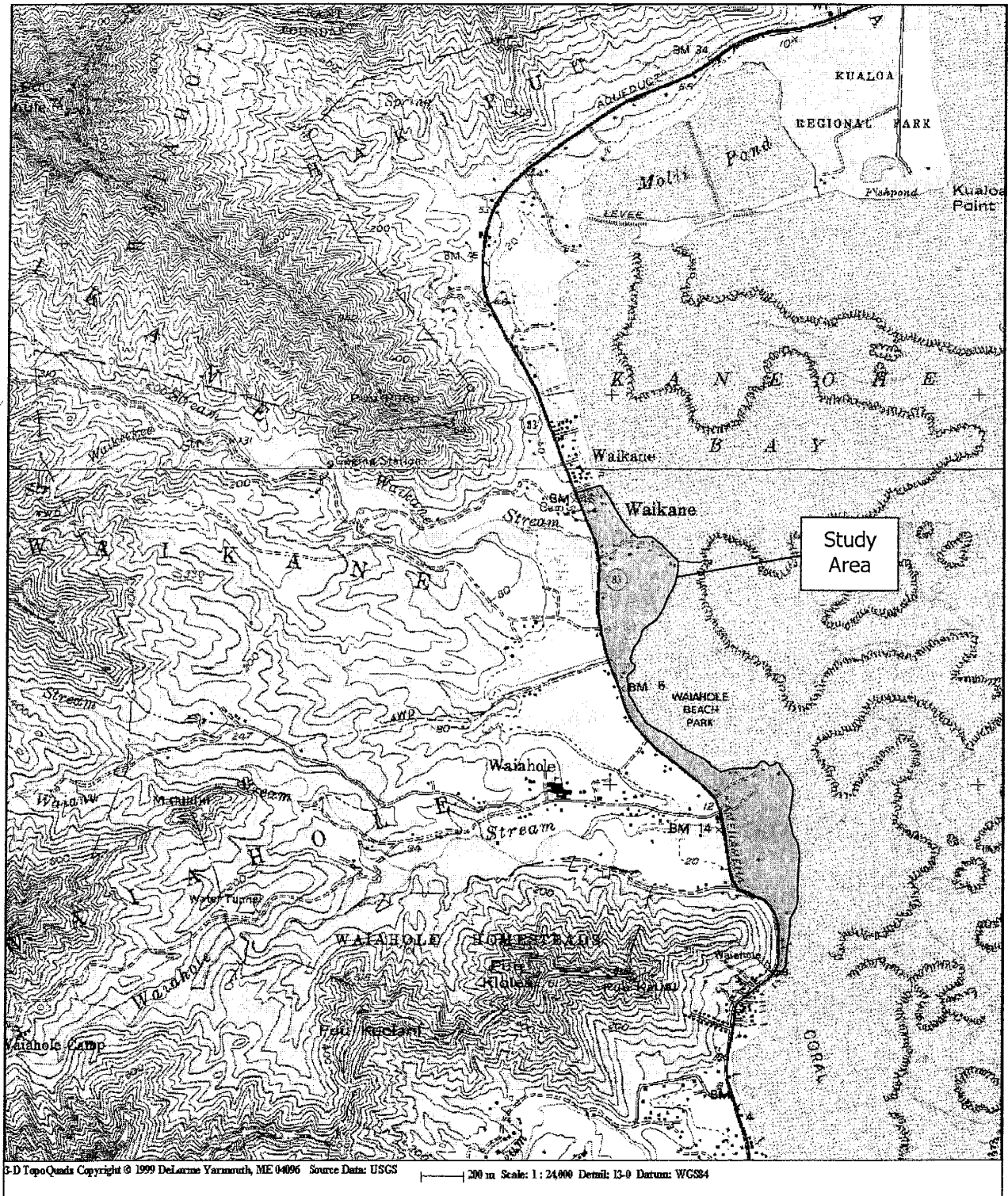


Figure 1 Portion of USGS 7.5 Minute Series Topographic Map of Kāneʻohe and Kahana Quads, Showing Waiāhole Ahupua`a and the Study Area.

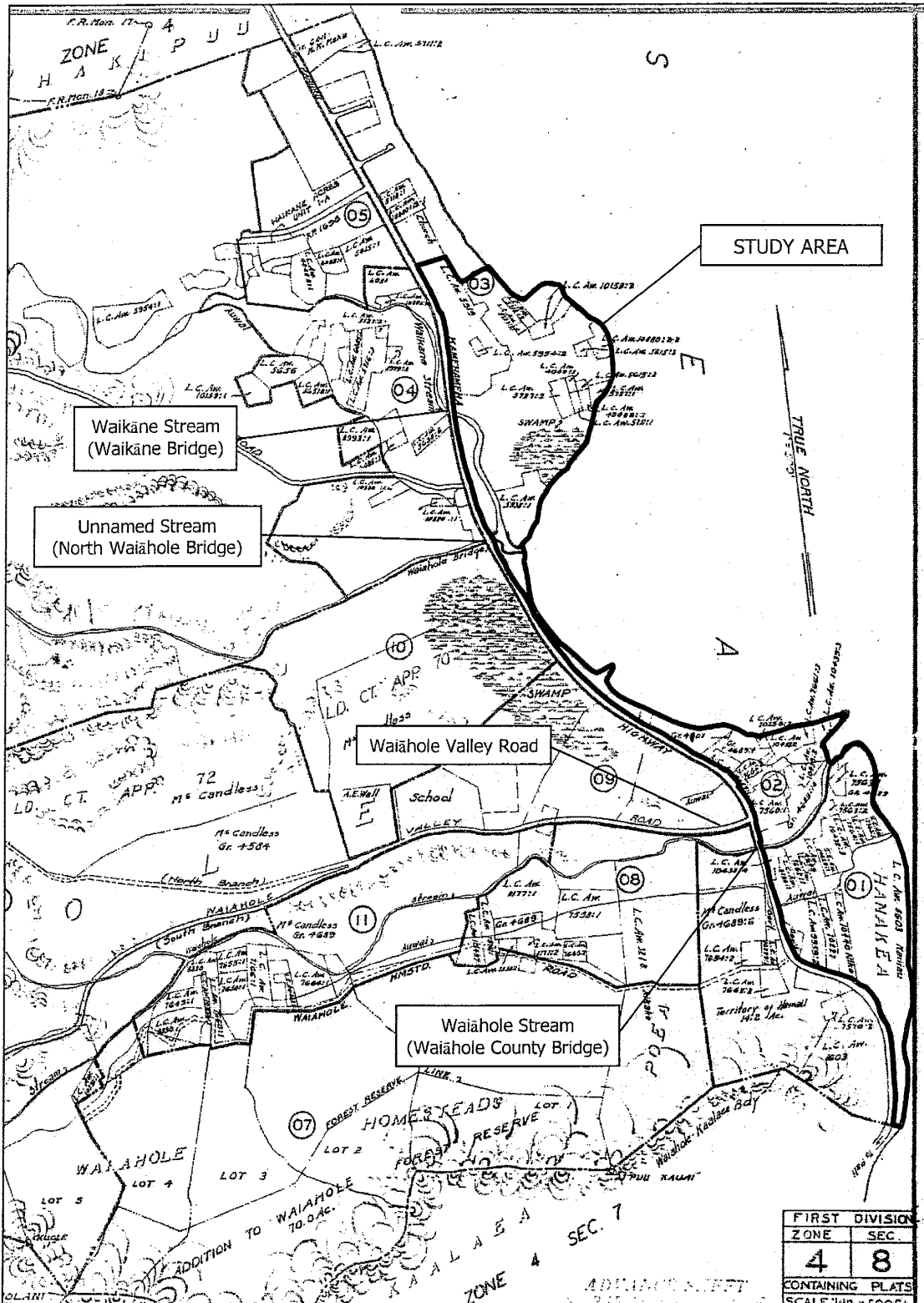


Figure 2 Portion of TMK 4-8, Showing the Study Area within Waiāhole and Waikāne Ahupua`a and the Names of Streams and Bridges.



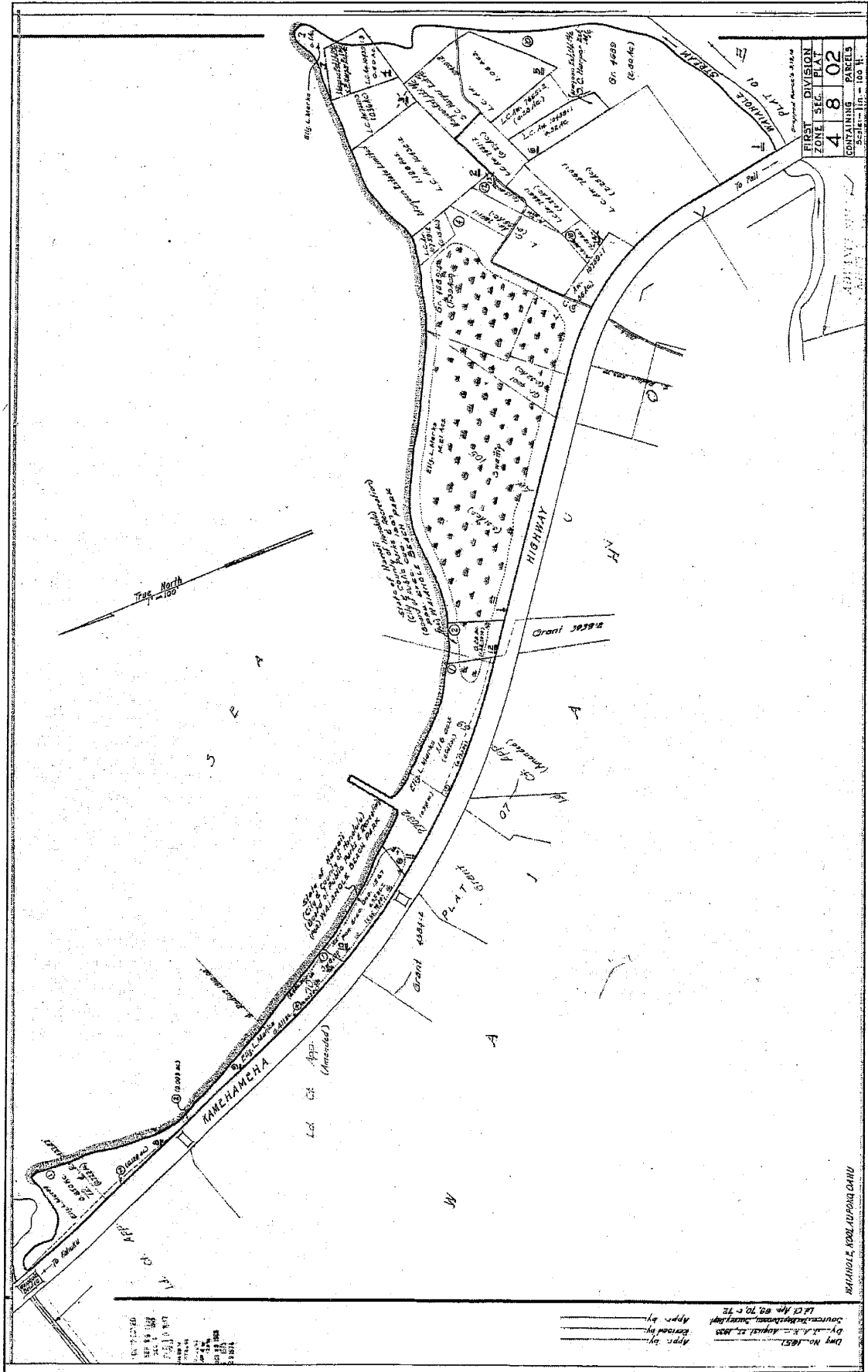


Figure 4 TMK 4-8-02, Showing the Study Area in Waiāhole Ahupua`a and LCAs in the Vicinity.

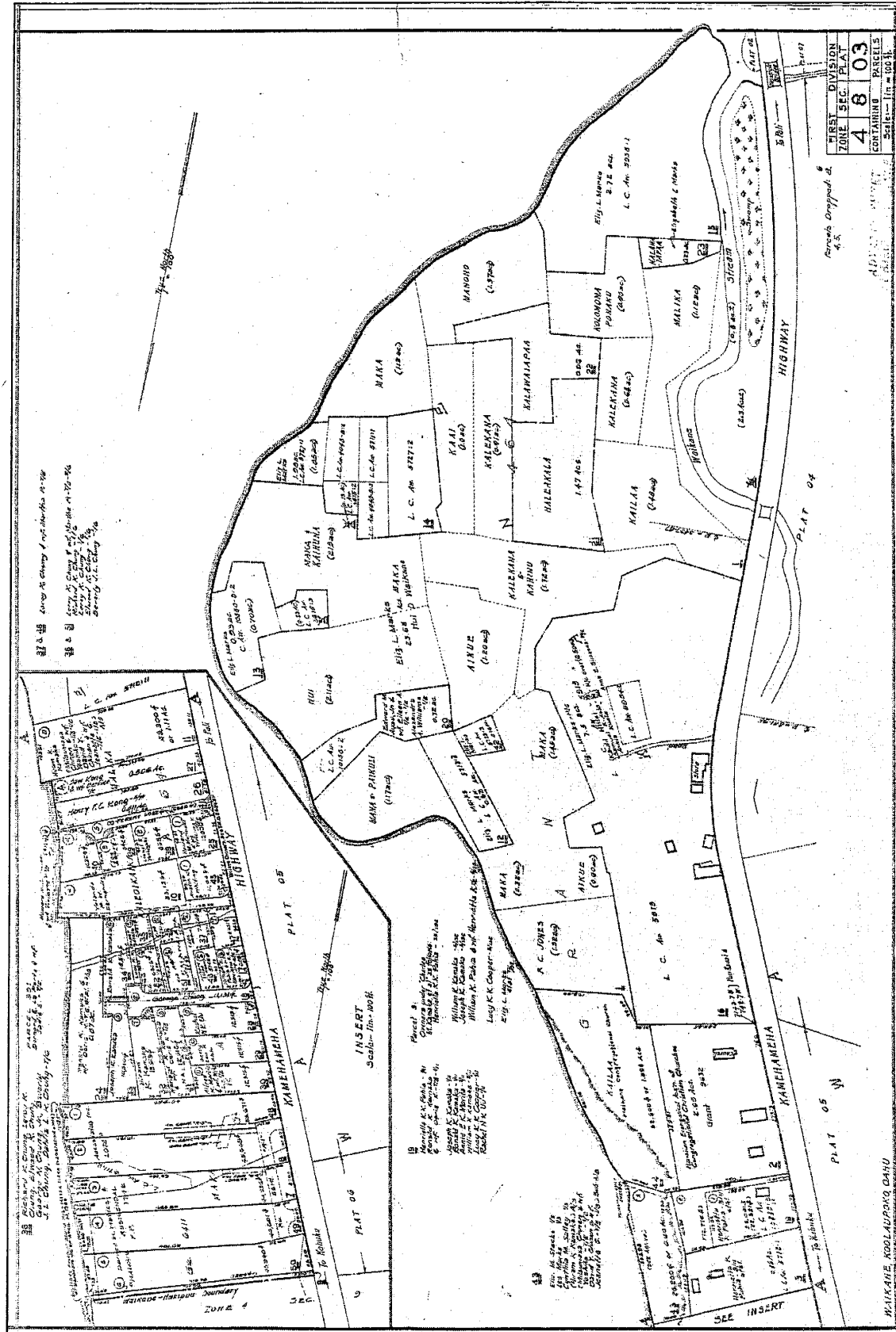


Figure 5 TMK 4-8-03, Showing the Study Area in Waikāne Ahupua'a and LCAs in the Vicinity.



Figure 6 Aerial Photograph of Waiāhole and Waikāne, 1970. Used with permission by Bishop Museum.



## II. CULTURAL BACKGROUND SUMMARY

There have been numerous studies done on this part of O`ahu and a great deal of primary research has been carried out on the *ahupua`a* which border Kāne`ohe Bay, including Waiāhole and Waikāne. The following background summary builds upon four of these studies in particular; *Land Use at Waiāhole Valley Oahu* by Michihiro Miyagi (1963), *Sites of Oahu* by Sterling, and Summers (1978), *Kane`ohe: A History of Change* by Dennis M. Devaney *et al.* (1982) and *Limited Historical Documentary Research Land of Waikāne, Ko`olaupoko district, Island of O`ahu* by Helen Wong Smith (1990).

### A. Traditional Accounts of Waiāhole and Waikāne

Pukui (1983:180) relates a poetical saying referring to the demi-god Maui at Waiāhole, probably drawing upon Kamakau's 1869 account given below:

*Ke ala kike`eke`e a Maui.  
The winding trails of Maui.*

She explains:

Trails made by Maui when he was pursued by those who wished to destroy him. One trail was at Waiāhole, O`ahu, one at Keka`a between Lahaina and Kā`anapali, and the third at Kealakahakaha, Kahakuloa, Maui.

Samuel M. Kamakau relates that:

*Ua `olelo ia o Maui a Kalana kekāhi ali`i kahiko loa i hana i nā alanui i ka wā he iwakalua a keu keneturia mamua, akā, ma kona ano mo`olelo, ua hanaia nā alanui a pololei loa. Ua ma`a nā kānaka i ka hele ma ka pololei o ke alanui, akā i ke alualu ana o kekāhi po`e e pepehi ia Maui, ua hele kike`eke`e `oia i ke alanui, a ua kapaia o "ke alanui kike`eke`e a Maui," aia ma Waikāne me Waiāhole ma Ko`olaupoko i O`ahu... (Ke Au `Oko`a October 14, 1869).*

Maui, son of Kalana, was one of the ancient chiefs of Maui who made roads twenty centuries ago. The roads in his day were straight, and the people were accustomed to running along straight roads; so when certain persons ran after Maui to kill him he made the road go zigzag and it was called "the zigzag road of Maui." (*ka alanui kike`eke`e a Maui*). One is at Waikāne and Waiāhole in Ko`olaupoko on O`ahu...

This myth may account for some of the winding roads in Waiāhole. It might be the explanation as to why the path is in a certain location or has a certain configuration such as switch-backs. Alternatively this may be a traditional explanation associated with the stream named Wai-ke`eke`e (*lit.* "Crooked water") in Waikāne .

Another poetical saying (Pukui 1983:186) was:

*Ke kalo pa`a o Waiāhole.  
The hard taro of Waiāhole.*

She explains, probably drawing upon the 1865 account of Kaehuaea given below:

A reminder not to treat others badly. One day, a man went to Waiāhole, O`ahu, to visit his sister, whom he had not seen for many years. She was absent, and her husband neither asked the stranger in nor offered him any food. When hunger possessed the visitor he asked if he might have some taro to eat. His brother-in-law directed him to his taro patches and told him to get some from there. The man went to the patches and then continued on his way. When the woman returned she was told of the visitor, and by her husband's description she knew that it was her brother. She rebuked him for his lack of hospitality. When they went to their taro patches they found all the taro pulled up and hacked to pieces.

Kaehuaea (1865) relates the following account in his "Na mea Kaulana o Waiahole" (The famous things of Waiahole):

*Ma ka`u mea i lohe ai, i na kama`āina o keia `āina no na mea kaulana i hanaia i ka wā kahiko.*

*Ka mua o kahi i hānau ai o Kualī`i; ka hope o ki`i kalu-pa`a i Waiāhole*

*Ua hāia ma ka Papa Kuhikuhi makahiki o nā mea kaulana o Hawai`i nei. "Helu 1., ma Kalapawai i Kailua kona wahi i hānau ai." `A`ole pela ka pololei, eia noia. O kona wahi i hānau ai, ma Waimuku i Waiāhole; a o kahi i hanai ia`a o Mokoli`i; a o kahi i noho ai i ke kapu ali`i & ke kapu Heiau, `oia o Kalapawai i Kailua; o kahi i ao ai i ke kukini ma Alele, he kula loa, a laula no hoi no ka mea, `a`ole i ike pono ia kahi i hanau ai keia ali`i. Mamuli o ke mele i ho`omaopopia`i, no ka mea, i nā ali`i a pau a `ākoako ana ma Kalapawai i Kailua, maloko hoi o kekahi hale nui; a o Kūali`i pu kekahi e noho ana. Ho`oho like ae la ka leo o nā`li`i, penei: "I hea kou wahi i hānau ai, nau-ā?" `Elua a `ekolu ho`oho ana pela, ekemu mai la o Kūali`i ma ka leo mele penei: "I Waiomuku `āina kahakai, nau-ā." A lohe nā`li`i i ka leo o ke Ali`i, pilihua iho la lākou, me ka no`ono`o nui, me ka nīnau ana iho, "Aia la i hea ia wahi?" Eia ka i Waiāhole nei. Nolaila ina paewaewa ka`u, e pane ma no mai ohumu. E hoi ae au e kamailio ia ki`i kalo-pa`a i Waiāhole.*

*Ua kaulana o ki`i kalo-pa`a i Waiāhole me ka mana`o paha o ka lehulehu, he paakiki maoli io no ke kalo. `A`ole pēlā eia wale no, ua kaulana o ki`i kalo-pa`a i Waiāhole mamuli o ka hana kupanaha a kekahi kanaka, `oia o Kuapunohu, he kanaka koaia, e hele huli hoa paio ana ia nona ma Ko`olaupoko; aia hoi e noho ana kona kaikuahine ilaila me kana kāne o Imaole. Ua hele nae kona kaikuahine i ka lawaia, a o ke kaikoeke wale no ko ka hale. Pane aku la ka malihini i ke kama`āina, "A`ohe nae paha a oulua ai?" Kama`āina "He ai no, aia la iwaena (kaika). No`ono`o iho la ka malihini,*

*e pilikia ana ia no ka pololei, ninau hou aku la ka malihini i ke kama`āina  
 "Auhea i kou `olua waena?" Kuhikuhi pololei aku la ke kama`āina, o ko ianei  
 hele no ia a hiki ma kuauna o ka loi, o ko ianei uhaki ae la no ia i ka welau o  
 ka ihe aia nei, a ho`olilo iho la ia mea i hea-a, lalau aku la ia elua kalo  
 kolikoli a li`ili`i, ho`ouka maluna o ke ahi. Pēlā kana hana ana a lilo i mea  
 nui, a pau loa ka loi okoa & ka (Eka okoa) a pupuhi aku la kela i ke kai o  
 Ukoa, akola, wahi a Kuapunohu, ke heo la kela.*

*`Oia iho la nā wahi mea kaulana ma Waiāhole ma ka`u ike & ko`u lohe. Pau  
 aku la ka`u o ka `oukou koe. Owau no me ka mahalo. B. Kaehuaea, Waiāhole.*

The solid taro of Waiāhole, according to the opinion of the public, was a very hard taro. It was not so, it became famous because of the strange deeds of a man, Kuapunohu, a warrior. He went about Ko`olaupoko to find some one to challenge. His sister was living there with her husband Imaole. She went fishing while he remained at home. The stranger said to the native son, "Have you two any food?" The native son answered, "We have food but standing in the patch." The stranger thought that he was going to have to suffer with hunger so he asked the native, "Where is your patch?" The native gave him specific directions and he went 'til he came to the border of the taro patch. Here he broke off the tip of his spear and used it as a prod. He reached out for two taros, cut them into small pieces and laid them on the fire. He continued doing this until he made a big work, clearing up the whole patch of four acres and burning it up like the blowing away of the sea of `Uko`a. "Serves him right." said Kuapunohu as he went off. (*Na Mea Kaulana o Waiāhole, Ku`oko`a* Sept. 16, 1865)

This myth describes land usage, and the attitude and values of the people previously living in the Waiāhole region. Waiāhole has fertile soil, and was renown for the cultivation of taro. The saying would appear to be a rebuke to the attitudes of the residents once living there who may have had a reputation as not being very accommodating and hospitable towards strangers. When a resident fails to offer food and accommodations to a stranger on his land (his brother-in-law), his wife later finds out and rebukes him for his lack of hospitality towards his brother-in-law. When the man allows the stranger to help himself to some taro, and doesn't bother to help the stranger, he eventually pays for his laziness and unaccommodating attitude. He learned his lesson later when he saw that all his taro was pulled up and wasted by his brother-in-law.

In the *Legend of Halemano* (Fornander, 1919 Vol. V, Part II) Halemano [the romantic anti-hero of Oahu] met up with the heroin of this tale, Kamalālāwalu (a Fickle Puna, Hawai`i Island princess) in Wailua, O`ahu. There, they resumed living together, but their living situation wasn't as harmonious as it was before. With her sad and unfulfilled heart, Kamalālāwalu set out and journeyed:

She journeyed to ... Kualoa where she met Waiāhole, a chief of that place who was a single man. He took Kamalālāwalu as his wife and they resided there [near Kualoa] together.

*Holo mai la o Kamalālāwalu... a Kualoa. Loa`a o Waiāhole, he `li`i no laila e noho ana, a`ohe ana wahine; lawe a`e la ia ia Kamalālāwalu i wahine nana, a noho iho la lāua ma laila.*

When Hua`a the King of Puna received word that Kamalālāwalu was residing on O`ahu with another chief he said:

Yes, we have given her our properties with the idea of getting her to be our wife, but we did not succeed. Let us therefore go and make war on those with whom she is now living.

*Ae, ua lilo ka kaua waiwai ia ia no kona kino, aka, aole i loaia ia kaua kona kino, nolaila, e holo kaua e kaua i kona wahi i noho ai*

King Hua`a did just that. He sent a massive fleet of men in about eight thousand canoes (*he mau man wa`a*) to make war with chief Waiāhole's people. King Hua`a's men landed at Makapu`u.

...they advanced overland, going by way of Kāne`ohe. At Kāne`ohe proper they met the enemy and the fighting began. Early in the battle O`ahu was routed and a great slaughter took place at Waiāhole.

*...a makaukau lākou, hele mai la lākou mauka a hiki i Kāne`ohe. Ho`omaka ke kaua, ma ia kaua ana, ua he`e honua o O`ahu nei, a ua luku ia o Waiāhole.*

After the battle, Kamalālāwalu was found alive and taken by the Kings of Hawai`i, Hua`a and Kulukulua, back to Hawai`i Island.

This tale presents the idea of a massive slaughtering of Hawaiians in the Waiāhole area (or of the forces of the chief Waiāhole) during a battle over possession of a princess, but the historical accuracy of this tale remains uncertain. If there was such a great slaughter of the forces of Waiāhole it could have been elsewhere at Luluku (Lit. "Destruction") in upland Kāne`ohe for example.

Fornander (1919, Vol. V, Number I, pp. 214-225) relates the *Legend of Kapunohu* which has many similar motifs to both Kaehuaea's account of Kuapunohu (magic spear, strife with brother-in-law as a result of a perceived slight over food) and the Legend of Halemano (a big island chief comes to visit an O`ahu woman, lands at Makapu`u, and slays the forces of O`ahu) and explains the proverb of the hard taro of Waiāhole. In this legend the strife with a brother-in-law as a result of a perceived insult over food is clearly set in Kohala, Hawai`i Island. After many adventures, Kuapunohu visits his sister named Konahuanui in Ko`olaupoko, O`ahu and harvests fabulous quantities of taro to eat. For reasons unexplained:

When the fire lit, he took some of the taro and cut it up and threw the pieces into the fire and in this way used the taro for firewood. Because of this action of Kapunohu, the saying "the hard taro of Waiāhole" is known from Hawai`i to Ni`ihau.

*...a mai la ke ahi, pela no kana hana mau ana, a lilo iho la ke kalo i wahie no ke ahi. Nolaila, ma kēia hana ana a Kapunohu, ua kapaia "kalo pa`a o Waiāhole," he `ōlelo kaulana loa ia mai Hawai`i a Ni`ihau.*

In the *Legend of Kapunohu* the hero's fabulous strength in pulling taro (presumably from Waiāhole) recommends him to his brother-in-law Olopana. Olopana makes Kapunohu his commander in battle (*alihakaua*), Kapunohu goes on to kill the ruling chief of O`ahu, Kākuhihewa, and Olopana rules all of O`ahu.

Raphaelson (1929:24) reported Waiāhole's fame as the place "where hard taro grows, taro so hard that *"hoi kalopa`a i Waiāhole"* is a catchword that means an obstinate man."

Raphaelson (1929:24) goes on to relate "There is a beautiful tale about Waiāhole and Waikāne, a place beyond. These two were man and wife, it is said. They loved each other for many years, and even today their mists embrace in the upper clouds."

Waiāhole was clearly considered a desirable and well watered land. Samuel Kamakau relates that:

*I ka lilo ana o ke aupuni i ke au o ke aupuni ia Kamapua`a o O`ahu, ua lilo ka nui o na `āina inoa wai i ke kahuna ia Lonoawohi, aka nae, mahope iho, ua ho`oponopono ia ka `āina e Kahikiula a me na kaikua`ana o Kamapua`a, no ka pau loa o na `āina inoa wai i ke kahuna, a no ka mana`o ia no hoi o pili pa`a loa ka `āina pelā i ka papa kahuna, nolaila, ua ha`awi pa`a ia na `āina o ka papa kahuna, oia o Waimea, Pūpūkea, Waiāhole a me Hakipu`u, a ua pili pa`a ia mau `āina i ka papa kahuna mai kahiko loa mai a hiki i ke au o Kahahana. I ke ao hoi o Kehekili a me Kalanikūpule, ua ha`awi no i ka laua mau kahuna, a pelā no i ke au o Kamehameha I. - Ua lilo o Waimea i ka papa kahuna a Pa`ao, a o Pūpūkea, no ka papa kahuna a Kauali`i, a o Waiāhole, no ka papa kahuna a Lonoamauki...*

When O`ahu came under the rule of Kama-pua`a, he gave the land containing the word *wai* to the kahuna Lono-a-wohi to distribute. Later the land was redistributed by Kahiki-`ula and the older brothers of Kama-pua`a because the kahunas had a monopoly of the well-watered lands, and the kahuna class were given the lands of Waimea, Pūpūkea, Waiāhole, and Hakipu`u in perpetuity, and these were held by them until the days of Kahahana. Kahekili and Kalanikūpule confirmed this gift to the kahunas, and so did Kamehameha...Waiāhole belonged to the priests of Lono-mauki. (*Ka Nupepa Ku`oko`a* November 16, 1867)

Richard Paglinawan (1964) related four traditions of Waiāhole presented below:

1. A Tradition of a *Mo`o* of Waianu Stream, Waiāhole reported by Richard Paglinawan (1964: 2-3)

This story is of an old Hawaiian man called Kawa`a who lived in upper Waiāhole Valley, close to the junction of Waiāhole and Waianu streams.

Kawa`a was married and was referred to by neighbors as a *ho`olaha* [Lit. "To spread abroad"] or a promiscuous person. No man trusted his wife near Kawa`a.

One day, Kawa`a decided to gather watercress growing in a pool in Waianu Stream. He went alone and took a short cut through the forest. As he neared the pool, he heard the splashing of water, as if some one was swimming in the pool. The splashing noise ceased and he heard a woman's voice. When he was in view of the pool, he saw the woman sitting on a large rock combing her long hair. Old man Kawa`a was surprised at the sight he beheld. The woman was young and beautiful, and soon his promiscuous nature overtook his initial surprise and he wanted to seduce her. Unfortunately the woman was not in agreement. As he attempted to grab her, she dove in the pool, leaving her comb behind.

The old man took the comb home and hid it under his pillow. He did not relate what he had seen to his wife. The third day after the incident, the wife found the comb while fixing her husband's bed. She questioned him and he finally related what had happened. The wife became angry and demanded that the comb be returned to its owner, for fear that a hex be placed upon them.

The old man was willing to return the comb, not because he was commanded to by his wife, but because he wanted to see the woman and try to possess her. He left toward evening and went to the pool. This was the last his wife saw of him. A search of the area proved fruitless.

Three months later, the old man was found wandering aimlessly on the highway near Koko Head area. He was dirty, covered with fish scales, and smelled fishy. He did not know where he was. Kawa`a's wife had heard of the old man found at Koko Head and therefore went to identify him. Sure enough, it was her husband. She asked him what had happened to him since she had last seen him.

He told her that he had returned to the pool and found the woman on the large rock. He sneaked up behind her and seized her, but she was much too powerful for him. She dove into the pool with him and both disappeared. He only remembers that the woman took him to a strange place in which he was only fed fish. He cannot recount his length of stay with the mermaid, but when he finally tired of her he begged her to return him home. He was led to an opening and released. This was when he was found at Koko Head, three months later.

His friends asked him to take them to the opening where he was released. Much to his amazement, he could not find the opening. As for the pool in Waianu Stream, it still remains there and the woman was never seen again.

## 2. The *Kūpe`e* Expedition and the Spirit

Clark, a middle-aged part-Hawaiian, got together interested family members to pick *kūpe`e*, [*Nerita polita*] an edible shellfish on the rocky Waiāhole Beach. Kerosine torches made of brass pipes with burlap bags for wicks were assembled and fueled. These torches gave a bright orange light in the dark. Clark and his brother-in-law were to hold the torches while the nephews picked *kūpe`e*. The nephews were given this task because their sight was better than that of the older men. Also, they had more energy to bend and pick the *kūpe`e* from the rocky beach. The boys' outlook toward the assignment was one of responsibility and fun.

The night was very dark. This was a good night because the *kūpe`e* would be out from under the rocks. They did not appear on moonlit nights. The group lit their torches on Kamehameha Highway and proceeded *makai* on the trail to the beach. Teddy, the family dog, led the way to the beach. The group passed two houses on their way and the quiet night was interrupted by barking dogs. Teddy answered but kept leading the way.

The group was highly successful and pleased with their catch. They obtained a half bag of *kūpe`e* and decided to return home. Teddy was in the lead again followed by Clark. The trail had banana trees and tall grass on either sides. The torches exaggerated the shadows of the banana stalks and moving people, causing an eerie effect. Suddenly, the lead torch began to sputter as if ready to go out. Teddy began to growl and began to charge ahead of the group.

He howled as he was tossed back toward Clark and charged again ahead. Everyone stopped, trying desperately to see what the dog was attacking. There was nothing in front of them as far as they could see. The dog repeated his attacks and seemed repelled on each attempt by someone. "He must be attacking a mongoose or something," was the comment made by one of the boys. "Kulikuli," said the leader of the group. Clark was very annoyed at the boy's comment and concerned over the dog's actions that something strange was happening.

"Give me the bag of *kūpe`e*!" Clark commanded to the boy who was carrying it. He grabbed a handful of *kūpe`e* and threw it in the bush, while muttering some Hawaiian words as if swearing to someone. Teddy immediately stopped his attack and lay exhausted. No one said a word but watched the dog. When the dog finally stood up, Clark said, "It's all right to continue homeward."

When the group reached home, Clark finally told the group what he thought had happened. Teddy had attacked a spirit who was waiting along the trail for the group to pass. He was after the bag of *kūpe`e*. Only the dog could see the spirit. That was why Clark threw the handful of *kūpe`e*, so that the spirit

would be satisfied with his share and leave the group alone. The group was fortunate that the dog interrupted the spirit's plan, for surely they would have been taken by surprise.

### 3. The `Ōpae Expedition and the `Āuku`u Spirit

There were three sisters who lived in Waiāhole Valley. One day, they craved to eat *`ōpae-kuahiwi* (mountain shrimp) and therefore decided to catch some. Kaweheonapua, the eldest of the three, was designated as head of the *`ōpae* expedition because of her knowledge of fresh water shrimping and of the local terrain. The day was set and the necessary preparations were made. "If anyone asks us where we're heading for, tell them we're going *`auwana* (wandering)," said the leader of the expedition. "Cha," said the two younger sisters, "you're superstitious."

And so the three sisters hiked up the valley to where the forest reserve boundary started. They descended the trail to Waiāhole Stream. "Here is where we start catching *`ōpae*," said the leader of the group. The *`ōpae* net was strung across the stream, blocking all escape routes. The front edge of the net was weighted down with stones so that the *`ōpae* could not escape under it. When everything was set, the two younger sisters commenced overturning the rocks, branches, and tree roots, and they stirred the muddy bottom of the stream so that the *`ōpae* would swim downstream into the net. In the meantime, the younger sisters were yelling and splashing water and enjoying themselves. "Don't make too much noise," said the leader, "someone might hear you." "Nobody here but us," laughed the two sisters.

The ends of the net were brought together and the sisters gathered in the net and carried it to a dry spot. The net was opened and the contents examined. No *`ōpae*s, only decayed leaves were found. "Eh, this is only our first try, maybe we'll catch some later," reassured the youngest sister, but the succeeding attempts yielded no *`ōpae*s.

Suddenly a strange woman's voice was heard by the eldest sister "*Hu-i...pehea ka hana?*" ("Hello...what are you doing?") "Catching *`ōpae*," Kaweheonapua replied, as she looked for the source of the voice. No one was there. "E, did any of you hear that woman's voice?" she asked. "You must be hearing things," said the other sisters. She shrugged her shoulders and proceeded upstream with her sisters. Again and again the voice haunted her but she was afraid to tell her sisters because they might think she was imagining things.

Suddenly, the waters began to flow faster, making it difficult for the *`ōpae* net to be set properly. As the sisters approached a *hau* (*Hibiscus tiliaceus*) tree, they heard a loud fluttering of wings. They caught a glance of a huge *`auku`u* (native black-crowned night heron) winging skyward. "It's only an *`auku`u*!" the sisters laughed uneasily. They continued upstream towards the bamboo forest. Rounding a bend, the sisters froze in their tracks. They



saw an old Hawaiian woman with silvery white hair in front of them. She wore a black *kīkepa* (tapa worn by women). The whiteness of her face matched the color of her hair. She floated above the waters toward them.

The sisters scrambled up the stream bank, over the cow fence, across an old abandoned taro patch, up the hill to the road, and down the dirt road to their home in a hurry. The youngest sister who weighed over two hundred pounds and much heavier than the other two was the first to reach home.

#### 4. Fish Lookouts

Pu`u Kahea was used as a lookout for the head fisherman or signal man used by the fishermen. The signal man would climb this hill on a vantage point so that he could get a clear view of the fishing party in their canoes off Waiāhole or Kahalu`u areas. `Ama`ama (mullet) and `awa (milk fish) were sought when the fish schools swam in the area.

The signal man would use his hands, stick, or paddle, or even a piece of rag as a signal. The signals were prearranged and understood by the fishermen. A hand motion in a semi-circular fashion would indicate to the men on the boat to surround the fish school and another signal would mean to drop the nets.

The signal man was a person who possessed great knowledge of fishes and their habits and eating grounds. He also understood the weather and the fishermen themselves, including the limitations and advantages they would be operating under. When the catch was brought in, he would receive a larger share of the catch because it was he who made the catch possible.

Other places were used as signal points. The following are some of them: Moku o Lo`e (Coconut Island); the two points on either side of Kahana Bay, one of which whose name is Kalae Makali`i; the point off Lā`ie Malo`o; and Kalae Laniloa.

Some accounts of the travels of the goddess Hi`iaka up the Ko`olau Coast on her way to fetch her sister Pele's lover Lohiau have her mentioning Waikāne.

*...i ko lākou hele ana a hō`ea i...Waikāne. I kēia wahi ua huli hou mai ia o Hi`iaka a kama`ilio hou mai la i kāna `aikāne.*

*O ka inoa o kēia `āina la o Waikāne no ka mea, ia nei la i `auwaha mua ai o Kāne i nā wai e pono ai o Paliuli, He Paliuli no ko`onei, aia la i kēlā kaola Pali e waiho mai la, a malalo iho he mau wahi wai kaulana loa o onei, o Waiololi, a o Waiolola.*

*He kāne a he wahine kēia. O Waiololi ke kāne a o Waiolola ka wahine. He mau `āina maika`i kēia he `āina piha momona, akā e hele loa aku na a pahulu a ola lala ka `āina. Ha`alele iho la lākou nei ia Waikāne...“Hi`iaka i ka poli o Pele” Hōkū o Hawai`i January 12, 1926*

Here Hi`iaka turned again to speak to her friend. “The name of this land is Waikāne because it was here that Kāne first dug for water for the benefit of Paliuli. There is a Paliuli here and it is on that ledge there. Below it are the famous water, Waiololi and Waiolola. One is male and the other female.

This tradition appears in another early twentieth century Hawaiian language newspaper as follows:

At Waikāne, Ko`olaupoko, is a land called Pali-uli. Also there in Waikāne are two streams that surround this land of Paliuli, for both streams have the same source. In Waikāne also are the names Waiolola and Waiololi, mentioned in the Kumulipo Chant *Hawai`i Holomua* March 20, 1912.

The Hawaiian poem of creation and geneology, “Kumulipo“ includes a line “*O Kāne ia Wai`ololi, o ka wahine ia Wai`olola.*” Martha Beckwith explains:

The words Wai`ololi and Wai`olola are applied in everyday speech to a narrow entrance through which water passes with force and a wide one which receives them without a struggle. Thus Pokini says the first term is given to a narrow bay along the coast where the water carries the fish in with a rush, the second to a large shoreline where the surf rolls in without breaking (Beckwith, 1972:51).

Whether the Kumulipo actually refers to specific sites in Waikāne Valley is less than clear although it does seem clear that certain Hawaiians have interpreted it this way since at least as early as 1912.

In his “*Nā Pana Kaulana o Nā Inoa o ka Mokupuni O`ahu*”, George Po`olua relates:

*Ne`e aku no mua, he pili no nā inoa o na `āina ma`ane`i; Ka`alaea, Waihe`e, Hanakailio, Hanakeape, a me Waiāhole. He kauhale e kū mai ana i kahakai a me uka o ka `āina.*

*Hō`ea kāua i Waikāne e kū mai ana ka hale pule o ke aupuni lani, makai o ke alanui. He nui no nā hale nani e kū mai ana iluna o ka `āina. He nui no ka u`i o ka waiho ana o ka `āina ke nānā aku.*

*Aia ma kēia wahi ka home ho`omaha o ka `Elele Linekona Eliwai, ka hale kipa ho`i o nā loea kāl`āiana o ka ao`ao Demokalaka, he nui nā kānaka Hawai`i ma ke ia wahi, o kekāhi olahou aia malalo o Linekona Eliwai.*

*E huli aku `oe iuka o ia kuahiwi e `ike ana oe i ka mō`ali ma nā awa`awa a me nā mauna; `oia ka wai o Waiāhole i `eli ia iho nei maloko o nā kuahiwi a puka ma Waipi`o, no ka ho`olawa ana i ka wai no nā hui mahi-kō o Waipahu mā.*

*Aia ma ke kahua o ka hale e kū nei o ka `Elele Linekona Eliwai `oia ka palena ho`omaha o ke kahua he`ehōlua kaulana "Kapahu." E ho`omaka ana kēia kahua he`ehōlua, ma ka pu`u mahope aku o ka hale pule Kakōlika.*

*He mo`ōlelo kaulana ko kēia kahua, ma`anei e ho`ohala ai nā kānaka ko`iko`i o ka `āina, i na wā i hala, a me nā maka`āinana pū no kēia hana he he`ehōlua, a no kēia le`ale`a, pēlā i kapa ia ai ka inoa o kēia wahi o Waikāne...*

Moving along, the names pertaining to the land here are Ka`alaea, Waihe`e, Hanakailio, Hanakeape, and Waiāhole. There are houses at the beach and in the uplands. Arriving at Waikāne there stands the church of the heavenly kingdom seaward of the road. There are many beautiful houses and the land lying before your gaze is lovely. In this place is the vacation home of Lincoln McCandless (called "*Elele Linekona Eliwai*" "Lincoln Water-Digger Envoy" in reference to his fame as an advocate of artesian well digging) the very hospitable friend of those skilled in politics of the Democratic Party. There are many Hawaiians at that place, some supported by Lincoln McCandless. Turning to the uplands one sees the furrows of the valleys in the mountain. There is the watercourse of Waiāhole excavated into the mountain emerging at Waipi`o to supply water to the sugar growing consortiums of Waipahu. Where Lincoln McCandless' house now stands [1919] was the resting place for the *hōlua* sledders. It was called Kapahu. The *hōlua* started on the hill back of the Catholic Church. The *hōlua* sled was very famous for at this place the prominent people as well as the ordinary folk came here to sled. That is why the place was called Waikāne. "*Nā Pana Kaulana o nā Inoa o Kamokupuni*" *Ke Aloha `Āina* Feb. 8, 1919

S. M. Kamakau (*Ke Au `Oko`a*, March 10, 1870; 1964:18) lists Waikāne as one of the three "*pu`uhonua*" ("place of refuge") lands of Ko`olaupoko, O`ahu:

*O ka pu`uhonua o ka po`e kahiko, he ahupua`a `okana, o Kailua, o Waikāne, ko Ko`olaupoko, a o Kualoa he `āina la`a kapu maoli ia e he pu`uhonua maoli no ka po`e make a komo ilaila ola, a pelā a puni o O`ahu...*

Nakuina (1992:51) lists the Kiliua as the wind of Waikāne. No wind is given for Waiāhole.

An account of the demi-god Kamapua`a (*Ka Leo o Ka Lāhui* June 24, 1891) has the porcine hero passing through Waiāhole and makes the following reference:

*Ia ho`i ana mai a ia nei, ua ike ia `oia e nā kānaka, no ka mea, ua hōea kakahiaka mai oia ma Waiāhole, nona ka `āina i `ōlelo ia: “E ki`i kalo pa`a i Waiāhole,” i ke au o Kūali`i, ke ali`i o O`ahu nei.*

When this one was returning, he was seen by the people, because morning had arrived while he was still at Waiāhole, the land for which was said, ‘Fetch the cooked unpounded taro at Waiāhole’ in the time of Kūali`i” (Kame`eleihiwa 1996:23).

Kame`eleihiwa draws upon *Sites of O`ahu* and *‘Ōlelo No`eau* in explaining the phrase “*E ki`i kalo pa`a i Waiāhole*” as “referring to a stubborn man” and as similar to the phrase “*Ke kolo pa`a o Waiāhole*” as “a reminder not to treat others badly.”

Laka was the chief that was born at `Alae in Kīpahulu (Maui). He ruled at Ko`olaupoko, O`ahu. His house site was at Hale`ula in Waikāne. Henriques-Peabody HEN: Vol. 1, p. 985

## B. Place Names in Waiāhole *Ahupua`a*

Alu	Area in central Waiāhole
Apua (Apu`u?)	An `ili in Waiāhole taken as Government Lands; `ili in Coastal Waiāhole
Chinese Cemetery	NE Waiāhole (c. 1900-1925)
Hanakea	Large `ili in Waiāhole probably divided into 2 <i>lele</i> , a large one in W central Waiāhole and a small one at the S coast
Hinamanu	<i>Kuleana</i> location
Hopekea	`Ili taken as Crown Lands, Area in E central Waiāhole
Ii (I?)	An `ili in Waiāhole taken as Government Lands, Same as <i>Oi</i> , an `ili in Coastal Waiāhole?
Ka`alaea	<i>Ahupua`a</i> to the south
Ka`aniu	`Ili in SE Waiāhole
Kāneloa	Large `ili in W Waiāhole,
Kaoio	<i>Kuleana</i> LCA location
Kapalai	Large `ili in Waiāhole probably divided into 2 <i>lele</i> , a large one in W central Waiāhole and a small one at the coast.
Kapi`ikokau	Large `ili in Waiāhole probably divided into 2 <i>lele</i> , a large one in W central Waiāhole and a small one at the coast.
Kapuakea	Large `ili in Waiāhole probably divided into 2 <i>lele</i> , a large one on N side of Waiāhole and a small one at the coast.
Kauakahipa	`Ili in SE Waiāhole
Kaululoa	<i>Kuleana</i> LCA location
Kaupokoku`u	<i>Kuleana</i> LCA location
Kekaula`au	<i>Kuleana</i> LCA location
Kuaiokumu	`Ili in E Waiāhole
Kualele	`Ili in central Waiāhole
Kumupali	<i>Kuleana</i> LCA location
Kuolani Trail	SW Waiāhole

Lan Sing Home	NE Waiāhole (c. 1900-1925)
Lan Sing Rice Mill	NE Waiāhole (c. 1900-1925)
Maihua Place	Road north of Waiāhole Valley Road
Makanilua	An <i>`ili</i> in in E central Waiāhole taken as Government Lands
Makawai	Large <i>`ili</i> in Waiāhole taken as Crown Lands, probably divided into 2 <i>lele</i> , a large <i>one</i> in SW Waiāhole and a small one at the coast.
Makikiki	Hill in N central Waiāhole
Oi (Oii)	<i>`Ili</i> in Coastal Waiāhole
Onouli	Large <i>`ili</i> in NE Waiāhole
Opaea	<i>Kuleana</i> location
Poahamai	An <i>`ili</i> in central Waiāhole taken as Government Lands
Poea	<i>`Ili</i> in SE Waiāhole taken as Government Lands
Po`opepe	Area in central Waiāhole
Pu`u Holua	Area in central Waiāhole
Pu`u Kaua`i	Peak on SE wall of Waiāhole <i>Ahupua`a</i>
Pu`u Kiolea	Peak on SE wall of Waiāhole <i>Ahupua`a</i>
Pu`u Kuolani	Peak on SE wall of Waiāhole <i>Ahupua`a</i>
Sing Tai Wai Plantation	SW Waiāhole <i>Ahupua`a</i> , 150 acres (circa 1900-1925)
Uwau (Uau)	Large <i>`ili</i> in Waiāhole taken as Government Lands probably divided into 2 <i>lele</i> , a large one in NW Waiāhole and a small one at the coast.
Uwau Stream	Stream in NW Waiāhole <i>Ahupua`a</i>
Wahahe`e	<i>`Ili</i> in E central Waiāhole
Waiāhole	Waiāhole <i>Ahupua`a</i>
Waiāhole Beach Park	Coastal Waiāhole <i>Ahupua`a</i>
Waiāhole Camp	SW Waiāhole <i>Ahupua`a</i> on Waiāhole Stream
Waiāhole Forest Reserve	W Waiāhole <i>Ahupua`a</i>
Waiāhole Homesteads	Area in SE Waiāhole <i>Ahupua`a</i>
Waiāhole Homestead Road	Main artery in SE Waiāhole
Waiāhole School	Elementary & Intermediate NE Waiāhole <i>Ahupua`a</i>
Waiāhole Town	E central Waiāhole <i>Ahupua`a</i>
Waiāhole Tunnel	SW Waiāhole <i>Ahupua`a</i>
Waiāhole Valley Road	Main artery into Waiāhole <i>Ahupua`a</i>
Waiāhole Valley Road, North Branch	Main artery into the north portion of Waiāhole <i>Ahupua`a</i>
Waiāhole Valley Road, South Branch	Main artery into the south portion of Waiāhole <i>Ahupua`a</i>
Waiahu	“Name in common use”, Location within Waiāhole <i>Ahupua`a</i> uncertain
Waianu	Large <i>`ili</i> in Waiāhole divided into 2 <i>lele</i> in NW and NE Waiāhole
Waianu I	Large <i>`ili</i> in NW Waiāhole
Waianu II	Large <i>`ili</i> in NW Waiāhole
Waianu Stream	Stream in NW Waiāhole <i>Ahupua`a</i>
Waiawa	<i>Ahupua`a</i> to the southwest

Waikāne *Ahupua`a* to the north  
 Waipi`o *Ahupua`a* to the northwest

### C. Place Names of Waikāne

Catholic Church	NE Waikāne <i>Ahupua`a</i> , <i>mauka</i> of hwy, (circa 1900-1926)
Chinese Cemetery	NE Waikāne <i>Ahupua`a</i> (circa 1900-1926)
Chinese School	SE Waikāne <i>Ahupua`a</i> (circa 1900-1926)
Congregational Church	NE Waikāne <i>Ahupua`a</i> , <i>makai</i> of hwy, (circa 1900-1926)
Hakipu`u	<i>Ahupua`a</i> to the northeast
Hale`ula	House site of chief Laka, location unknown
Haunaokiha	<i>Kuleana</i> location
Haupoa Road	NE Waikāne <i>Ahupua`a</i> , <i>mauka</i> of hwy.
Hōlua Slide	Just south of Kukuianiani <i>Heiau</i>
Kaaipua`a	<i>Kuleana</i> location
Ka`anui	An `ili taken as Government Lands
Ka`apoko	<i>Kuleana</i> location
Kahaiao	<i>Kuleana</i> location
Kahala`a	<i>Kuleana</i> location
Kahalua	An `ili taken as Government Lands
Kaihuna	<i>Kuleana</i> location
Kaiki	<i>Kuleana</i> location
Kalokoloa	<i>Kuleana</i> location
Kaluakauwila	<i>Kuleana</i> location
Kamaka Place	NE Waikāne <i>Ahupua`a</i> , <i>makai</i> of hwy.
Kamoa	<i>Kuleana</i> location
Kanoi place	Road north off of Waikāne Valley Road
Kapuakea	An `ili taken as Government Lands
Kapukaukaloa/Kapukauhaloa	<i>Kuleana</i> location
Ki`ilau	<i>Kuleana</i> location
Kokowale`ole	<i>Kuleana</i> location
Kong Sang Store	E Waikāne <i>Ahupua`a</i> , east of hwy (circa 1900-1926)
Kuaiomoku	An `ili taken as Government Lands
Kukuianiani <i>Heiau</i>	Ridge between Hakipu`u and Waikāne <i>mauka</i> of hwy.
Kumupali	An `ili taken as Government Lands
Kupapaulau	An `ili taken as Government Lands
Manu Kōlea	A series of stones, a marker to Maui
McCandless Home	NE Waikāne <i>Ahupua`a</i> west of hwy (circa 1900-1926)
Pōhaku Wela	A stony cliff that emitted smoke at certain times as a portent of things to come
Pu`u Ka`aumakua	Peak on west edge of <i>ahupua`a</i>
Pu`u Koiele	Peak on northwest edge of <i>ahupua`a</i>
Pu`u Menehune	A circular hill made from cinder said built by <i>menehune</i>

Pu`u Ohulehule	Peak on northwest edge of <i>ahupua`a</i>
Pu`u Pueo	Peak on northeast edge of <i>ahupua`a</i>
Sing Kee Wai Rice Plantation	E Waikāne <i>Ahupua`a</i> west of hwy (circa 1900-1926)
Ulawini Spring	N central Waikāne
Wah Chong Store	E Waikāne <i>Ahupua`a</i> east of hwy (circa 1900-1926)
Waiāhole	<i>Ahupua`a</i> to the south
Waikāne	Waikāne <i>Ahupua`a</i>
Waikāne Camp	Camp in extreme west of Waikāne <i>Ahupua`a</i>
Waikāne Stream	Stream on north side of Waikāne <i>Ahupua`a</i>
Waikāne Town	North coast of Waikāne <i>Ahupua`a</i>
Waikāne Valley Road	Main artery into Waikāne <i>Ahupua`a</i>
Waikē`eke`e	Stream in SW central portion of Waikāne <i>Ahupua`a</i>
Wao-o-Kāne	Spring of magical waters
Waipi`o	<i>Ahupua`a</i> to the southwest
Wing Wo Tai Rice Mill	SE Waikāne <i>Ahupua`a</i> west of hwy (circa 1900-1926)
Young Mun Look Cake Store	SE Waikāne <i>Ahupua`a</i> east of hwy (circa 1900-1926)

#### D. Traditional Land Use

The district of Ko`olaupoko was rich in many of the resources utilized by traditional Hawaiians. The exploitation of marine resources is evidenced by the multitude of fishponds around the coastal fringe of Kāne`ohe Bay and by the existence of numerous fishing shrines. It has also been recognized that traditional land divisions within the district (*ahupua`a* and *`ili*) extended out into the sea, delineating discrete fishery areas. Inland from the coast, rich alluvial soils, an equable climate and abundant water supply allowed the extensive cultivation of traditional crops, especially wetland taro. Handy and Handy characterized the *ahupua`a* in the region as each having,

a broad coastal plain which was converted by Hawaiians into an almost continuous expanse of *lo`i* irrigated with water from large streams flowing out of the deep valleys that cut back into the Ko`olau range. The hinterland must have produced great quantities of sweet potato, yam, banana, upland taro, *wauke*, *olonā*, and *`awa*. Undoubtedly the population was large... (1972:452).

The valleys were described by early visitors to the region as "in a high state of cultivation". Evidence of prehistoric field systems (*lo`i*) and irrigation channels (*`auwai*) have been found throughout the valley floors. The upland forests and ridges that divide

the valleys undoubtedly contained a wide variety of valuable resources as well, one of which is known to have been a high-quality basalt that was quarried and used in the manufacture of stone tools.

Archaeological sites identified within Waiāhole and Waikāne reflect many of the traditional activities associated with the utilization of these resources, including agriculture, habitation, tool manufacture, and religious observance. Irrigated taro fields

have been identified along the stream beds from the upper reaches of the valleys to where the streams meet the sea. Site 1078, Waikāne Taro Flats, represents a portion of the field system within Waikāne, and has been entered on the National Register of Historic Places. Paved areas and enclosures have been found in close proximity to the fields and have been interpreted as habitation sites. Adze quarries have been identified on the ridges between the valleys, and evidence of the manufacture of stone tools has been found throughout the valley floors. The quarry sites that comprise the Waiāhole Quarry Complex, have been recommended for inclusion in the National and State Registers. Sites of religious and/or political significance include Kukuianiani *Heiau* (site 317), located near the coast of Waikāne, Ka`awakoa *Heiau* which at one time stood in close proximity, and several upland sites interpreted as agricultural shrines. Historical accounts have also indicated that Waikāne used to contain a *hōlua* slide, behind the present day Catholic Church, although no physical evidence of this site has been found.

Dating analyses from archaeological studies suggest that occupation of Waiāhole Valley may have begun around AD 1200 (Tomonari-Tuggle and Tuggle 1984:1-16), while the bulk of activities probably occurred in late prehistoric and early historic times (e.g. Shapiro *et al.* 1988:36, Dunn *et al.* 1990:14). Early census data indicate that in 1831-32, a total of 419 persons lived within the two valleys of Waiāhole/Waikāne (Schmitt 1973:19). The population was probably considerably higher at the time of European contact though, since by the 1830s, the native Hawaiian population had already been severely diminished by contact with western diseases. Also, many of the native inhabitants from these outlying districts had begun moving to the newly burgeoning population centers, such as Honolulu.

Many researchers believe that the Hawaiian population reached its maximum at around the time of western contact. In his study of land use at Waiāhole, Michihiro Miyagi found that,

in the later period of Hawaiian occupation... all the land in the valley suitable for the cultivation of taro was probably so utilized (Figure 7). The intensive use of the land is indicated by the existence of *kuleana* on small strips of stony land along the tributaries in the valley head. Remains of taro-patch dikes can still be seen in the rough areas above the forest reserve boundary. If such unfavorable areas were utilized for taro, it can be concluded that there was some measure of pressure on the resources of the valley. (1963:78)

In his analysis of land holding patterns based on land claims made at Waiāhole during the *Māhele*, Miyagi found that the majority of *kuleanas*, lands granted to commoners, were used for the cultivation of taro and were located in the lowlands "in relation to high water table and the possibility of water diversion from streams" (1963:76). A small number of holdings were located in *kula*, or open pasture areas, "but their numbers and size is small as compared with lowland plots... they were probably utilized for house lots and gardens" (*Ibid.*: 76-77). The distribution of LCAs within the study area seems to fit this general pattern as well (Figure 8).



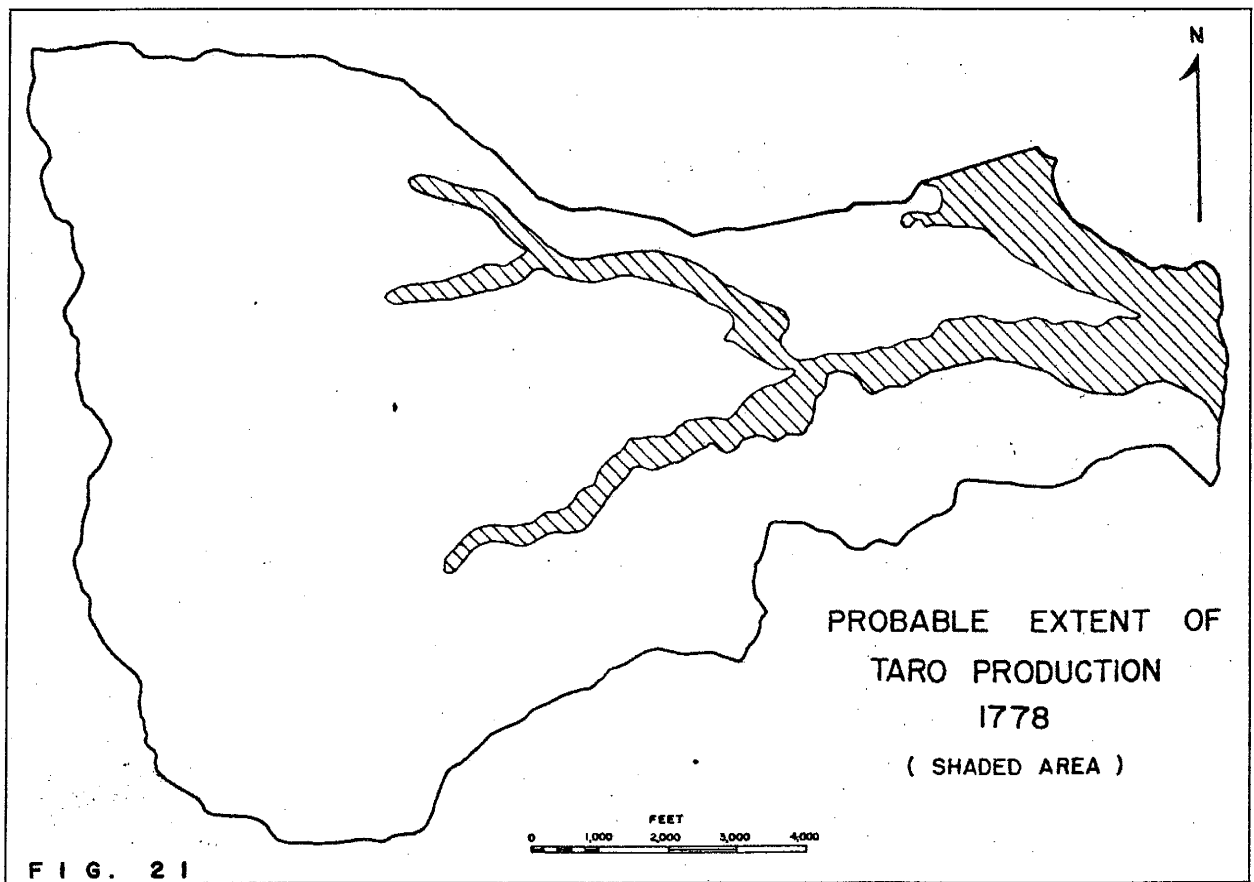


Figure 7 Probable Extent of Taro Production – 1778 (from Miyagi 1963:79).

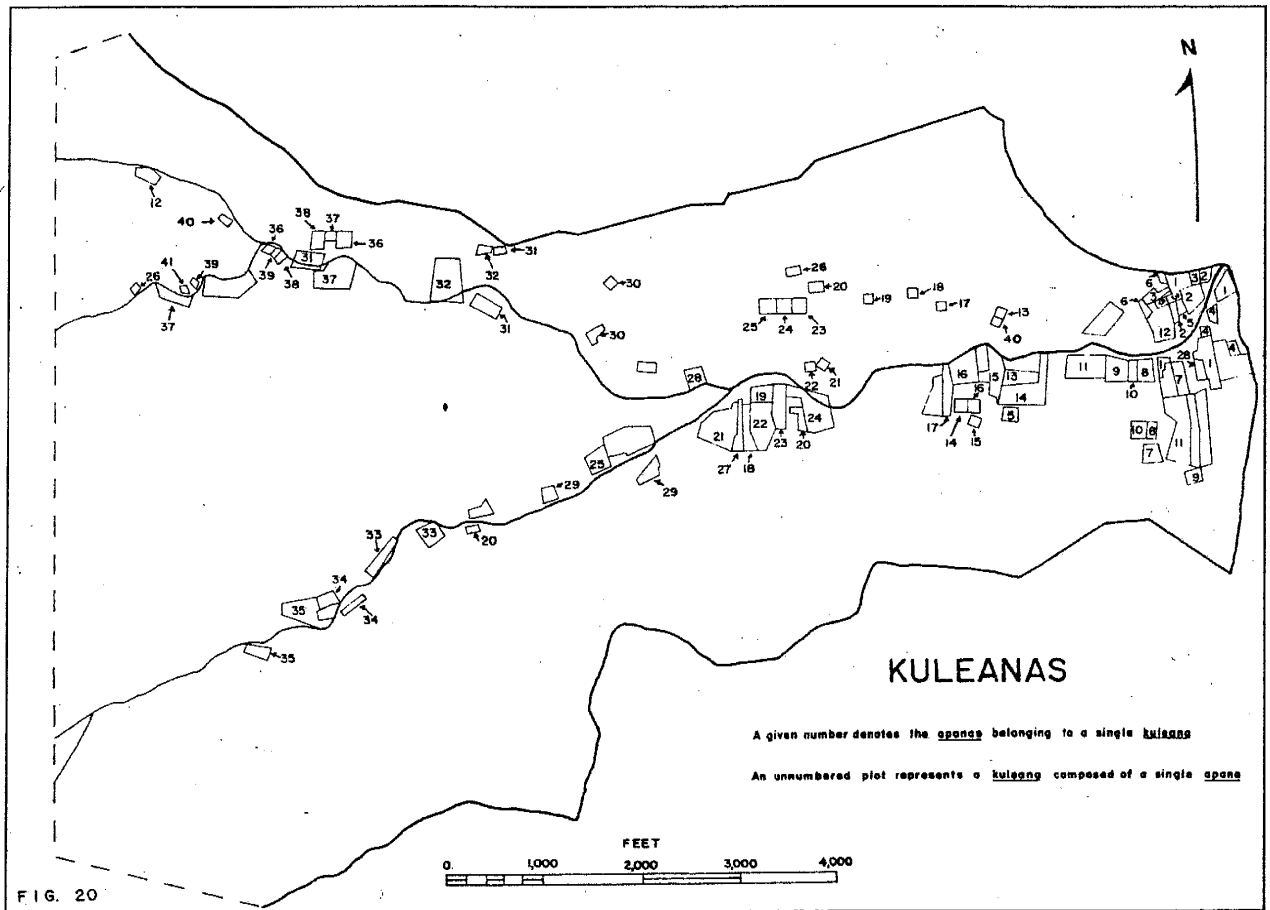


Figure 8 Distribution of *kuleana* Awards at Waiāhole (from Miyagi 1963:73).

## E. Māhele Records

### 1. Waikāne

Six *ʻili* at Waikāne including Ka`anui, Kahalua, Kapuakea, Kuaiomoku, Kumupali and Kupapaulau were taken as “Government Lands”. There were a total of nineteen Land Commission Awards (*kuleana* LCA) at Waikāne for a total of 53.49 acres. The average size of an award was 2.82 acres and the range was 0.15 to 7.76 acres. There were no *kuleana* awards larger than 7.76 acres. E. O. Hall and H. Dimond received a major grant of land (Grant No. 464, 1,698.48 acres) at Waikāne in 1850.

### 2. Waiāhole

Two *ʻili* at Waiāhole (Hopeka and Makawai) were kept as “Crown Lands”. Six *ʻili* at Waiāhole including Apua, I, Makanilua, Poahamai, Poea and Uau were taken as “Government Lands”. There were a total of fifty-three small (less than 10 acre) LCA (*kuleana*) awards at Waiāhole for a total of 106.89 acres. The average size of these awards was 2.02 acres and the range was 0.47 to 5.6 acres. There were, however, four larger awards at Waiāhole: LCA 105 to William Walker (81.6 acres), LCA 5936 to Pu`uiki (225 acres), LCA 7137 to Kaho`ohanohano (93 acres), and LCA 8603 to Kaniau (57.2 acres). Subsequently there were three large grants of land; grants 702 and 703 (total 264.68 acres) to Kekakeiki in 1860 and grant 874 (113.33 acres) to Kaopulupulu in 1862.

## F. Historic Land Use

The amount of land in Waiāhole under cultivation appears to have decreased throughout early historic times, as it had throughout the Kāne`ohe Bay region. This period saw a steady decline in the native population and an increasing amount of land left fallow or converted to pasture for cattle grazing.

It can safely be assumed that by the time the *kuleana* were awarded [around 1850] there were many parcels of land that were not being cultivated by the Hawaiians primarily because of depopulation, roaming cattle, and the requirements of the Kuleana Act. (Devaney *et al.* 1982:12)

The rate of population decline slowed after 1849 and the population began to increase in parts of O`ahu in 1853, but the population of Ko`olaupoko continued to decline until 1872 (Kittelson 1972, cited in Devaney *et al.* 1982:13). The population increase outside of Ko`olaupoko reflected the emergence of the sugar cane industry and the development of Honolulu as a port city. Ko`olaupoko was not directly affected by these developments because the land was not suited to the cultivation of sugar cane and it was geographically removed from the growing population center of Honolulu.

## 1. Period of Chinese Rice Cultivation at Waiāhole

Population increase in Ko`olaupoko began in the 1870s, and seems to have been directly related to the development of a rice growing industry in the region which began in the late 1860s or early 1870s. Rice production throughout the islands was attributed primarily to the Chinese.

Having first been brought to the islands to serve as sugar plantation laborers, many remained in the Islands following the completion of their contracts. Their accumulation of capital enabled them to rent land and turn to rice cultivation utilizing their traditional knowledge of methods of production which they had brought from China. (Miyagi 1963:106)

Citing Bowser, Miyagi noted that by 1879, "there were at least six rice plantations, seven rice planters and one rice mill operated by a water wheel at Waiāhole. The lowlands formerly utilized for taro were ideal for planting and Waiāhole stream provided an abundance of water for irrigation" (Miyagi 1963:106). An 1897 map of Waikāne shows the location of the areas under rice cultivation at that time, and shows the location of the mill and several "rice floors scattered throughout the valley" (Monsarrat 1897a, Figure 9). Another 1897 map of Waikāne also shows a considerable amount of land under rice cultivation, a rice mill, and, interestingly, an upland portion of the valley planted in coffee (Dove 1897, Figure 10). Other sources indicate that there were three rice plantations in Waikāne in 1880 (Bowser 1880:484 cited in Devaney 1982:51), and 200 acres of land were under rice cultivation in 1892 (Coulter and Chun 1937:72 in Miyagi 1963:108).

Mr. Lum Pui Young's memoirs (1975) of his childhood in Waikāne relate that rice cultivation in the period of *ca.* 1906-1926 amounted to some 250 acres with approximately 150 of those acres grown by Sing Tai Wai. Young's map indicates extensive rice cultivation on the north side of the Waiāhole Stream mouth seaward of Kamehameha Highway within the present study area (Figure 11). Sing Tai Wai employed 20-25 year-round workers and 15 to 25 more itinerant laborers during planting and harvesting time. The rice mill at Waiāhole was known as the Lansing Mill. The proprietor, Theodore F. Lansing grew rice but also milled the rice of other growers. Young notes that the major transportation link to Honolulu during this time period was a daily round-trip by stagecoach owned by Chinese living in Ka`alaea with a terminus at the Wing Wo Tai Mill in Waikāne. Most of the activities in the region were centered in Waikāne. Later transportation was served by a passenger truck owned by Hung Yew Yuen of Waikāne.

Young relates that during the period from 1913 to 1917 a contingent of 50 to 60 Chinese males were recruited to work on the Waiāhole Tunnel Project. They were used to build the railroad bed and trails from the seashore to the tunnel site. None of the Chinese did any tunneling, however, the Japanese did it all. Young notes that during this period there were as many Chinese as native Hawaiians living in this region. The rice industry reached its peak in Hawaii about 1910 then rapidly declined. Practically all of the Chinese rice fields were idled by 1925.



Figure 9 Portion of 1897 Map of Waikane (Reduced), M.D. Monsarrat, Surveyor.



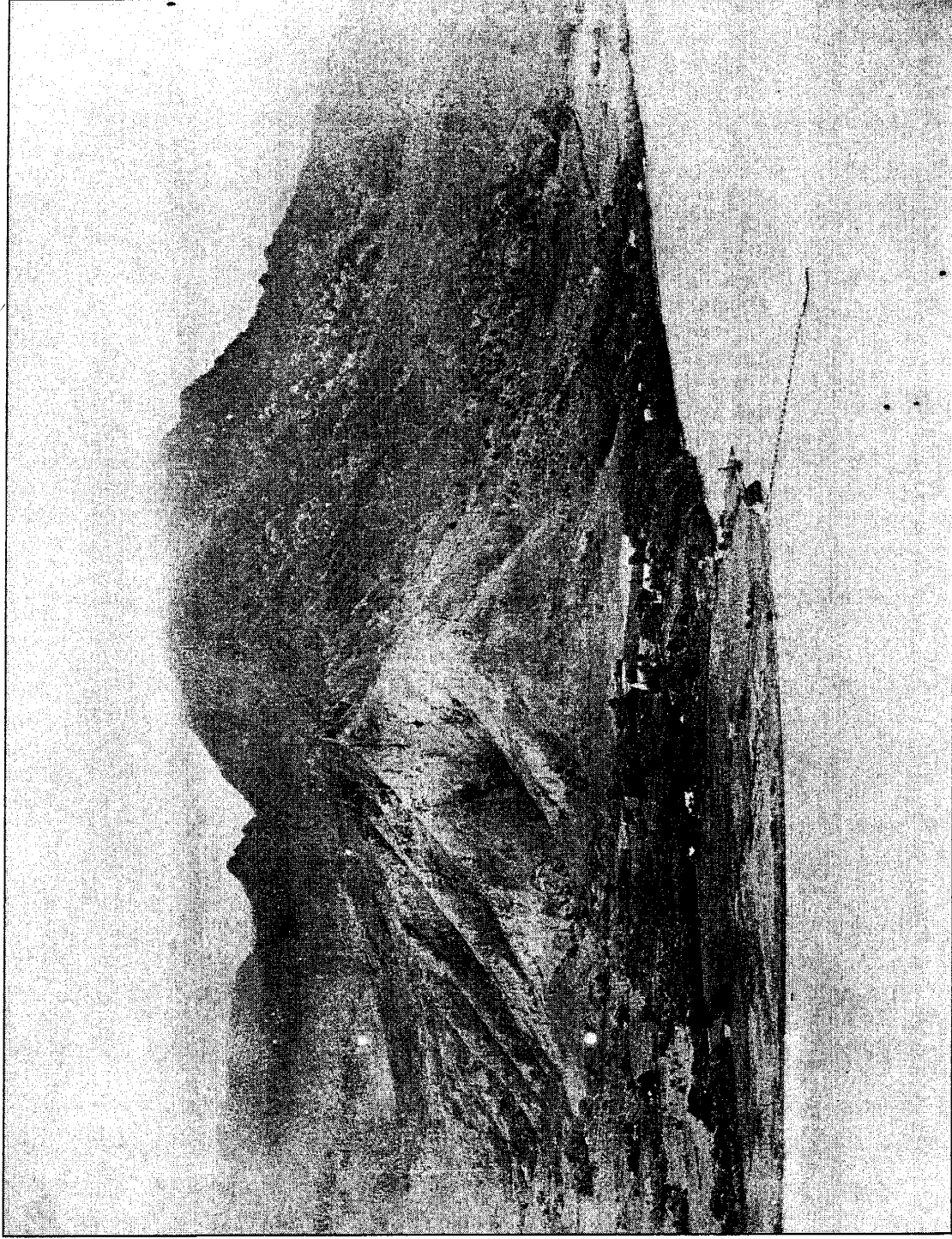


Figure 11 Waikāne, 1924, with Waikāne Pier in the Foreground and Pu`u Pueo in the Background. Note that much of the coastal flats appear to be unused swampy land in this period. Used with permission by Bishop Museum.

While rice cultivation came to dominate the landscape at Waiāhole and Waikāne, taro cultivation remained common (Figure 12) and other crops such as introduced vegetables and fruits were grown. These included cabbage, radishes, onions, turnips, beans, lotus root, litchi, mango, lungan, pomelo, and banana (Devaney *et al.* 1982:53). A coffee orchard was identified on an 1897 map of Waikāne and was mentioned by Miyagi as being identified on a 1902 base map as well (Miyagi 1963:114). Citing an informant, Miyagi notes that "the farmers of the valley sent their taro and other products to Honolulu by way of the Pali Road as late as 1910" (*Ibid*:108).

Pineapple planting also occurred for a brief time "by individual Chinese and Japanese farmers on moderately sloped hill land where rice and taro could not be grown" (*Ibid*:115).

The pineapples were hauled from Waiāhole to the Waikāne landing by train, and from Waikāne were sent by boat to the Libby Cannery at Wailau... there are still railroad tracks under the heavy brush at Waiāhole. (Ferreira 1940:9, cited in Miyagi 1963:115)

The train track used to transport pineapples is likely the same that was constructed by the Waiāhole Water Company in 1913. Condé and Best wrote that "ten miles of railroad were built, including an ocean pier (See Figure 11 for pier). One portion of the railroad was laid at the landing at Waikāne..." (1973:337). The railroad was built to transport so that supplies during the construction of "an engineering feat of epic proportions"; a system of tunnels through the Ko'olau Mountains that supplied water to the O'ahu Sugar plantations on the leeward side of the island. Once the tunnel system was complete and operational in 1916, the railroad was removed (*ibid*).

The pineapple industry proved to be very short-lived in the region and the Libby Cannery at Wailau was moved to Honolulu in the early 1920s. It is believed that many of the agricultural fields and, perhaps, houses were abandoned at this time (Miyagi 1963:116). Since the decline in rice production, land use in the valley may best be characterized as "diversified agriculture." Writing in 1963, Miyagi characterized this as the "Japanese Period" because in Waiāhole, Japanese farmers gradually replaced Chinese farmers and dominated land use through the 1930s and 1940s (*Ibid*:132). By 1961, the four major land uses at Waiāhole were identified as diversified agriculture (consisting primarily of bananas, papaya and taro), grazing (primarily dairy, but also beef cattle), residential use (as of September, 1962, 453 persons resided in Waiāhole), and forest (including the *pali* with no trees, wooded areas, waste land, and shrub land). Miyagi concluded that in the 1960s, land use was in a general state of decline in Waiāhole and "will probably continue to follow its trend of decline while the area awaits the development of the future" (*Ibid*:163).



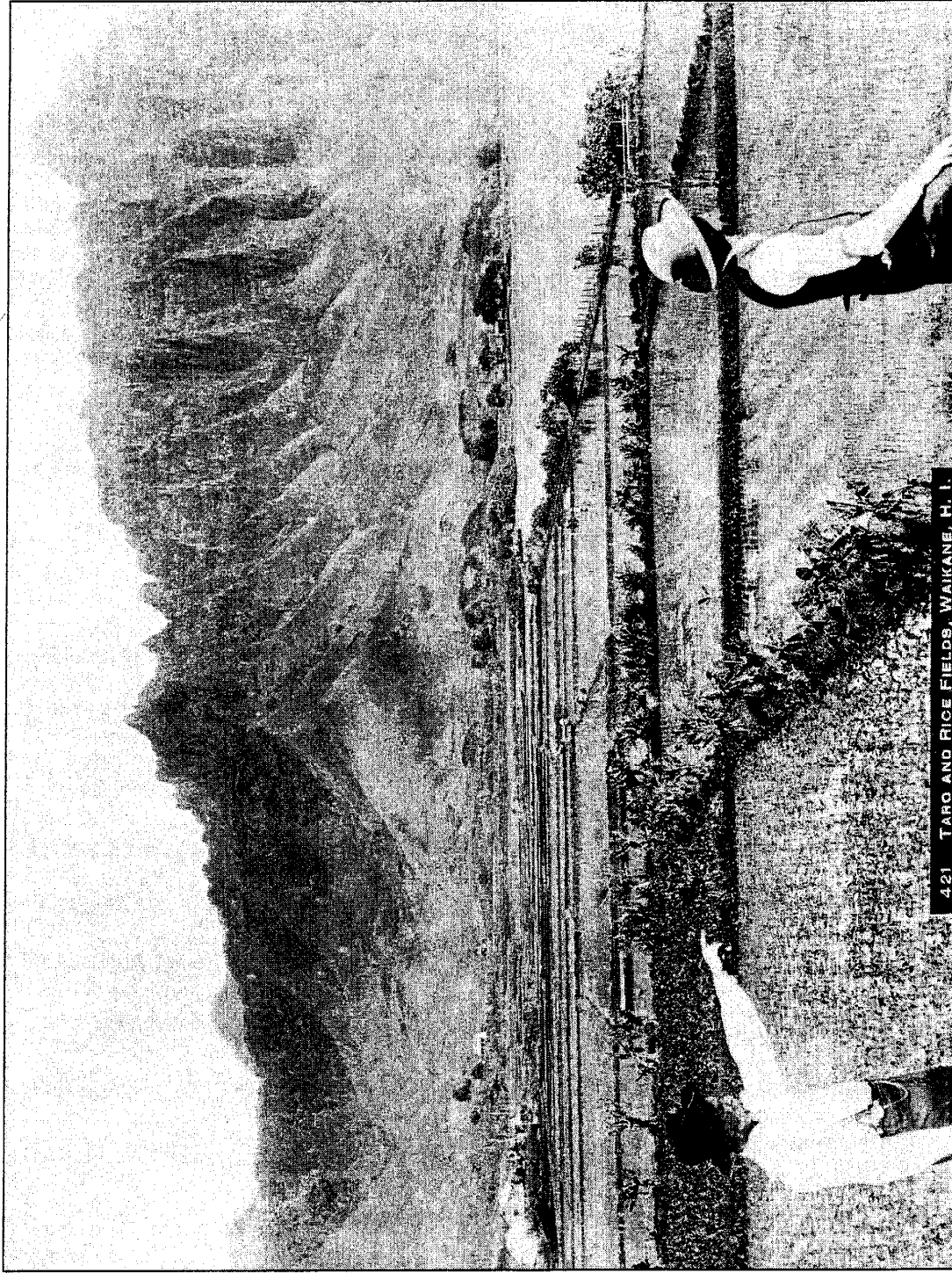


Figure 12 Taro and Rice Fields of Hakipu`u, 1907. The coastal flats of the study area probably looked similar during this time period. Notice the openness of the terrain. Used with permission by Bishop Museum.

### III. PREVIOUS ARCHAEOLOGICAL AND HISTORICAL STUDIES

Previous archaeological and historical studies in Waiāhole and Waikāne *Ahupua`a* are summarized in Table 1, shown in Figure 13 and are summarized briefly below.

**Table 1 Previous Archaeological Studies in the Vicinity of the Study Area**

Source	Area of Study	Nature of Study	Findings
McAllister 1933	Island wide	Archaeological Survey	Designates Site 317 Kukuianiani <i>Heiau</i> and Site 318 Ka`awakoa <i>Heiau</i> at Waikāne
Miyagi 1963	Waiāhole Valley	Historical Land Use Study - M.A. Geography	Documents changes in landscape
Kikuchi 1964	Waiāhole Valley	Archaeological Survey	Discusses adze quarry & other sites. Gives 4 traditions of Waiāhole from R. Paglinawan
Handy and Handy 1972	Hawai`i in general including Waiāhole-Waikāne	"Native Planters" studies	Documents conditions c. 1935 noting evidence of traditional Hawaiian land use
Stell Newman 1972	Site 50-80-06-1078 in the back of Waikāne Valley	Site Form for Site 50-80-06-1078 known as Waikāne Taro Flats	Describes numerous terraces along Waikāne Stream
Griffin & Pyle 1974	Lower one-third of Waiāhole-Waikāne	Archaeological Reconnaissance & Historical Investigation	Results described as disappointing. A number of <i>lo`i</i> and misc. walls were observed <i>mauka</i> & <i>makai</i> of the hwy. Kikuchi (1964) sites could not be relocated
Young 1975	Waiāhole, Waikāne, Hakipu`u	Chinese History in Windward O`ahu	Documents Chinese rice cultivation c. 1906-1926
Napoka 1977	Waikāne Valley	Report of field trip	Mentions a number of traditional cultural sites

Barrera 1982	Waiāhole Valley Agricultural Park	Archaeological Reconnaissance	Notes an abandoned system of taro terraces in the vicinity of LCA 10230.
Tomonari- Tuggle 1983a	Waiāhole Valley Agricultural Park	Archaeological Reconnaissance	Identifies 28 sites incl. residential areas, lithic workshops and traditional & historic agricultural sites
Tomonari- Tuggle 1983b	Waiāhole Valley Agricultural Park	Executive Summary	Executive Summary and Update of previous document
Barrera 1984a	Uwau Stream, Waikāne	Archaeological Survey	Notes a possible <i>auwai</i>
Barrera 1984b	Waiānu Stream Waikāne	Archaeological Survey	No Sites
Barrera 1984c	Near Waiāhole Camp, Waiāhole	Archaeological Survey	No Sites
Barrera 1984d	2 areas central Waikāne	Archaeological Survey	No Sites
Tomonari- Tuggle & Tuggle 1984	<i>Mauka</i> portion Waiāhole Valley floor	Mapping & Excavation Report	Documentation of work at sites 50-80-10-3509, -3510, -3511, -3512, -3513 and - 3526. Reports eight c <sup>14</sup> dates from site -3512.
Welch & Streck 1984	Upper Waikāne Valley	Archaeological Survey	Describes Site -2889 a shrine and -2890 a <i>lo'i</i> complex
Hammatt <i>et</i> <i>al.</i> 1987	Lithic Workshop Site -3512, central Waiāhole Valley	Archaeological Testing	Documents adze flaking and habitation activities. Reports one c <sup>14</sup> date.

Shapiro <i>et al.</i> 1988	Waikāne Golf Course project, seaward Waikāne	Archaeological Reconnaissance Survey	Identified 29 sites (60 component features) incl. ag., boundary, tool manufacture, habitation, transportation and religious sites
Kawachi & Griffin 1990	Site 50-80-10-4246, central Waiāhole Valley	Field check	Documents numerous agricultural terraces
Walker & Rosendahl 1990	50-Ft wide Fence Corridor project, north central Waikāne Valley	Intensive Archaeological Survey	Identified three sites (7 component features) incl. ag. terraces, mound & `auwai and a foundation remnant of a road
Dunn <i>et al.</i> 1992	Proposed SMF/HDI Golf Course, central Waikāne Valley	Archaeological Inventory Survey	Identified 13 sites (100 component features) incl. ag., charcoal production, military, road remnant, temp. habitation & indeterminate
Dye <i>et al.</i> n.d.	Pu`u Kuolani, Waiāhole	Adze Quarries Study	Evidence of adze manufacture at three Sites
AECOS 1995	Adjacent coastal areas of Waiāhole & Waikāne	Natural Resources Inventory	Description of vegetation, fauna, wetlands and streams offering insights on history of land use
Walsh <i>et al.</i> 1995	Adjacent coastal areas of Waiāhole & Waikāne	Archaeological Assessment	Notes fields & a possible `auwai & cultural layer in the Waiāhole study area & historic structures at Waikāne, + seawalls, a railroad berm, & historic artifact scatters

McAllister described two sites, Kukuianiani and Ka`awakoa *Heiau* at Waikāne, but noted that Ka`awakoa *Heiau* had been destroyed by the time of his survey (1931). He mentions no archaeological sites at Waiāhole.

Handy and Handy, although not archaeologists, were interested in the traditional agricultural use of the land and made observations about features that are now considered to be archaeologically significant.

There were formerly *lo`i* throughout the seaward lowlands of Waiāhole. Some were in swampy lands, but most of them were irrigated by the stream from which the *ahupua`a* takes its name. Groups of *lo`i* adjoining Waikāne were planted up into recent times (Handy and Handy 1972:453).

Miyagi (1963) wrote an M.A. thesis in geography on "Land Use in Waiāhole Valley, O`ahu" which has been used extensively in later studies. He documents land use during three major periods, pre-contact, 1778-1920 and 1920 to 1961.

Kikuchi (1964) observed that:

The entire length and width of [Waiāhole] valley was once extensively terraced into taro patches, *lo`i*, and was irrigated by a network of ditches, *auwai*, of which only *makai*, or seaward portions of Waiāhole are still maintained. Traces of abandoned taro plots and ditches can be readily distinguished along the paths and inland trails. (Kikuchi 1964:1)

Kikuchi also found considerable evidence of the manufacture of stone tools within the valley, including a lithic scatter in a bulldozed field (later designated site 50-80-10-2476), two adz quarries on one of the ridges along the edge of the valley (later designated sites 50-80-10-2472 and -2475). Within the seaward portion of the *ahupua`a* he identified two house sites within several large *hau* trees "where the stream enters the sea" (later designated site 50-80-10-1086). He described one of these sites as follows:

The best preserved site consisted of a high mound of dirt, 8-12 inches high, ringed with a pavement of small pebbles. Portions of the site were delineated by rows of stones marking the house site. A rectangular plot of stones with pavement within the general paved area may possibly be a grave. A wall of stones ran from the site directly into the ocean. Numerous adze chips and partial blanks were found within the two house sites. (Kikuchi 1964:2)

Site 50-80-10-1086 is believed to lie within the study area.

T. Stell Newman, archaeologist with the Division of State Parks conducted a survey along Waikāne Stream in 1970 as part of the state-wide site inventory locating two sites, 50-80-06-1057 a partial rectangular enclosure along the north bank of Waikāne Stream approximately 1 kilometer inland from Waikāne Town and site 50-80-06-1078 a series of taro terraces in the upper reaches of Waikāne Stream including flat beds and two beds with remnants of interior mounds and numerous *auwai*. Newman filled out a National Register Site Form in 1972 for site 50-80-06-1078 which has been called "Waikāne Taro Flats". Newman recommended a nature park of some type be set aside here. Site - 1078, Waikāne Taro Flats, with boundaries defined to include a large area beyond the known features, was nominated to the National Register of Historic Places and entered on the Register on April 11, 1973.

Griffin and Pyle's (1974) reconnaissance of the lower one-third of Waiāhole-Waikāne found a number of *lo`i* and miscellaneous walls *mauka* and *makai* of the highway. They found no evidence of the habitation sites identified by Kikuchi. They remarked that "it was evident that much of the sites within the study area have been destroyed, otherwise obliterated, or are in an advanced stage of deterioration" (1974:4). Griffin and Pyle summarized their findings as follows:

The results were, from an archaeologist's point of view, disappointing. The beach area revealed only a low seawall at the edge of the beach-turf line. This wall is undatable and may be of recent origin. In a few locations taro *lo`i* are still observable behind the beach. In general the disturbance of the various site predicted areas are bad. Pasturage of cattle seems to have eradicated even the *lo`i*, in most cases....it is as if someone has taken an eraser and wiped clean the reminders of the former Hawaiian occupation of this part of Waiāhole-Waikāne. (1974:15-16)

With the exception of Kukuianiani Heiau in Waikāne "all the sites encountered during field operations are considered marginal." (1974:4) Griffin and Pyle provide a historical overview of the area drawing heavily upon Miyagi (1963).

Lum Pui Young (1975) was born in Waikāne in 1900 and produced a memoir of his early memories of the Chinese community in Waiāhole, Waikāne, Hakipu`u circa 1906-1926. His data are incorporated in the historic land use section of this study.

Nathan Napoka (1977) reported on a field trip with members of the Kamaka family to examine historic taro *lo`i* in Waikāne Valley. He comments on a number of culturally important sites including: Waiokāne a spring of magical waters, a series of stones known as Manu kōlea, water channel and a house site, a circular cinder hill known as Pu`u Menehune, a stony cliff known as Pōhaku Wela that emitted smoke at certain times as a portent of things to come, a famous mountain peak known as Pu`u Pueo and a remnant of Kukuianiani *Heiau*.

Barrera (1982) presents the results of a brief reconnaissance and literature review in support of the Waiāhole Valley Agricultural Park project. He notes an abandoned system of taro terraces in the vicinity of LCA 10230. He concludes that "the entire valley of Waiāhole is probably eligible to the State and National Registers of Historic Places as an archaeological district" (Barrera 1982:3)

Tomonari-Tuggle (1983a & b) reports on a more in-depth archaeological reconnaissance survey in support of the Waiāhole Valley Agricultural Park project studied previously by Barrera (1982). This consisted of 5 discrete survey areas in the central portion of Waiāhole Valley. She documents twenty-eight sites, nineteen of which were in the area of the juncture of Waiāhole and Waianu Streams. These sites included residential areas, stone tool manufacturing work shops and agricultural features related to both traditional taro cultivation and historic rice cultivation. A brief history of settlement and land use is provided.

Dye *et al.* (n. d.) Studied a Waiāhole quarry complex located on opposite slopes of a small ridge that trends north into Waiāhole Valley from Pu`u Kuolani. Quarrying activity in the area had been reported by Kikuchi (1963). This complex includes sites 50-80-10-2472 (B.M. site # 50-Oa-G2-7) and 50-80-10-2475 (B.M. site # 50-Oa-G2-8) and 50-80-10-2476 (B.M. site # 50-Oa-G2-9). The study (Dye *et al.* n.d.:65) relates that Dr. Patrick McCoy did some mapping and collecting at the complex in 1982 but there are evidently no reports of this work. The study relates that Kikuchi (1982) published descriptions by Macdonald of two thin sections from the complex. This study recommended nomination of sites 50-80-10-2472 (B.M. site # 50-Oa-G2-7) and 50-80-10-2475 (B.M. site # 50-Oa-G2-8) to State and National Registers of Historic Places

In 1984 William Barrera carried out a series of four archaeological surveys of proposed well locations in Waiāhole and Waikāne, at Uwau Stream, Waianu Stream, and two areas in central Waikāne and near Waiāhole Camp in Waiāhole. Three of these modest studies reported no sites with the Uwau Stream study noting only a possible *auwai*.

In 1984, Tomonari-Tuggle & Tuggle documented excavation and mapping work at sites 50-80-10-3509, -3510, -3511, -3512, -3513 and -3526 all located near the confluence of Waiāhole and Waianu Streams and previously described in their earlier work (Tomonari-Tuggle 1983a & b) . They report six  $c^{14}$  dates from site -3512 (the locus of most of their research) and concluded the site was used for both agriculture and habitation from the late pre-contact times into the historic period. They report some relatively early carbon date (Beta 100031) of c. A.D. 1040-1480 from site -3512.

In 1984 Welch and Streck prepared an archaeological survey report for the Commanding Officer Marine Corps Air Station, Kāne`ohe Bay describing a Hawaiian shrine in Waikāne Valley (Site 50-80-06-2889) and evaluating the impact of an ordnance removal project. The shrine consisted of an *ahu* or stone cairn, a terrace, two basalt retaining walls and a circular petroglyph located on a ridge, known as Mortar Hill, above the valley at about 90 m above mean sea level. This study also assigned site # 50-80-06-2890 to another adjacent complex of abandoned taro *lo`i* which were evidently in production as late as 1928 when aerial photographs of the valley were taken. "Al and Ray Kamaka say that the shrine is currently used as a family *heiau* to make offerings of crops and to chant to Lono, the god of rain and agriculture." (Welch and Streck 1984:14) . David Welch prepared a historic site form for site 2889 on July 18, 1984.

Cultural Surveys Hawaii (Hammatt *et al.* 1987) carried out archaeological testing of a lithic workshop (site -3512) located on a low knoll overlooking the confluence of Waianu and Waiāhole Streams which was identified in a survey by Tomonari-Tuggle in 1983 and tested by her in 1984. Both habitation and flaking activity were documented. Final stage flaking of adzes took place at the site and this is suggested to have been the single most important economic activity at the site. The one  $c^{14}$  date recovered was AD 1655-1950 was regarded as consistent with six of the dates reported by Tomonari-Tuggle. The earliest Tomonari-Tuggle dates are questioned because of their apparent shared stratigraphic

context with later dates (Hammatt *et al.* 1987:41)

PHRI (Shapiro *et al.* 1988) carried out an archaeological reconnaissance survey in support of a Waikāne Golf Course project, in 300 acres of seaward Waikāne just *mauka* of the highway identifying 29 sites (60 component features) including one previously identified site (Kukuianiani *Heiau*). These included agricultural, boundary, tool manufacture, habitation, transportation and religious sites (cemetery, burial, shrine and *heiau*). The one c<sup>14</sup> date recovered was AD 1430-1640.

The State Historic Preservation Division conducted a field check (Kawachi & Griffin 1990) documenting several terraces in central Waiāhole Valley designated site 50-80-10-4246.

PHRI (Walker & Rosendahl 1990) carried out an intensive archaeological survey of a 50-Ft wide fence corridor project bounding TMK: 4-8-14:6 in central Waikāne Valley. This study identified three sites (50-80-06-1078, -4116 and -4117 with 7 total component features) including four agricultural terraces, an agricultural mound & *auwai* and a boulder alignment foundation remnant of a road. This study includes a "Limited Historical Documentary Research Land of Waikāne ..." study by Helen Wong Smith as Appendix A.

PHRI (Dunn *et al.* 1992) carried out an archaeological inventory survey of an approximately 407 acre proposed SMF/HDI Golf Course study area in central Waikāne Valley identifying thirteen sites with 100 component features all within stream basins. Most of the features (68) are pre-contact agricultural features but 9 were related to historic charcoal production three to temporary habitation and one to a ceremonial function. Site -4356 appears to have been a major pre-contact/post-contact agricultural complex with forty-six designated features. Eight c<sup>14</sup> dates are reported with the oldest of AD 1400-1640.

AECOS Inc. (1995) carried out a Natural Resources Inventory of two coastal areas of Waiāhole & Waikāne adjacent to the present study area with descriptions of vegetation, fauna, wetlands and streams offering insights on the history of land use in this area.

Cultural Surveys Hawaii (Walsh *et al.* 1995) carried out an archaeological assessment of coastal areas of Waiāhole & Waikāne adjacent to the present study area. This study notes vaguely defined fields with *lo`i* type soils and a possible *auwai* and a possible buried cultural layer with possible water-worn basalt flakes and charcoal in the Waiāhole study area. In the Waikāne study area historic structures including the Waikāne Store (possibly dating to 1897) and a wooden pier (possibly dating to 1913) were noted. Additionally, seawalls, historic roads, one of which may overlie a railroad berm, & remnant historic sites evidenced by historic artifact scatters were noted.



**Table 2**      **Previously Reported Carbon Dates for Waiāhole and Waikāne**

Reported Sample No.	Reference	Provenience	C 14 Years B.P.	C13/C12	C13 adjusted C14 Age	Calender Range A.D.
3512-1	Tomonari-Tuggle & Tuggle, 1984 App. 3 p.17	Waiāhole Site 3512	Modern	-	-	Modern
3512-2	Tomonari-Tuggle & Tuggle, 1984 App. 3 p.17	Waiāhole Site 3512	Modern	-	-	Modern
Beta 100028	Tomonari-Tuggle & Tuggle, 1984 App. 3	Waiāhole Site 3512	Less than 130 B.P.	-23.48 0/00	Less than 130 B.P.	Post 1820
Beta 1000289	Tomonari-Tuggle & Tuggle, 1984 App. 3	Waiāhole Site 3512	180 +/- 50 B.P.	-23.26 0/00	210 +/- 50 B.P.	1690-1790
Beta 100030	Tomonari-Tuggle & Tuggle, 1984 App. 3	Waiāhole Site 3512	480 +/- 60 B.P.	-27.67 0/00	440 +/-60 B.P.	1450-1570
Beta 100031	Tomonari-Tuggle & Tuggle, 1984 App. 3	Waiāhole Site 3512	720 +/- 220 B.P.	-26.49 0/00	690 +/- 220 B.P.	1040-1480
Beta 100032	Tomonari-Tuggle & Tuggle, 1984 App. 3	Waiāhole Site 3512	Less than 140 B.P.	-27.76 0/00	Less than 140 B.P.	Post 1810
Beta 100033	Tomonari-Tuggle & Tuggle, 1984 App. 3	Waiāhole Site 3512	160 +/- 70 B.P.	-26.52 0/00	130 +/- 70 B.P.	1750-1890
Beta 21086	Hammatt <i>et al.</i> 1987:39	Waiāhole Site 3152	190 +/- 70	-29.4	120 +/- 70 B.P.	1655-1950

Beta 25830	Shapiro <i>et al.</i> 1988: 35	Waikāne Site T-23	390 +/- 50	-25.1	390 +/- 50	1430- 1640
Beta 40931	Dunn <i>et al.</i> 1992:15	Waikāne Site 1078	450 +/- 70	-27.3	420 +/- 70	1400- 1640
Beta 40705	Dunn <i>et al.</i> 1992:15	Waikāne Site 4356	170 +/- 60	-28.6	120 +/- 60	1650- 1955#
Beta 40926	Dunn <i>et al.</i> 1992:15	Waikāne Site 4361	90 +/- 50	-28.8	30 +/- 50	1683- 1739 1810- 1930 1955#
Beta 40927	Dunn <i>et al.</i> 1992:15	Waikāne Site 4361	70 +/- 50	-28.6	10 +/- 50	1690- 1732 1810- 1920 1955#
Beta 40706	Dunn <i>et al.</i> 1992:15	Waikāne Site 4361	120 +/- 50	-27.6	70 +/- 50	1670- 1770 1790- 1950 1953- 1955#
Beta 40707	Dunn <i>et al.</i> 1992:15	Waikāne Site 4361	210 +/- 50	-28.6	160 +/- 50	1650- 1950
Beta 40929	Dunn <i>et al.</i> 1992:15	Waikāne Site 4362	50 +/- 60	28.8	100.2 +/- 0.7% modern	-
Beta 40928	Dunn <i>et al.</i> 1992:15	Waikāne Site 4362	240 +/- 70	-29.8	170 +/- 70	1527- 1557 1630- 1950

#### IV. RESULTS OF COMMUNITY CONSULTATIONS

As partial fulfillment for the Scope of Work (SOW), consultation with organizations and the community were conducted to identify knowledgeable *kūpuna* and participants to be interviewed, as well as others who could inform on the history of the subject parcel and previous land use. The organizations consulted were the State Historic Preservation Division, the Office of Hawaiian Affairs, the O`ahu Island Burial Council, the Queen Lili`uokalani Children's Center (Ko`olaupoko), the Kahalu`u Neighborhood Board #29, the Hawaiian Civic Clubs of Ko`olaupoko and Ko`olauloa and the Waiāhole-Waikāne Community Associations. Through the City and County of Honolulu, Department of Design and Construction, we were able to acquire lists of tenants who live in the study area as well as lists of the Waiāhole Beach Park volunteers in the community.

Early on in the consultation process, it became clear that there were many *kama`āina* families knowledgeable of both Hawaiian traditions of the Waiāhole and Waikāne areas as well as current controversial issues affecting those traditions. Some of these families can trace their roots back to the *Māhele* and some even further. Their deep conviction that the land and the water are for the use of the people of those *ahupua`a* has influenced their involvement in current issues affecting those resources. It was necessary to try to limit the scope of the consultation to individuals and families who may have roots in the study area. This was not easy as many families with *kuleana* ties to the study area have moved to *mauka* areas in Waiāhole and Waikāne or away from the region entirely.

##### A. Informants

Through the consultation process, eight individuals, were identified as potential informants. Of these eight, three had lived in the study area for at least some period of their lives. These include Incarnation Manatad, Elizabeth Mahoe, and Felix "Don" Pacyau. Three had lived near the study area, George Hoaeae and Alfred Morita in Waikāne and Richard Paglinawan in Waiāhole Valley. One interviewee was from Hakipu`u, but had cultural ties to Waiāhole and Waikāne, Calvin Hoe. The eighth interviewee, Emil Wolfgramm is originally from Tonga, but has lived in Waikāne for many years and has absorbed much of the area's lore. In addition, a ninth interview was conducted with a long time leasee, James Medeiros, of the former Magoon Estate. He has long been a resident in the Waiāhole portion of the study area, north of the Waiāhole Stream (Figure 14).

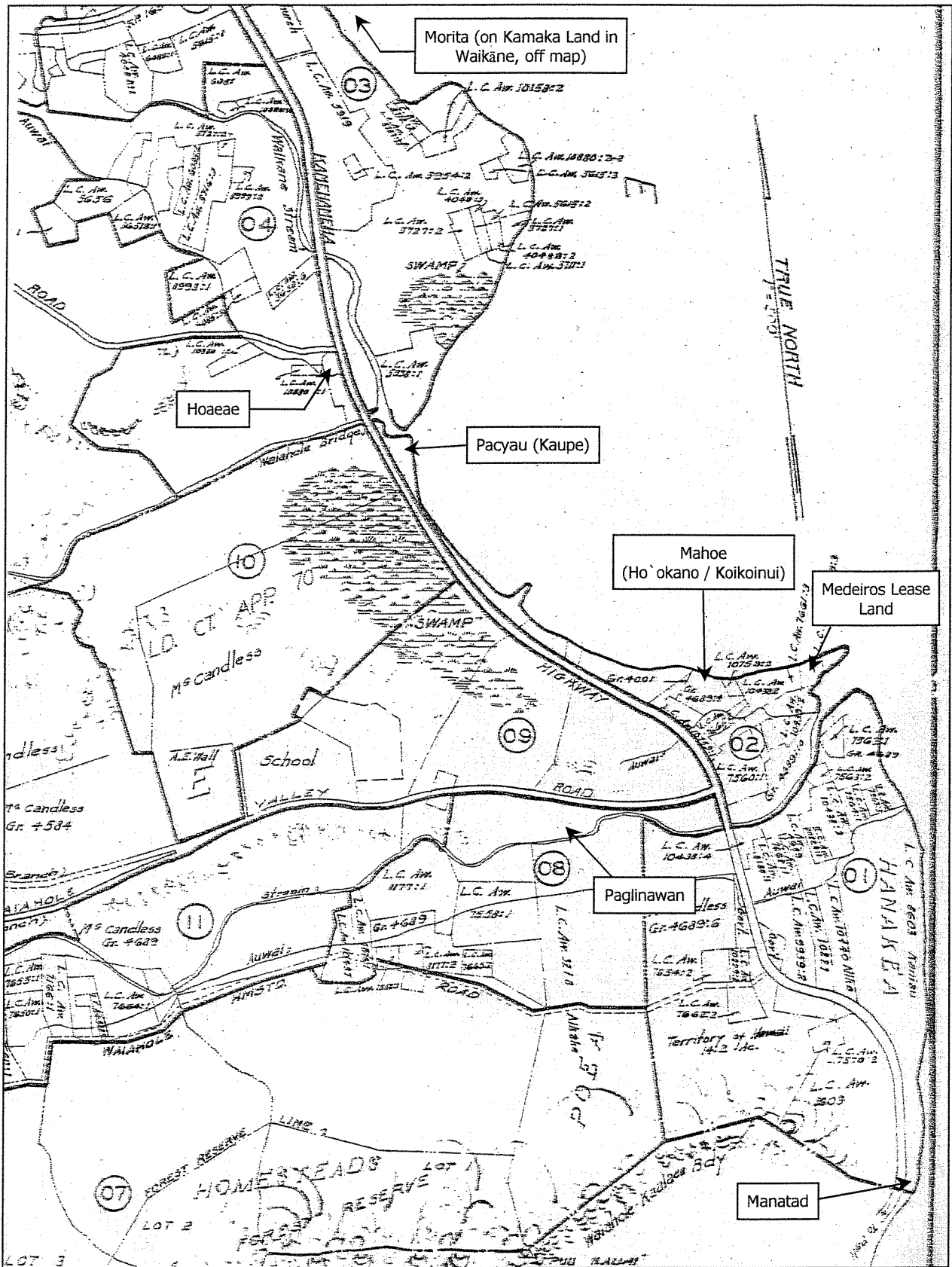


Figure 14 Portion of TMK 4-8 Showing the Homes (Past and Present) of Knowledgeable Informants in Waiāhole and Waikāne

The following table shows the results of the community consultations which were conducted by Tina Bushnell and Rodney Chiogioji for Cultural Surveys Hawaii.

**Table 3 Results of Community Consultations**

**Key:**

Affiliation

HCC = Hawaiian Civic Club  
 HMINK=Hui Mālama o Nā Kūpuna o Hawai'i  
 KNB=Kahalu`u Neighborhood Board #29  
 OHA = Office of Hawaiian Affairs

OIBC = O`ahu Island Burial Council  
 QLCC=Queen Lili`uokalani Children's Center  
 SHPD=State Historic Preservation Division  
 WBP=Waiāhole Beach Park  
 WWCA=Waiāhole-Waikane Community Association

Y = Yes

N = No

D = Declined to comment

A = Attempted (at least 3 attempts were made to contact individual, with no response)

U = unable to contact, i.e., no known phone number or forwarding address

Name	Affiliation	Contacted (Y/N/A)	Referral (s)	Comments
Ajifu, Ralph	C&C land tenant	A		deceased
Alejo, Ben	C&C land tenant	A		No response
Bagio, Prisco	C&C land tenant	A		No response
Bender, Daniel A.	Kahalu`u Neighborhood Brd	A		No response
Bridges, Cy	OIBC-Ko`olauloa Representative	Y	Y	
Carson, Charles	C&C land tenant	A		No Response; Related to Mary Villanueva (Chartrand)
Chartrand, Winnie	C&C land tenant	A		Talked to granddaughter (M. Villanueva) who said grandma was too frail to talk
Chinen, David	WWCA	Y	N	Okinawan parents moved to Waikāne in 1940s to farm
Cooper, Sandra	C&C land tenant	Y	N	Runs fruit stand adjacent to Waikāne Store
Davis, Richard	C&C land tenant	Y	Y	Runs fruit stand w/ T. Kim in Waikāne
Hayata, Toku	C&C land tenant	U		No telephone number
Hoaeae, George	Former Waikāne Resident	Y	N	Interviewed 1/18/02

Name	Affiliation	Contacted (Y/N/A)	Referral (s)	Comments
Hoe, Calvin	Waiāhole Resident, taro farmer	Y	Y	Interviewed 12/13/01; originally from Hakipu`u
Holmes, Steve	County Councilman	Y	Y	Talked to Councilman Holmes' Aide Bob Mon; gave referrals
Horton, Mrs.	Had country home in Waikāne	Y	N	Took over property 4-8-03:20 from her Uncle Ayau; in Waikāne near pier
Hui Malama `Āina o Ko`olau		A		No response, no contact person
Kamaka, Raymond	Member of Kamaka Family	Y	Y	
Kim, Tanya	C&C land tenant	D		Runs fruit stand w/ R. Davis in Waikāne
Kippen, Colin	OHA	Y	Y	
Kini, Kalei	OIBC	Y	N	No information.
Koikoinui, Evelyn	former C&C land tenant	Y	N	Married to the late Henry Koikoinui, <i>kama`āina</i> of Waiāhole who grew up in study area
Koikoinui, Monica	former C&C land tenant	Y	Y	Lived in study area in Waiāhole; Evelyn and Henry's daughter
Lagapa, Alejandra	C&C land tenant	Y	Y	Lived in study area many years, Waikāne
Lagapa, Cookie	WWBP volunteer	Y	Y	Married to Lawrence Lagapa; lives in study area, Waikāne
Lau, Elizabeth Cypher	Kualoa-He`eia Hawaiian Civic Club	A		No response; no telephone number
Lee, Moana	Kahalu`u NB #29	Y	Y	Some knowledge of area
Mahoe, Elizabeth	C&C land tenant	Y	N	Interviewed 1/7/02; grew up in study area, Waiāhole
Manatad, Candido	C&C land tenant	Y	Y	Incarnation Manatad's son; lives on Manatad land in Waiāhole

Name	Affiliation	Contacted (Y/N/A)	Referral (s)	Comments
Manatad, Incarnation	C&C land tenant	Y	N	Interviewed 12/19/01; lived in study area since 1934, Waiāhole (near Ka'alaea border)
Manatad, Sharon	WBP volunteer	Y	Y	Incarnation Manatad's daughter-in-law
Markell, Ka'iana	SHPD	A		No response
McEldowney, Holly	SHPD-Culture and History Branch	Y	Y	Community issues: *reestablish <i>lo'i</i> *community fishing access issues
Meaders, Antoia	C&C land tenant	A		Moved to mainland
Medeiros, James	C&C land tenant	Y	N	Leases land that was formerly known as the "Magoon Estate" in the study area; Interviewed 1/24/02
Meyer, Colleen	WBP volunteer	A		No response
Morita, Alfred	Waikāne Resident	Y	Y	Interviewed 1/04/02
Mossman, John	WWBP volunteer	A		No response
Napoka, Nathan	SHPD-Culture and History Branch	Y	Y	Known traditional cultural properties up <i>mauka</i> . Contact knowledgeable families
Naval, Andreas	C&C land tenant	U		No telephone number
Obedoza-Ahrens, Diane	Grew up in study area, Waikāne	Y	Y	Interviewed with Felix "Don" Pacyau, Jr., 11/30/01
Owens, Susan	C&C land tenant	A		No response
Pacyau, Felix	C&C land tenant	Y	Y	Interviewed 11/30/01
Paglinawan, Richard	Waiāhole resident	Y	Y	Interviewed 11/26/01
Panoke, Wayne Kaho'onei	Kahalu'u NB #29	A		No response
Picanco, Mr. & Mrs. Leonard	C&C land tenant	D		
Reppun, John L.	WWCA	Y	Y	Some members of the family grow taro up in Waiāhole Valley
Royes, Joe and Pat	WWCA	Y	Y	Pat, formerly a Lagapa, grew up in study area, Waikāne

Name	Affiliation	Contacted (Y/N/A)	Referral (s)	Comments
Salas, Hannah	WBP volunteer	Y	Y	
Santos, Elizabeth	Na Kūpuna o Ko'olau	A		No response
Santos, Russell	Works and fishes in Waiāhole	Y	Y	Grew up and lives in Kahalu'u, but spends time in Waiāhole
Song, James	C&C land tenant	A		No response
Tokuzato, Nadine	C&C land tenant	Y	Y	Current owner of Waikane Store
Towill, Rick	WBP volunteer	A		No response
Tsutsui, Horuko	Waikane Store	Y	Y	Came to Waikāne in 1927 with Moriwaki family; parents owned and operated Waikane Store
Villanueva, Mr. & Mrs. Proceso	C&C land tenant	A		No response; related to the Chartrand family
Wada, Susan Holly	QLCC-Ko'olaupoko	Y	Y	
Wolfgramm, Emil	Waikāne Resident and Farmer	Y	N	Interviewed 12/03/01

## B. The Interview Process

Once the participants were identified, they were contacted and appointments were set up to conduct the interviews. The interviews were conducted between November 26, 2001 and January 24, 2002 in Waiāhole or Waikāne with the exception of one interview which was conducted in Nu'uano at the workplace of the informant. All interviews were recorded and transcribed. All participants were allowed the opportunity to review the typed transcript for corrections, editing and to approve the final transcript. All informants signed an "Authorization for Release" form giving permission for the interview to be used as part of this study. Excerpts from the interview are used throughout this report, wherever applicable. The full transcripts of all interviews are appended to this report.

## C. Biographical Sketches of the Interview Informants

The following biographical sketches of the nine interviewees serve to introduce the reader to the informants.



### *George Hoaeae, "Uncle George"*

George Hoaeae was born in 1916 in the back of Waikāne Valley. George's parents were Daniel Hoaeae, originally from Lihue, Kaua`i and Mariah Ka`ilimoku, from Kealia, Kaua`i. According to George, his parents moved to Waikāne in order to work at Lincoln McCandless' ranch there. The first six years of George's life, his family lived up in the Waikāne Valley, quite some distance from the road. In the valley, they planted rice and taro. In about 1922, the Hoaeae family moved down to the highway, at the corner of Waikāne Valley Road and the highway. At this time George's father became a sort of *luna* for the cowboys at McCandless Ranch. Through his teen years, George learned to be a cowboy himself and according to another informant, became quite good at it, earning him the nickname of "John Wayne". Throughout his early years growing up, George spent much time exploring the valleys and hills of the Waikāne as well as the ocean fronting the study area. In his twenties, George left Waikāne and moved to Hau`ula where he married and had several children. Since then, he has moved all over the island of O`ahu and remarried and currently lives in Honolulu.

### *Calvin Hoe*

Born in Hakipu`u in 1945, Calvin Hoe, grew up attending Waiāhole School. His family has ties to the Ka`anana family which was awarded *kuleana* land in Waiāhole Valley. As Calvin puts it, "most of the old families, this whole area, related". The Hoe family purchased the Waiāhole Poi Factory in the 1970s which they then converted into an art gallery. Calvin started growing taro in Waiāhole Valley in the 1970s and continues to be a strong figure in the taro revitalization efforts in this area. He is currently involved in forming a charter school in Hakipu`u, as a community development facilitator at Queen Lili`uokalani Children's Center-Ko`olaupoko Unit and nurturing his Hawaiian traditions, particularly in music and farming.

### *Elizabeth Mahoe, "Aunty"*

Elizabeth Mahoe, formerly Elizabeth Wong was born in 1933 at her home in Waiāhole, in the study area. Her mother, Helen Wong, was born to a Chinese family who grew rice *mauka* of the study area in the early 1900s. Mrs. Mahoe's father, Joseph Ho`okano Koikoinui, was from the land in the study area. Mrs. Mahoe believes her father's family, the Koikoinui's are the Kuikuinui family who was awarded *kuleana* land in Waiāhole (Kukuinui, LCA 7665). Growing up in the 1930s and 40s, Mrs. Mahoe remembers that her parents shared little of their histories with she and her siblings. She does recall her father telling her that her family was from the Kualoa area and had ties to the fishponds there. Elizabeth went to Waiāhole School as a youngster and her free time was often spent fishing with her brother to feed the family or to help supplement her father's income. Mrs. Mahoe describes her family as a fishing family. Her father worked at the Waikāne Pier as a security guard during World War II. Around 1950, Mrs. Mahoe left Waiāhole to go live and work in other parts of O`ahu. Since then, she has spent much time

in Waiāhole on the family land, bringing her children, and now grandchildren to fish and swim whenever possible. Her family house was destroyed a few years ago to make way for the Waiāhole Beach Park Expansion.

### *Incarnation Manatad, “Manatad”*

Born to Filipino parents in 1919 in Haiku, Maui, Incarnation Manatad (formerly Incarnation Navares) was taken to O`ahu while she was quite young. After her mother’s death when she was a small girl, she was cared for by a family member in Waipahu until she was seven at which time her father came to get her. They lived for a brief time in Honolulu and then moved to Ka`alaea where Incarnation’s father farmed land and sold his produce wholesale. Along with other children from Ka`alaea, Mrs. Manatad attended Waiāhole School. In 1934, she was married to Candido Manatad and they began to lease land in Waiāhole, although at the time, that area was considered to be part of Ka`alaea. In the 1930s, Mrs. Manatad’s husband was a commercial fisherman working from a sampan which caught mostly *akule* in the Kāne`ohe Bay. Once they began their own commercial fishing business, Mrs. Manatad worked alongside her husband to learn about fishing. She has been fishing ever since and continues to fish to this day with her extended family. Mrs. Manatad has been living on the land in Waiāhole for approximately 67 years.

### *James Medeiros, “Jimmy”*

James Frederick Nalani Medeiros, was born in 1946 near Moanalua, O`ahu. He is of mixed ethnic background including Portuguese, Hawaiian and some western European. After having worked for the Magoon family in a different capacity, Mr. Medeiros was able to acquire a lease to the Magoon Estate at Waiāhole in the 1970s. He has been leasing the land ever since and has been living there with his family since the early 1980s. During his time on the land, Mr. Medeiros has engaged in numerous farming activities including cattle, pigs, chickens, pigeons, rabbits, flowers and countless others. Through the years, Mr. Medeiros and other family members have experienced many “inexplicable” occurrences, those of which he attributes to spirits roaming the land and the burial ground which is located on his lease land. In addition, Mr. Medeiros was able to share information concerning lithic artifacts found on the Waiāhole lease land.

### *Alfred Morita*

Alfred Morita, also known as Uncle Kalei, was born in Waikāne in 1928 and has lived there most of his life. His parents were Annie Emalia Kamaka and Alfred Kiyotomo Morita. As the first grandchild born into the family, Uncle Kalei was the *mo`opuna i ke alo*, the favorite grandchild of his grandparents, Annie and John Kamaka. Uncle Kalei grew up in Waikāne on the Kamaka land and attended Waiāhole School. He recalls going fishing with his grandfather where he learned to poke tako. Uncle Kalei also has memories of herding cattle with his Uncles all along the coast from Waiāhole to Hakipu`u. Although, he remembers his grandfather conferring with his *kahuna* and some family affiliation with the *heiau* on Pu`u Pueo in Waikāne, he feels that the *kahuna* tradition of his family was never passed on and has been mostly lost.

### *Felix “Don” Pacyau and Diane Obedoza-Ahrens*

Uncle Don was born in 1940 in Kāne`ohe down what's known as Fishermen Camp Road. His parents met in Waikāne when Uncle Don's father, Mr. Pacyau moved to Waikāne to work in the taro patches. During his youth, he spent much time in Waikāne at his grandparents home. His grandparents were Ela and Sarah Kaupe and their home was just off the highway, near the mouth of the Waikāne River (in the study area). Just footsteps from the ocean, Uncle Don learned to fish with his uncle and grandparents and has many memories and much knowledge of the ocean fronting the study area. From Kāne`ohe, Uncle Don's parents moved back to Waikāne to care for his grandparents sometime during the 1940s. Uncle Don has lived here in Waikāne ever since. Currently, he and his family have begun a flower farm just *mauka* of Kamehameha Highway and will be constructing a house there when Waiāhole Beach Park Expansion moves their way.

Diane Obedoza-Ahrens is a younger *hānai* sister of Uncle Don's. She grew up in Waikāne in the 1950s and 60s and has fond memories of her time spent there. She encouraged Uncle Don to share his *mana`o* in this study. She termed the whole of Waikāne and Waiāhole as her “playground” as she was growing up.

### *Richard Paglinawan*

Born in 1936 to a Filipino father and Hawaiian mother, Richard Paglinawan has wonderful memories of growing up in Waiāhole. As did most children in the region, Mr. Paglinawan went to Waiāhole School in his young years. He also attended the Japanese School in Waiāhole and his family was very involved in the Catholic Church in Waikāne, Our Lady of Mount Carmel. Because his father worked at Pearl Harbor and was often gone, his mother and uncles would lead the children on fishing and gathering expeditions down along the coast, adjacent to the study area. Here, Richard and his siblings and cousins learned to gather *kūpe`e*, *`ōlepe*, different varieties of *limu*, crabs, *`ōpae lōlō* and fish many varieties of fish. Mr. Paglinawan's clear recollections of the natural and cultural resources in the vicinity of the study area are impressive and he has a deep understanding of the history behind the land and water issues facing the Waiāhole and Waikāne communities. Currently, Mr. Paglinawan is a project manager at the Queen Emma Foundation in Honolulu and is a former administrator of the Office of Hawaiian Affairs.

### *Emil Wolfgramm*

Born in Tonga, Emil Wolfgramm has been living in Waiāhole Valley since 1985. Mr. Wolfgramm's wife is a long-time landowner in Waiāhole and they now farm a piece of land she inherited in the back of Waiāhole. Mr. Wolfgramm brings with him a storytelling tradition with a broader Polynesian perspective. He attempts to incorporate traditional Hawaiian legends into this Polynesian framework in seeking a common heritage. Mr. Wolfgramm is an educator at Kailua High School and at Windward Community College, where he teaches cultural aspects of Polynesian voyaging.

## V. TRADITIONAL CULTURAL PRACTICES

### A. Legendary Associations with Waiāhole and Waikāne

#### 1. Hawaiian Creation Myth

During interviews and talk story with the people of Waiāhole and Waikāne, the stories of Waiāhole and Waikāne emerged little by little, most of the time in loose fragments. Although it is evident that much has been lost, there is still a sense that the land and the ocean surrounding these two *ahupua`a* retain connections to Hawai`i's history and the *mo`olelo*. Some still link this area, particularly Waikāne to the Hawaiian creation story. According to tradition, there was a Paliuli in Waikāne. "The name of this land is Waikane because it was here that Kane first dug for water for the benefit of Paliuli. There is a Paliuli here and it is on that ledge there. Below it are the famous water, Waiololi and Waiolola. One is male and the other female" (in Sterling and Summers, 1978:187). A common refrain in the Kumulipo speaks of Waiololī and Waiololā, generally thought to symbolize the male and the female procreative forces respectively. A native of Tonga residing in Waiāhole since 1985, Emil Wolfgramm continually seeks the connections between Hawaiian *mo`olelo* and greater Polynesia through his storytelling. Mr. Wolfgramm explains the water features of Waikāne and Waiāhole and how they symbolize Waiololī and Waiololā (Figure 15):

The expanse between that point there and this point over here which, around the corner, is actually a peninsula that used to be the Magoon Estate, right next to the river. From that point [in Wai`āhole] to that point over there, which is Waikāne, where the pier is, around that corner, that's Wai`alolā, right there. [Mr. Wolfgramm is indicating the expanse of the bay, off the study area, between the Waikāne pier and the mouth of Wai`āhole Stream.] That's the wide expanse of the female. And this stream over here, this drainage, this is Wai`alolī, this is male. [Mr. Wolfgramm is indicating a small drainage that enters the bay, from Wai`āhole, in the narrow central portion of the study area.] That's the fast-flowing, narrow movement of water. Whereas this one here is expansive, broad and you can't tell the speed of that water. Now that imagery comes from – Those two names come from Waikāne, next door. But they play themselves out in this physical setting here in Wai`āhole. (Interview with Emil Wolfgramm, 12/3/01).

Mr. Wolfgramm emphasizes that these names are poetic images that may be associated with these water features and not specific place names of the features.

A second fresh water source which empties into the small bay indicated by Mr. Wolfgramm as symbolic of Waiololā is sometimes known as Waike`eke`e Stream, though many people living in the area do not recall the name of it. The Pacyau family now lives on the border of this stream and their ancestors, the Kaupe `ohana has lived on this land for generations. One of the family interviewed, Felix Pacyau, Jr. identified a pair of stones located adjacent to and just north of the stream. Although Mr. Pacyau did not call them *kū`ula* stones, he describes how his family would offer fish to the stones after bringing in a catch. Mr. Pacyau's Hawaiian grandfather, Ela Kaupe told his grandson about the stones:

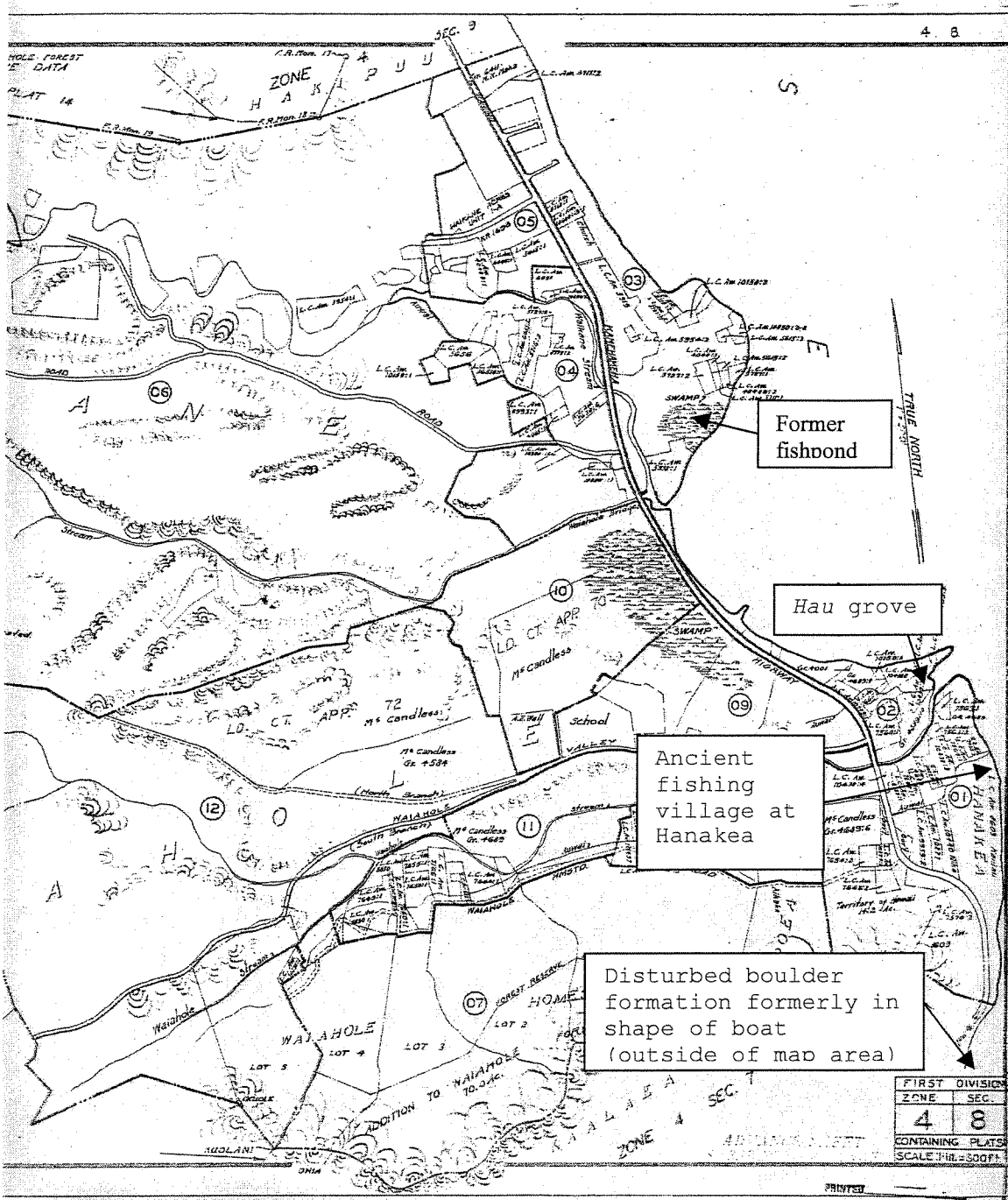


Figure 15 Approximate Location of Features Described by Mr. Emil Wolfgramm.

KB: Those stones, did they have a name?

DP: No, I don't think so. My grandfather told us, but I don't know how true it is, but he said one of the stones is—one is Waiāhole and one is Waikāne. I don't know what he mean by that. I know Waikāne is a man. But, I don't know what Waiāhole is. I don't know, woman? So, actually the two stones is like husband and wife. That's what he say, that time. But the stone is there yet.

Perhaps there is a connection between these stones and the male and female procreative forces of Waiololī and Waiololā, famed in the *Kumulipo* (Hawaiian creation myth) and in the Paliuli of Waikāne.

## 2. Navigation

Mr. Wolfgramm who is particularly interested in Polynesian voyaging explained the importance of Waiāhole and Waikāne in the context of being a part of Kāne`ohe Bay, a significant rest spot and replenishing station for transoceanic voyagers, "...the thing is, this area, the whole bay was for voyaging, refurbishing, rest spot, and preparing to launch again. That's something most people neglect" (Interview with E. Wolfgramm, 12/3/01). Many natural features served as navigation points for the early Polynesian seafarers and few people recall many of these features. During an interview with Mr. Wolfgramm, he pointed out two points which were used by navigators to enter Kāne`ohe Bay.

Now that line goes right across, goes to Mokumanu and Mōkapu. And those are the eyes of the dragon, *mo`owahine*. That's actually her eyes. So when the navigators come in, they go towards Mokumanu. And they come in and slide through her body in the channel – comes into this bay. All this area here going towards Kualoa is where they rest. Any place along these places. So all the way down to Wai`āhole, Waikāne, Hakipu`u. (Interview with E. Wolfgramm, 12/3/01)

A *kama`āina* who has spent most of his seventy odd years in Waikāne, Alfred Morita, also remembered significant navigational landmarks in the area. Mr. Morita described one navigational landmark, Manu Kōlea. According to Mr. Morita, there are three stones located adjacent to the *hōlua* slide that represent the flight pattern of the *kōlea* bird. The stones represent the migratory path to Tahiti and were used for navigation purposes (Interview w/ A. Morita, 1/4/02). One of Mr. Morita's uncles, the late Ben Kamaka, led a field trip to the Manu Kōlea stones in the 1970s. The notes of the field trip describe the site as "a series of stones one is a guardian stone and a lower male and female rock that lined up with a marker to Maui where migrations were made, the Kōlea bird acted as a guardian on these voyages" (Napoka, 1977:1).

Near the border of Ka`alaea and Waiāhole, there is a formation of stones which, according to Mr. Wolfgramm, used to be in the form of a boat.

That was the ancestral boat that brought the people to settle this place from the South Pacific. But the guy who had a contract to rebuild this Kamehameha Highway— one of the overthrow gang—dismantled that boat. But he couldn't move these big babies here. So it's still there. (Interview with E. Wolfgramm, 12/3/01)

Most likely, Mr. Wolfgramm is referring to *nā wa`a li`ili`i kioloa*, the small, long narrow canoes brought over from Kahiki by La`amaikahiki, son of the famed voyager and progenitor Mō`ikeha (Kamakau in Sterling and Summers, 1978: 191). These canoes were thought to have brought the sands Onehuna, Onehali, Kaipuolea and Māhinahina to Hawai`i. When the canoes landed, they were turned to stone and through the ages, have been eroded by water, sun, salt, and wind. A strict *kapu* was placed on the stones until the stones were destroyed during road building of the Kamehameha Highway.

### 3. The *Kahuna* Lands O`ahu

In talking to the *kama`āina* of Waiāhole and Waikāne, it is not at first clear that anyone recalls the traditional significance of the *ahupua`a* of Waiāhole and Waikāne in the context of “*kahuna* lands”. The historic record reveals that all lands containing the word *wai* were given by Kamapua`a to the *kahuna* Lonoawohi (*Ka Nupepa Ku`oko`a* November 16, 1867). During an ethnographic study of Kualoa, Ko`olaupoko, O`ahu, one of the interviewees, Thelma Parish, converses and writes extensively about the priesthood of Pali-kū and the Sacred Lands of O`ahu (Interview with T. Parish, 7/27/98 in Shideler, 2000; *in preparation*). Ms. Parish identifies the sacred lands of O`ahu as the *ahupua`a* of Kualoa, Hakipu`u, Waikāne, Waiāhole and Apua and writes they have been declared sacred by the gods Kū, Kāne, Lono and Kanaloa. She writes:

The sacredness of these lands was confirmed by the ancient ali`i Kamapua`a, the demi-god, who declared that all lands whose name contain the word *wai* were to be held sacred and become the property of the priesthood. It was found that his precept was not very practical for the ali`i and their people simply because so many land names contained *wai* that very few good land areas were actually available to the royalty and their people. The precept was modified. (*Ibid*: 167)

Thelma Parish's mother, Libbie Nawahinekawai Peck Parish, was born and raised in Waikāne in the late nineteenth century, early twentieth century. According to Ms. Parish, her mother, better known as Lipi, was raised as the *mo`opuna punahele* of Ka`akaualani and her husband Kaukukālā.

Kauku-kālā was the *kahuna-nui* of these five sacred *ahupua`a* in recent times. He was born around 1822 and died 1920. His home was in Waikāne at the end of what we now know as Kamaka Lane. It was there that he received my mother as a tiny infant and reared her as his favorite *mo`opuna*. As the child grew older, she was Kauku-kālā's constant companion. He told her much about the sacred lands and took her to its most significant sites. (*Ibid*:168)

Kaukukālā was the great great grandfather of one of the interviewees for this study, Alfred (Kalei) Morita. Uncle Kalei remembers hearing about his great great grandfather Kaukukālā. When asked about the Kukuianiani Heiau located on Pu`u Pueo in Waikāne, Uncle Kalei recalled Kaukukālā:

KB: Tell me more about that *heiau*. How is that associated with your family?

AM: Well, that was like I said, a healing *heiau* and my great great grandfather Kauku-kālā was—and anytime anybody got sick, if anybody got sick in Waiāhole or Hakipu`u, Kahana and they'd go over there and I guess it was an old Hawaiian custom, they look into the eye whether they did something wrong or whatever and then they make the herbs, kind of herbs and how many days they gotta watch. When and what not. They'd chant and got spooky, make your hair stand up [laughter]. Every time I'd hear that chant, I'd run in the house. (Interview with A. Morita, 1/4/02)

As far as Uncle Kalei knows, the *kahuna* tradition was not passed down in the Kamaka family after Kaukukālā's time.

KB: So, did any of that pass down to your family, to your grandfather or any of your grandfather's brothers and sisters? Any of the *kahuna* tradition?

AM: No, nobody. Not one. Like I say, he was the one that I told you put the old lady Parish on the turtle.

The "old lady Parish" recalled by Uncle Kalei is Thelma Parish's mother, Lipi. According to Ms. Parish, Lipi learned late in her life that she had been bestowed the priesthood of Palikū (Interview w/ T. Parish, 7/27/98; in Shideler, 2000, *report under review*). Somehow, the *kahuna* tradition of the Sacred Lands of O`ahu lives on.

## **B. Ke Kai**

### **1. Ocean**

#### **a. The ocean and traditional lifestyles**

As we made our way into the communities of Waikāne and Waiāhole and invited people to talk to us, it soon became apparent that the ocean surrounding the study area has been an integral part of people's lives for generations and holds a special place in people's hearts. For many of the older generations, growing up in Waiāhole and Waikāne during the 1920's through the 1950s and 1960s, the ocean was the main source of sustenance, and many folks describe having to go out and fish almost daily in order to keep food on the table. Fishing and gathering seafood was not necessarily viewed as practicing Hawaiian culture or even as earning a living, it was just what the family did. Elizabeth Mahoe, who grew up gazing at Mokoli`i (Chinamen's Hat) from her *lanai* at Waiāhole (in the study area), describes what it was like growing up in the 1940s and 1950s:



EM: We make our own nets. We make our own lead. We make our own floaters. We make traps to catch fish for us to eat. We make lay nets to catch fish for us to eat. We dive for squid. We catch lobster. All our food was from the ocean. We would eat once a month from in town where we buy roast pork, char siu, pork chop, stew meat, hot dog. 'Cause we had no electricity. We cannot buy lot of food. Where we gonna put 'em. No ice box. No nothing. So, once a month, we go out there, buy, make one big pot of stew and that's what we eat. Other than that it's all lobster, healthy things. Lobster, fish, you know, all that kind of stuff. (Interview w/ E. Mahoe, 1/6/02).

Mr. Richard Paglinawan, of Waiāhole Valley, also grew up in the 1940s and 1950s. He describes the ocean and rivers as the family "bread basket":

I never knew we were poor until I went to McKinley High School. Then I found out – you know they get demographics and all that kind stuff – that I fall in that profile of being poor. But I never – [*Laughs.*] We always had food on the table because we wen' go out. And I oftentimes wondered how come we would go fishing nearly every day. If my mother can – and she was the one that – Not my father. My father worked Pearl Harbor. But my mother would take us out. We would go fishing and gather whatever off the land and the ocean and come home. And every weekend, even during the week – My mother had big family. We had an extended family. And from downtown they would come down and stay with us. So there was all these mouths to feed. And little did I realize that the reason my mother had us guys going out one o'clock in the morning, depending on the tide, is to go catch fish so that our family – we can all eat. So I never knew that – But like I said, there's always food on the table. We didn't know we was poor. So the reason for those activities was survival. And then whatever my dad made supplemented – you know, canned goods and stuff like that. Crackers, coffee, whatever it is. (Interview w/ R. Paglinawan, 11/26/01).

A contemporary of Mrs. Mahoe and Mr. Paglinawan, Mr. Felix Don Pacyau, Jr. spent much of his childhood fishing with his grandparents in the ocean off of the study area, which is where he grew up. His grandparents lived adjacent to the river, on the Waikāne side of the small bay separating Waiāhole and Waikāne. Uncle Don remembers that even in the hardest times, fish could be found.

I can go right out here. I know what to do, I can bring home fish. I guarantee you. 'Cause I go the simple way where if no can catch nothing, I just get one other *hīnālea* or other fish and I can take the rubbish fish and I can bring in something, you see. Guarantee something. Guaranteed fishing, *hīnālea* fishing. It's not really good fish to eat, but it's eatable. It's not like *kūmū*, it's not the kind, you know. *Hīnālea* is like what they call that rubbish fish. But it was not rubbish for our family those days. This was food. We can eat that for breakfast, lunch and dinner. We had to anyway. There was [always] something. But anything special, maybe once a week, our family (Interview w/ D. Pacyau, 11/30/01).

Fishing was usually done within the family unit. Informants describe going fishing

with grandparents, uncles, parents and siblings. By most accounts, fishing was not just limited to the men. Uncle Don Pacyau talks about his grandmother, Sarah Kaupe, rowing out in her boat and poking *tako* from the boat. "But, she went out on her own because look like she was, she was more strong than my grandfather, so she used to take the boat out and she used to catch *tako* too." (Interview w/ D. Pacyau, 11/30/01) The changing economics of the area may have been influenced changing roles as well. Richard Paglinawan pointed out his mother was in charge of the fishing and gathering while his father worked at Pearl Harbor. Aunty Elizabeth Mahoe fished alongside her brother to help feed the family and sell to the market while their father worked at Waikāne Pier during World War II.

## b. Ocean Resources

Talk story with the community and interviews of certain individuals of Waikāne and Waiāhole suggest that the waters surrounding the study area were once a spectacularly rich fishing ground and presently continue to be a good fishing area, although overfished. The waters between Kualoa Point (Ka Lae o ka `Oi`o) and Mōkapu were once called Ko`olau Bay, but are now known as Kāne`ohe Bay. Kāne`ohe Bay contains the only barrier reef in Hawai`i. The protected bay is a prime spot for schooling fish who come into the bay to feed and some of them to spawn in the calm waters. Net fishing is particularly popular in the waters of Kāne`ohe Bay (Figure 16).

When asked about fishing in Waiāhole and Waikāne, people became quite animated. Many varieties of fish were identified as being available in the waters fronting the study area including: *āholehole*, *pāpio*, *akule*, *kūmū*, *weke*, *awa*, *`ama* (mullet), *hīnālea*, *manini*, *palani*, *kala*, *alalauā*, *moi*, *he`e* (*tako*, squid), turtle, lobster and shark. Traditionally, the near shore environment was also a rich gathering area containing ocean shrimp, *`ōpae lōlō*, a variety of crabs including *kūhonu*, *`ala`eke* and *mo`ala*, Samoa crab, and the red or Hawaiian crab, and a few species of edible marine snails the *kūpe`e* and the *`olepe* several species of *limu* such as *manauea*, *`ele`ele* and *līpe`epe`e*. Further offshore, *limu līpoa* was collected.

### `Ama (*`ama`ama*, *Mugil cephalus* Linné)

The *`ama*, (mullet), is famed in this area. At Kualoa and Hakipu`u, *`ama* and *awa* were cultivated in the fishponds of Moli`i and Koholalele.

...This land had been very rich in the olden days and even to the present, because of running schools of mullet from Kaihuopalaai, the *awa* fish and mullets that had been kept and fattened in ponds. These good things of the land are long past. (Apuakehau, W.K., *Kuokoa*, July 18, 1919)

The waters of Kāne`ohe Bay are the ideal habitat for the *`ama*, which typically inhabit bays, harbors and estuaries, or brackish water environments where they feed off of the mud bottom and eat seaweed (Hosaka, 1973:87). Traditionally, *`ama* was one of the most important estuary fishes and was enjoyed for its delicious white flesh with few bones. Several individuals of Waikāne and Waiāhole, particularly the older residents who grew up in the 1930s recall large schools of mullet in the bay and in nearshore areas in the waters of Waiāhole and Waikāne.

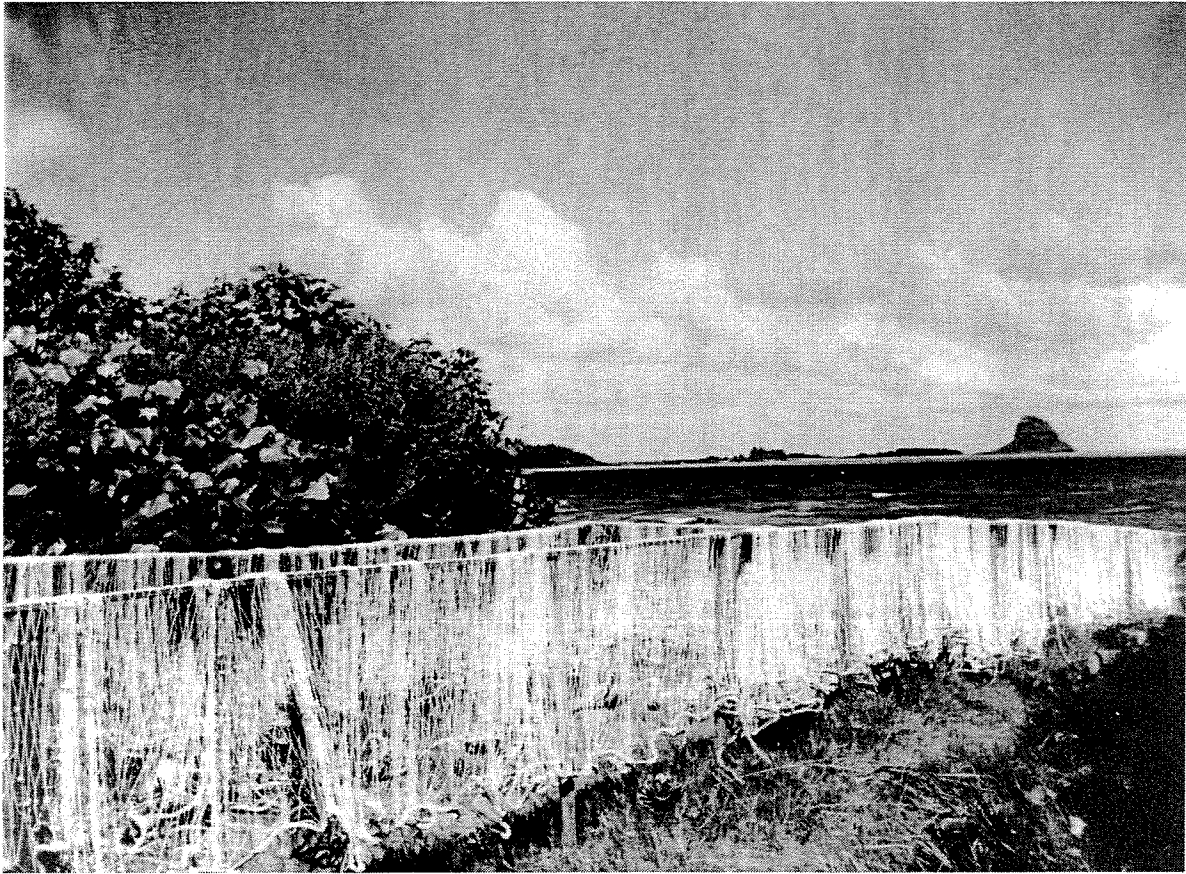


Figure 16 Nets Drying at Waikane (Kualoa Point and Chinaman's Hat in distance), Oahu, Hawaii, 1938 (Bishop Museum Archives).

Mrs. Incarnation Manatad came to live in Ka`alaea, Ko`olaupoko about 1929 from Honolulu. Born of Filipino immigrant parents of the Visayan Islands, she grew up farming the land. She met and married her fisherman husband in 1934 in Ka`alaea. From the land they leased from McCandless on the Ka`alaea–Waiāhole border, the Manatad family has been fishing for almost seventy years. Manatad described her late husband as the first commercial fisherman to catch mullet in Kāne`ohe Bay and one of the best. In the 1930s, Mr. Manatad was a captain for one of the sampans which was commercially fishing for *akule* in Kāne`ohe Bay. After the Manatads acquired their own boat, they went into business for themselves catching a variety of fish, mullet often making up the bulk of their catch. Manatad, as Mrs. Manatad likes to be called, learned about fishing while working alongside her husband. Here she describes how the whole family would get involved with mullet fishing:

KB: What about the different kinds of nets. You guys use different kind nets or ?

IM: No, only just that way and–for lay the net, we use the seven feet net. And then if you like go way outside, and you get the twenty feet sugi. That twenty feet–like maybe Hakipu`u, you get the mullet. All right, we surround the mullet over there with the twenty feet. But, when we go to the channel `cause sometimes the *akule* and the mullet go in the channel, then my husband, he order sixty, sixty feet [net] I think. `Cause by the channel, `as deep yeah? And then, `cause sometimes, the mullet, he stay in the channel. And then, we go to--fishing to Kokokahi, you know by the bay? We go get the mullet. That's the home of the mullet over there. And then, my husband, we order the net and then he make the lead and the floater. He order the net from Japan. And then we, my husband, he get the twenty feet and the sixty feet. When he go– you see how he look one school fish. He no go in the boat. He go in the shore and bring binoculars. He look and if the fish jump, then he come home. Then he tell the children, `oh, we go over there'. And we get the big boat, the 24 feet and with a fifty horse engine. Fast eh, go over there. Then they surround the fish. Then, when they surround the fish, I get this walkie talkie, you know the walkie talkie? And my husband get one. He says, `oh, get ready with the ice'. Then, I get my daughter, he [she drive]–the wife of my son-in-law. Then he [she] go buy the ice in He`eia Kea–they make–sell ice over there. Then, when they come in, we ready with the ice. That's what we do–ready the ice. We ice the fish. After we ice the fish, and then–the next morning we have to bring them to Tamashiro or we get other customer in the market. And then–like Eddie Pang, that's our customer. And then, they just buy the whole–sometimes my husband get about thousand pound, nine hundred pound. All depend how big the school. So, my husband he's a number one fisherman for catch mullet. And he's the first one that catch mullet, you see.(Interview w/ I. Manatad, 12/19/01)

In conjunction with the surround net or lay net to catch `ama, the *pa`i pa`i* was also used. *Pa`i* literally means to hit and *pa`i pa`i* in fishing referred to hitting the water to

scare the fish into the net. According to Manatad, *pa`i pa`i* is also called “bang bang”. One old timer, born in 1916 in Waikāne, George Hoaeae, recalls the *pa`i pa`i* being used to catch mullet and how the mullet would jump over the net:

GH: No, you go way outside. Kind a pretty far side. Sometime the fish, he stay outside see. You gotta go get ‘em. Then you get one guy with you on this side, one guy on the other side. You make big noise, the fish no come back, he go in the net, see. He stay in there. But, if you don’t make noise, he run, he come back. But, you get guys in front of you chase ‘em and then he stay back, he don’t come, he don’t come out, he stay in the back there until they get caught, until you get ‘em up on the shoreline here. In fact, we used to drag ‘em in the shoreline. Before we drag ‘em to the shoreline. My brother and my dad say, ‘no, no, no, no good. We chase ‘em all inside and right in the water mo’ bettah.’ The net stay up, see. And we would get ‘em up on the shoreline and then drop down or you had to hold ‘em up ‘cause the fish, he might come back and he jump across. He jump over the net you know. They leap over. They leap over the net, the fish. But only the mullet, that’s the only fish, he leap over the neat. The other fishes don’t, it doesn’t. Only mullet. When he hit up the shoreline, he cannot get out, and when he go back, that’s when he going over the net. They’re smart too you know. But, all other fishes don’t, they never jump. (Interview w/ G. Hoaeae, 1/18/02)

According to Manatad, some of the best places to lay net in Kāne`ohe were Kokokahi (near the present day YMCA in Kāne`ohe), Hakipu`u and Kahalu`u. The conditions in these areas are ideal for mullet and traditionally Hawaiians took advantage of these conditions by building fishponds in these locations. For home consumption, Mr. Hoaeae recalls the ocean near the mouths of the Waiāhole and the other stream, as being excellent fishing grounds for mullet.

KB: So, right at the mouth of the river was good.

GH: Oh, the mouth of the river, or little bit out yeah, better because inside kinda too much rock. But, I used to go throw net right in there. By golly over there, get big kind fish too, big mullets, good size. Oh yeah. I don’t know about now. I don’t know if somebody go over there, go throw net. I used to go ohh myy, I used to go sneak inside the bush. (Interview w/ G.Hoaeae, 1/18/02).

*Kūmū and weke* (*kūmū*, goat fish, *Parupeneus porphyreus*; *weke* (certain species of *Mullidae*, surmulletts; *weke`ula*, *Mullocichthys auriflamma*)

*Kūmū* and *weke* are mentioned as a popular fish caught in the waters near Waiāhole and Waikāne. In addition to the *āhole*, *ama`ama*, *anae*, *humuhumunukunukuapua`a*, and the *puala*, the *kūmū* was considered a *pua`a kai* or sea pig, used as a substitute for a pig when a *kahuna* required an offering (Pukui and Elbert, 1986:345). In the past, certain species of *weke* are linked to having caused nightmares, visions and even delirium

(Titcomb, 1972:161)

The flesh of the head of some *weke* has a poisonous quality. Those who eat it have restless sleep or nightmare in which the sensation is one of having lost balance, and especially one of feeling that the head is lower than the feet and it is impossible to get it back to level as one is lying down.

These strange symptoms seem to be associated particularly with the *weke pahulu*. In the legend of Pahulu, the chief of ghosts, Pahulu was apparently a human chief who was killed and lives on “in the itching caused by certain fish” (in Titcomb, 1972:162).

Both *weke`ula* and *kūmū* are found in shallow reefs and both are considered excellent eating fish (Hosaka, 1973:126, 130). Kamakau recorded various traditional methods for catching *kūmū* including `a`ei nets (fine meshed bag nets with side sticks often used from canoes), dive fishing (with *melomelo* nets or dive nets—also used in fishing for *weke*) and torch fishing (Kamakau, 1976:60,62, 80). Mr. Pacyau’s younger sister, Diane Obedoza-Ahrens recalls going torch fishing from their home on the Waikāne shore.

DAO: So, that and I know he [brother Don] used to take me torching and I used to be freezing, but I went. It was really fun. What was the conditions was no moon yeah and the water the still, like glass. And we would go walking all the way down, I don’t know where we going, holding the torch like that. They would take me for go torching for stuff. I don’t know what kind fish we caught.

DP: We caught *weke* like that, *kūmū* And the reason why you go out when the moon is, no moon ‘cause the fish freeze up yeah, the fish sleep, so easier for poke. When you get moon, the fish always on the alert, they don’t sleep. That’s the reason we go out dark, no more moon.(Interview w/ D. Pacyau, 11/30/01)

In the first part of the twentieth century, torch fishing, also known as *lama lama* fishing was done with a type of kerosene lantern known as a *kukui hele pō*. The lantern basically consisted of a brass pipe covered with a burlap bag drenched in kerosene. The name *kukui hele pō* comes from the original source of lanterns for the Hawaiians which was the oil of the *kukui* nut.

*Hīnālea* (*Thalassoma ballieui*, *Coris gaimardi*, *Gomphosus vicarius* and other Families & species)

Hosaka (1973:149) gives the following description of the *hīnālea*, “the flesh is rather soft and is tasteless. When caught the fish is usually thrown back into the sea. If saved for eating, the best way to prepare it is to cut it into large pieces and make fish chowder”. Similarly, one of our interviewees described the *hīnālea* as a “rubbish fish”, although he points out that in hard times, his family would eat the fish.(Interview w/ Pacyau, 11/30/01) The written historic record, however, suggests that *hīnālea* held more significance in

traditional lifestyles. Malo lists the *hīnālea* as one of several excellent eating fish (Malo, 1951:46). Fornander describes the *hīnālea* as a “choice fish” (Fornander, 1918-1919: 112). In Fornander’s account of the Legend of Kuapakaa, Pakaa teaches his son Kuapakaa how to temper the bitter taste of *awa* with the *hīnālea* when serving a king.

After you have strained the awa into the cup, hand the cup to your master, then run as fast as you can to the pool where we keep the hinalea and catch two for your master, for he would want the fish to take away the bitter taste of the awa from his mouth (*Ibid.*: 114).

In legend, the *hīnālea* fish is derived from the pieces of two supernatural beings who were torn to bits by an *ē`epa* woman who discovered that the two supernatural beings had been aiding her disloyal husband (Kamakau in Titcomb, 1972: 78). Titcomb also discusses the use of the *hīnālea* as an offering in invoking Kū and Hina when pregnancy was desired (*Ibid.*: 77-78).

In *Shore Fishing in Hawaii*, Hosaka records the common way of catching *hīnālea* is by using shrimp on a hook (1973:148). One of the individuals we interviewed whose family fished in the waters off of the study area remembers his family eating *hīnālea* if there was nothing else to eat. When asked about bait used in fishing, Uncle Don relates this humorous story:

we used to take—you see this is kind of jokly kind, but we used to bring rice yeah outside, cooked rice. So, get the *hinalea*. *Hinalea*, they ate anything, you know that fish. So, we used to bring that, we catch one or two with that, with the cooked rice. And after that, we use the same fish, we cut ‘em up in pieces and we use him as bait. You see. Yeah, *hinalea* bite their own thing [laughter]. That sounds a joke, but that’s true. But, *hinalea* will eat anything. But, that’s part of our life, you know that food. (Interview w/ D. Pacyau, 11/30/01)

*Alalauā* (or *Alalauwā*, young of the *aweoweo*, Priacanthus sp.)

The *alalauā* is a term used for the young stages of the *aweoweo*, sometimes known as big-eye. *Alalauā* sometimes appear in Hawai‘i’s harbors and bays in large schools (Titcomb, 1972:70). In the Hawaiian memory, certain years are marked by the arrival of great schools of *alalauā*. One such year was 1873 when the Hawaiian newspaper *Ka Nuhou* reported two to three thousand people in Honolulu harbor hooking fish. Mark Kawena Pukui translates the story of the arrival of a great school of *alalauā*:

As soon as the hook and bait could be cast into the water the fish would bite and be hauled in. They were mostly very small, varying from an ounce or two to half a pound (Pukui in Titcomb, 1972:70).

The arrival of another large school of *`alalauā* is recorded in Lā'ie in 1917 (*Ibid*). Waikāne also received its share of *`alalauā* and George Hoaeae, born 1916, remembers congregating at the Waikāne Pier to hook great numbers of this fish.

KB: Plenty people used to go down to the wharf to go fishing?

GH: Oh yeah, nighttime. Because she get some, you know—come to the year, he get this—they call—almost like *`āweoweo*, but they call them *`alalauā*. Oh the color almost like 'em, but more smaller than *`āweoweo*. Loaded.

KB: And what is it called?

GH: *`Āweoweo*. *`Alalauā*.

KB: *`Alalauā*.

GH: Yeah, oh loaded, loaded.

KB: Certain time of year?

GH: You go by the bridge, drop your bag.

KB: You hook 'em.

GH: Oh yeah. Piles, oh loaded. You try shine the light, ohh, loaded. Well, he get season 'as why.

Interestingly enough, there was also a correlation between *`alalauā* and royalty. Malo (1951:7) notes the significance behind the arrival of schools of *`alalauā*. “The appearance of the *`āweoweo*, also called *ala-lau-a*, in large numbers about the harbor of Honolulu was formerly regarded as an omen of death to some *ali`i*.” Uncle George (Hoaeae) of Waikāne speaks of a connection between royalty and the *`alalauā*:

GH: Oh yeah. Piles, oh loaded. You try shine the light, ohh, loaded. Well, he get season 'as why. I don't know who—who carry that fish when he come to one king or queen, between that king or queen, that fish come. Depend. 'As how it goes see.

KB: I don't understand.

GH: Get someone can tell you the story better than me. What I hear, 'as what I say. But what I see, 'as what I gonna tell you. But if I don't see, I not gonna tell you because I no like give you false alarm. 'As no good. But what I seen and what I do because I be *huki* that *alalauā*. We go nighttime. Plenty. It get certain time in the year that thing come and certain time, no more.



KB: And how you know which time?

GH: Ohhh, I forget girlie. I don't wanna give you false alarm. My dad used to tell us you know. Like them, they know, you know. They is certain time in the year and certain time in the year, no more. And certain time got. Depend who was the queen and who was the king. See, 'as how that fish come in. That fish is queen, no king.

Although Uncle George's memory of the story behind the *`alalauā* is not altogether clear, he does recall the connection between the *`alalauā* and the king and queen, something which just appears in history books for the most of us.

Squid, He`e, Tako (*Octopus marmoratus*, *Octopus ornatus* and others)

Of all the types of fishing, squidding, also referred to as tako-ing, seems to have been one of the most popular amongst the residents of Waiāhole and Waikāne. Historic records suggest squid was once an abundant resource in the region. One document consisting of a king's list of Koolaupoko lands and their respective *kapu* fish lists squid as a *kapu* fish for Waiāhole *Ahupua`a* in the mid 1800s (in Devaney, Kelly, Lee and Motteler, 1982:136). This suggests that squid was a prized resource and much in demand. Even up until the 1940s, large amounts of squid could be found in the waters off of Waiāhole and Waikāne. Mrs. Mahoe, who lived in the study area, would dive with her brother for squid to sell to the market:

We did everything by hand, my brother and I. We work like a horse and we took care our—helped my dad out because he was working too and he couldn't get all that burden on him. And we'd help him take all the sale things out—he'd catch the taxi and he'd go. Like we'd dive for squid too, hundred pounds, two hundred pounds. He'd take 'em up to market, he'd sell 'em. Then once in a while, he'd buy us treats, you know. (Interview w/ E. Mahoe, 1/6/02)

Besides diving for squid or *tako*, another common method for bringing up squid was by spearing it from a boat. The idea was to balance the boat, hold the boat steady, identify the squid and spear the squid, all at the same time. This is how Uncle Kalei described learning to poke squid from his grandfather, "You gotta poke the boat, hold the boat with one pole and the other, with the right hand you poke the spear—without going into the water now. All from the boat." (Interview w/ A. Morita, 1/4/02). Uncle Don also learned to poke *tako* from his boat from his Hawaiian grandfather.

DP: Oh, we used to go, my grandfather used to go what you call, squidding, *takoing*, you know catch squid. Those days, no more the outboard motor so I used to row the boat for him. I took him out, he always tell me for row him because I was kind of husky back then. I row him out there and then he used to go poke *tako* from the boat, you know. And then, the bad thing is, he show the *tako* right there and he point to them and I cannot see. And he put the spear right by the *tako* and right there, and he tell me 'look', I 'look'. Even

though I bend over and look, I cannot see 'em. And yet, my grandfather had one eye. That's what I used to do, row the boat for him, 'cause he was kind of old already too, yeah. Even my grandmother used to go fishing too, catch *tako* too. Yeah. Hard to believe that, but she went out too. But, she went out on her own because look like she was, she was more strong than my grandfather, so she used to take the boat out and she used to catch *tako* too. (Interview w/ D. Pacyau, 11/30/01)

In preparing the squid, one must first *lomi he'e* or squeeze and pound the squid to soften the meat (Ahuna, 1977:8). Uncle George Hoaeae explains how to prepare the squid for eating:

GH: I mix 'em up with the squid. By golly, go get 'em. Yeah. But you have to pound the squid to get 'em soft. If not, cannot. Until the leg all curl up, all curl up, you have to pound soft. You get the teeth there, you gotta stick the salt in the teeth so kill 'em. If not, hard time for come curl up, hard time.

KB: So, you stick salt in the teeth?

GH: Yeah, you get da teeth right under here, the black one. You put salt in there, kill 'em. And then, the squid turn white, not red. Then you know that squid is dead and then the squid going come and he going be curl. If not he don't curl. If the color don't change, no, he don't curl. 'Cause stay alive.

KB: How long take for curl?

GH: Oh, 'as when you get the salt in –you know where the teeth is? Oh, take about five minutes, it's *pau* already. Then you see the color changing, you see the color changing, all the red part all draining away. You see 'em all disappearing. And then you see all white. That's when you pound 'em, turn all the what you call—the legs all come curl up. But in Hawaiian *'awe'awe*, 'as the leg. The squid, in Hawaiian they call the leg *'awe'awe*, that's the leg.

KB: Which kind *limu* you eat with the squid?

GH: Oh, either one that you like, either one. If you like the *maunaea* or you like the *limu 'ele'ele*, up to you. You like *lipoa*, oh yeah the smell kind. (Interview w/ G. Hoaeae, 1/18/02)

### Turtle, *Honu*

Before the prohibition of catching turtles in the late 1970s, turtles were often fished in the waters of Ko'olaupoko. People growing up in the fifties and sixties in Wai'āhole and Waikāne recall eating turtle, which some say is comparable to eating chicken. Malo considers *honu* excellent eating and also describes the utility of its shell in fabricating scraping instruments for *olonā* and most recently for making combs (Malo, 1951: 47). The

fishing family at the southern end of Waiāhole, the Manatad family used to catch turtle commercially in Kāne`ohe Bay. The Mahoe family, living at the shore in Wai`āhole, also caught turtle for the market. Mrs. Mahoe talked about how her father used to have a turtle pen in front of the house. She explained that the family would catch and place the turtles in the pen, to keep them fresh until they were ready to sell. (pers. communication E. Mahoe, 1/12/02).

The Mahoe family often caught turtles when laying net for other fish. Another method of catching turtles was by using your body to propel them to shore. Uncle George Hoaeae stressed that he had only tried catching by this method a few times, and therefore was no expert. But he does remember that you had to grab on to the turtles front fins, otherwise the turtle would dive. If you could grab the turtle's front fins and restrain it, the turtle would keep using his back flippers and you could use the front flippers like a steering wheel to steer the turtle to shore (pers. communication G. Hoaeae, 1/28/02).

Shark, *Manō* (*Carcharodon carcharias*, *Isurus glaucus*, *Galeocerdo arcticus*, *Glyphis glaucus*, *Eulamia sorrah*, *Eulamia melanopterus*, *Sphryna zygaena* and others; *Spyhryna zygaena* common as in Kāne`ohe Bay; Titcomb1972:106)

Two of the interviewees spoke of eating shark. Uncle George Hoaeae recalled watching his father prepare the shark to eat. He remembered his father bleeding the shark and then cutting it into strips to dry (pers. communication George Hoaeae, 1/28/02). According to Uncle George, shark was available in the area, but his family did not fish for it. On the other hand, Aunt Elizabeth Mahoe's family were avid fishermen of shark, catching most of their sharks with nets. Their principle way of preparing shark was to make fishcake. When asked about her family home, Aunt Elizabeth Mahoe spoke of her grandparents lifestyle fishing:

KB: So, tell me about that place where you used to live. Where exactly was it? I know you already told me, but tell me again.

EM: It's in the back, *makai* part by the water 'cause that's where my grandparents was living because they were fishermen. They loved to fish. They trap, they lay nets, they catch turtles, everything. They're the fishermen. That's why I can't see today, when they stop the sharks, people cannot sell it. We ate fishcake from the shark for hundred years. Not one of us died. That was the best fishcake out. (Interview w/ E. Mahoe, 1/6/02).

#### `Ōpae kai (Decapod)

Along with various types of crab, the `ōpae kai or sea shrimp seems to be one of the most favored *i`a* (marine resource food) gathered in nearshore environments in Waiāhole and Waikāne. `Ōpae kai is a term referring to any type of sea shrimp (Titcomb, 1979: 357). Those consulted referred to `ōpae kai using many names including rock `ōpae, `ōpae lōlō (*Penaeus marginatus*), `ōpae, `ōpae huli, and salt water `ōpae. One interviewee talked of two different types of sea shrimp, the `ōpae lōlō and the `ōpae huli, a sea shrimp smaller

than the `ōpae lōlō (Interview w/ G.Hoaeae, 1/18/02). It is uncertain whether everyone meant the `ōpae lōlō or not, however from their description of the shrimp habitat and the methods of catching, it is assumed that most people were talking about the `ōpae lōlō.

Many of the *kama`āina* growing up in this area talk about gathering `ōpae lōlō as kids along the shoreline of the study area. The residents remark on how plentiful and large the shrimp were back in the fifties and sixties. As adults now, some realize how ideal the `ōpae lōlō were at the time. These shrimp were easy to catch and abundant and provided little kids an excellent way to fill a hungry little `ōpū. Aunty Elizabeth Mahoe describes how she and her brother would catch `ōpae lōlō:

Then, `ōpae, rock `ōpae, put the rocks together and then they all go in the rocks and we take our `ōpae net, push 'em underneath, my brother carry the rocks, shake it out, I push the net underneath. We catch one big pot full, wash 'em up, dry 'em, fry 'em with olive oil or whatevah, wesson oil, whatevah. We never starve. This is what I'm trying to say. If we hungry, we either in the taro patch catching crayfish which I call miniature lobster tail or we in the ocean catching the other `ōpae and that's what we did.  
(Interview w/ E. Mahoe, 1/6/02)

Another resident who grew up fishing along the shore of the study area, Richard Paglinawan, recalls fishing for `ōpae in the `aki `aki (*Sporobolus virginicus*) grass growing on the shoreline. This coarse grass generally grows on sandy shores and offered a good hiding place for the `ōpae (Figure 17).

And `aki`aki grass grew right over here. `Aki`aki grass all along here, here, here was `aki`aki grass. No mo' the bushes that you get now. The `aki`aki grass. The reason why I mention it because that's where we used to go catch `ōpae – you know, the salt-water `ōpae, the one you can see through. There would be plenty underneath the grass. You lift up the grass. You shove your `ōpae net under there. Oh, man. To me that was real *ono*, yeah.(Interview w/ R. Paglinawan, 11/26/01)

`ōpae were generally found in grasses along the shore and under rocks, anywhere they could find some protection from the open water. In more recent times, a new habitat was created for the `ōpae lōlō and other crustaceans such as crabs. One resident reported that about twenty five years ago, people had placed old tires in the water with metal pegs in the middle as markers (Interview w/ D. Pacyau, 11/30/01). These tires made it easier for people to know where to locate the crabs and shrimp quickly, thus saving on the effort it took to search for them. People still complain about the rusting metal pegs in the water.

The `ōpae net was probably the most common way to catch `ōpae lōlō, however other methods were indicated during talk story sessions. A sister and brother described using a push push net to catch `ōpae lōlō. The following is a description of the net and its use:

DAO: [Asking her brother Don] Didn't you used to make those nets, you call it push push nets. Just individual kind where you just make this net that's

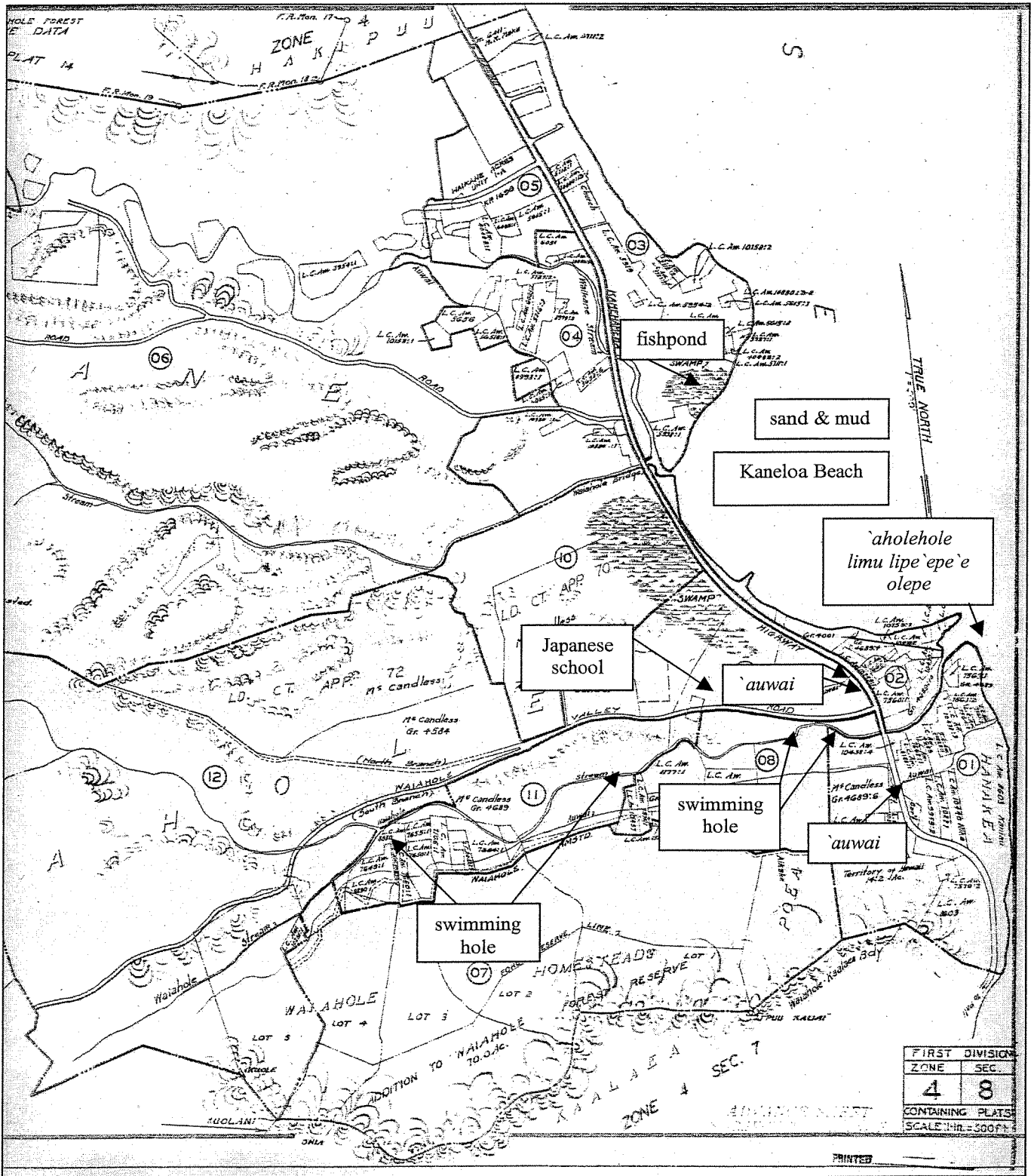


Figure 17 Approximate Location of Features Described by Mr. Paglinawan.

looks like a triangle and two poles and at the end, you would get coconuts and chop 'em in half and make like shoe. So it's round like this already so it'll just go like this on the ground. But, yet, the net is open and whatever you just touch, and then you just put it on the bottom of the ocean and then—near the shore— and you pick up stuff and then you shake 'em out. (Interview w/ D. Pacyau, 11/30/01)

On occasion, Uncle George Hoaeae could expect to pick up `ōpae lōlō in his drag net, the “big ones”.

#### Kūpe`e and `Ōlepe ((*Nerita polita* and Bivalves various)

*Kūpe`e* is a type of edible marine snail and the `ōlepe is an edible marine clam (Titcomb, 1979). are harvested at certain times of the year according to the moon (pers. communication w/ H. Salas, 11/29/01). Ahuna (1977:10) suggests that the best night to harvest *kūpe`e* is on the night of the first quarter moon. Richard Paglinawan specifies the habitat of the *kūpe`e* is the rocky shoreline while the `ōlepe prefer the muddy bottom in between the rocks. Paglinawan gives some advice on how to gather *kūpe`e*:

I don't know if you know how to catch *kūpe`e* but as you walking along, you usually don't go during moonlit night. You go black night, yeah. And as you walking along, of course you have torches. Our torches was more of a brass pipe with burlap bag and kerosene. And as you walking along, as you getting kinda close to 'em, they see the light. From the top of the rock they would unloosen themselves and they'd fall down. So you hear this trickling effect. Cling, cling, cling, cling. And you know it's *kūpe`e* because plenty of 'em. Cling, cling, cling...Sometime they turn over, you can see the white side, eh.

So easy to pick up. But that's how we used to pick up. And the kids would line up. The old fogeys would hold the torches. The young kids, they were the mobile ones. They would move around and pick up and so forth, like that. (Interview w/ R. Paglinawan, 11/26/01)

One source suggests not talking while harvesting *kūpe`e*, “for they will fall off the rocks making it difficult to find them” (Ahuna, 1977:10). Historic records suggest the `ōlepe was generally eaten raw, the slime removed with salt water (Titcomb, 1979: 350). This method of cleaning the `ōlepe is reiterated by Mr. Paglinawan who mentions the `ōlepe needed multiple rinsings before it was edible. He did not specify whether the `ōlepe was eaten raw or cooked. *Kūpe`e* is consumed both raw and cooked, depending on the locality and the palate. The Paglinawan `ohana ate their *kūpe`e* raw, apparently “by the five-gallon bucket”.

#### Crabs (Gastropods various)

Oral accounts attest to the importance of crabbing in Waiāhole and Waikāne. Crabbing continues to be very popular in the vicinity of the study area. Even during intermittent site visits to the study area, there have been families parked at the existing Waiāhole Beach Park, adults and children with their crab nets wading through the

shallow, rocky nearshore waters. Conditions are favorable for certain species of crabs as their preferred habitat is rocky shoreline in calm, shallow murky waters. Several types of crabs are sought in the waters fronting the study area. Names given for the crabs include *kūhonu* (*Portunus sanguinolentus*), *mo`ala* (*Podophthalmus vigil*), *`ala`eke*, *pokipoki* (Family Calappidae)), Samoan crab, red crab or Hawaiian crab and white crab or *haole* crab.

The *kūhonu* (*Portunus sanguinolentus*) is also known as the white crab or *haole* crab (Hoover, 1998:276), a term of use with the younger generations. This is one of the most sought after crabs in Waiāhole and Waikāne. The Samoan crab (*Scylla serrata*) is another popular crab, which is often found in the brackish waters at the mouths of the Waiāhole and Waikāne Rivers, even up river. One *kama`āina* has seen Samoan crab near the Waikāne Bridge, a good ways up the river. This person describes how the Samoan crab would go after bait meant to catch the *`o`opu* (Interview w/ D. Pacyau, 11/30/01). A third type of crab caught was the *`ala`eke*. Several species are combined under the general name of *`ala`eke* including *Portunus granulatus*, *P. orbicularis*, *Charybdis orientalis*, *C. erythroductyla* (Titcomb, 1979:363). It is uncertain which species correlates to the *`ala`eke* of Waikāne and Waiāhole, although Mr. Richard Paglinawan describes the crab as a cross between a Samoan and a *kūhonu* crab and small in size. *Mo`ala* (*Podophthalmus vigil*) is described as being a rare crab, found more towards Waikāne (Interview w/ R. Paglinawan, 11/26/01). An informant for Titcomb's *Native Use of Marine Invertebrates in Old Hawaii*, Lahilahi Webb, describes the significance of the *mo`ala* to the inland people:

This was the crab that the mountain or inland people got when they came to the shore, 'crab hungry'. This lasts longer than the *kuahonu* [*kūhonu*], which is another common crab but which has to be eaten right away. They would take a goodly number with them back to the mountains, and eat one a day. The *mo`ala* lasts a month or so, lightly salted and packed in a calabash (1979:369).

The ocean conditions fronting the study area are favorable for the *mo`ala* who prefer brackish, muddy waters (Hoover, 1998: 275). It is unknown which species of crab the red or Hawaiian crab correlates to. It may indicate the Hawaiian swimming crab (*Charybdis hawaiiensis*) which is the most common large, swimming crab on Hawaiian reefs (*Ibid*: 274).

Nowadays, the most common method of catching crab is with a crab net and bait. In times past, however, crabs were often caught with something akin to a sling shot stick. Uncle George Hoaeae describes the sling shot stick method of crabbing:

GH: Well, you gotta cut 'em kinda pretty long, the handle with the V stay in front. That much long the stick, so you can hold it [indicating with his hands]. And when you see 'em, the teeth, the crab with the teeth open, you catch right in between here. That's how we catch our crab, nighttime, that's for night, with a lamp.(Interview w/ G. Hoaeae, 1/4/02)

As for baiting crab, one experienced local crabber suggests using the most *pilau* [stinky] thing you can find such as rotten *awa* fish (pers. communication w/ R. Santos, 12/7/01).

Local residents described eating crab both raw and cooked. Mr. Santos talked of preparing crab with *limu kohu* and *kukui* nut depending on your taste. He explained that when lots of crab was needed for parties, particularly baby *luau*, he would freeze the crab. It was important not to wash the crab in fresh water when freezing and the crab shouldn't be frozen for longer than one or two weeks (pers. communication w/ R. Santos, 12/7/01). Uncle George Hoaeae's preferred way of preparing *kūhonu* was by boiling, although he does also eat them raw. He discusses how important it is to clean the crab if it is to be eaten raw:

GH: ... For raw, you gotta clean, you have to take 'em out. He get stuff inside too you know. He get da kind of stuff, both side. Seem like cushion or what something li' dat. You have to take that one out and something in the center. You have to take 'em out—bitter taste. You gotta clean 'em good. Underneath here, get one other piece. Underneath here, so you gotta take 'em out. (Interview w/ G. Hoaeae, 1/18/02).

### Limu

*Limu* is still collected on the Waiāhole, Waikāne coastline, although people feel quantities have diminished substantially. Two of the most common types of *limu* gathered in former decades were the *manauea* and the `ele`ele. *Limu manauea* was often gathered near the Waikāne Pier and outside near the reef (Interview w/ D. Pacyau, 11/30/01). The *manauea* is often referred to by its Japanese name, *ogo* (Abbott and Williamson, 1974:17).

Uncle Don Pacyau describes the *limu`ele`ele* as a hairy *limu* found at the river mouth. *Limu`ele`ele* is also known to be found growing at the opening of underwater springs in the ocean (Abbott and Williamson, 1974:10). Uncle George Hoaeae explains how to prepare the *limu`ele`ele*:

KB: What about *limu*, you wen' collect *limu*?

GH: Oh, the kind black *limu*, the river way down, right outside there, yeah get. Plenty, what they call dat, *manauea*. And then they get the *limu`ele`ele*. Get, but that *limu*, yeah, get.

KB: And what you used to use the *limu* for?

GH: We eat 'em. You gotta clean with salt and when the *limu* came red, 'as the time to eat. Too new, kinda pretty hard, eh. You have to chew. But you leave 'em one day, next day you eat. Soft.

KB: One day in salt water.

GH: Well, you clean up and let the salt water, the salt, 'as what make the



gravy. Oh by golly, it tastes good. He turn red, the color.

KB: That's the *manauea*?

GH: No, the *limu`ele`ele*. *Manauea*, no he no turn that much red. But, I like eat 'em when they're fresh—I don't wanna get a lot of mushy. Not too good.  
(Interview w/ G. Hoaeae, 1/18/02)

The other two varieties of *limu* which were linked to this area, the *limu lipe`epe`e* and the *limu lipoa* are not as well known. No information regarding habitat and preparation was obtained for the *lipe`epe`e*. One informant recalled gathering *lipoa* on Mokoli'i (Interview w/ G.Hoaeae, 1/18/02). He referred to this *limu* as the "smell kind" and warned that one had to be careful not to get pounded by the surf when collecting this *limu* on the *makai* side of Mokoli'i. Uncle George Hoaeae related that *limu* was eaten with everything from squid to fish, with *poi*, with shrimp or just by itself, whichever way you like.

### c. Fishing Grounds

Talking about fishing grounds can be a touchy subject. Traditionally, Hawaiian fishermen fiercely "guarded their rights to certain fishing grounds and kept their techniques and fishing spots secret" (Kawaharada, 1992:xxi). The secrecy persists and people are weary of revealing too much. One has only to be sensitive to a long pause, a general statement or even a swift change of subject to know that some things are better left unasked. Kamakau attributed the loss of fishing tradition to this guardedness. "That is why most of the fishing grounds of *ka po`e kahiko* are unknown to their descendants and their locations have been lost" (Kamakau, 1976:79).

For the *kama`āina* of Waiāhole and Waikāne who continue to fish today, the fishing grounds which have been passed down through the generations seem to adhere to laws set forth long ago. One informant specified the area between the Waiāhole-Ka`alaea border to Kualoa Point (Ka Lae o ka `Oi`o) as the fishing ground for "home use".(Interview w/ D.Pacyau, 11/30/01) Most everyone else who spoke of fishing referred to fishing within this area. The only exception was Mrs. Manatad who has traveled all over Kāne`ohe Bay seeking fish for her family's commercial fishing ventures. In Mrs. Manatad's experience, each fish has a special habitat, or "home" and if you want to catch a certain type of fish, you must search for its home. In her own words:

All right, but me when I lay—my husband he teach me. When you lay in the shore, the fish you like, like *papio*, the *papio*, he stay in a sand place. All right, the mullet, he stay in the mud place, you see. And *weke*, he stay in a stone place, the *weke*. He got white *weke*, he got red *weke*. The red *weke* always stay outside way in the deep. But the white *weke* over here by the shallow. So, that's how we know where the place. And some, they like, most Filipino, they like *palani*, you know. And then, where the *palani*, he stay in the stone place. Then you lay your net in the stone place, then you get the *palani*. So, we get all kind. You know all kind of fish, they get different home, you see.(Interview w/ I. Manatad, 12/19/01).

The following are names for places, *papa* [reefs], or references to accessing fishing areas were gleaned from the interviews. The place names are a reflection of the English and Filipino (Visaya) influence on the fisher families of this region.

**Monohiki:** described by Uncle Kalei [Alfred Morita] as a large flat area in the ocean of Waikāne with a deep pond on the inside, good for catching lobster and squid.

**Kaneloa:** the little bay separating the *makai* lands of Waiāhole and Waikāne. This bay includes stream mouths of the Waiāhole and the Waike`eke`e/Waikāne Rivers. Only one informant refers to this area by name, although several others know it as an excellent fishing ground. More than one informant recall using the *huki huki* net or drag net in this bay. With the estuary like conditions creating a rich eco-system, many types of fish, crustaceans and seaweeds were collected from this area. Kaneloa is also the name of the `ili just *mauka* of the bay.

**Hanakea:** Mr. Paglinawan described this as an area of mudflats which was a good fishing ground. In a 1923 list of Ko`olaupoko fishing rights, Link McCandless was listed as the owner of fishing rights in Hanakea (Devaney *et al.*, 1975). Hanakea is also a name used for an `ili in Waiāhole, located south of Waiāhole river and *makai* of Kamehameha Highway.

**Crosspin Papa/ Moku 1/Moku 2 :** For geographical references when one is fishing, Uncle Don Pacyau pointed out what was formerly called “Crosspin papa”:

DP: Okay. Remember, I told you about railroad track. See that pole out there. Get one *papa*, see we call ‘em *papa*, one round shallow place. We used to call that place “crosspin” because we had, I told you we had that fish crosspin. So we used to name that “crosspin *papa*” okay. After the crosspin went down and then no more identification again, so my grandfather told us the name regularly was—get two reefs over there. One in the front where the crosspin used to be “moku 1” or “moku 2” or something like that. And get one more in the front. Looks like it’s related kind reef, one is deep and one is shallow. Get two names anyway. So we scared go in front the reef because they say they get all kind stuff over there, like sharks hanging around there ‘cause that *papa* is deep and giant sting ray like that. So, we usually go in the front one where the fish cross used to be...(Interview w/ D.Pacyau, 11/30/01)

**Spooky Reef:** described as a dark black reef outside of Waiāhole. Another informant called it a dark blue channel.

**Circle Blue:** name of a reef which has a flat area, shaped like an egg, with a deeper blue area in the middle. Supposed home of the giant sting ray.

**Iscalon:** name of a *poepoe* [Visaya Filipino for reef] where the *akule* are found. This name was given to the reef by Mr. Candido Manatad, who fished in the Kāne`ohe Bay for some seventy years.

**Serena:** name of a *poepoe* where the *akule* are found. This name was given to the reef by

Mr. Candido Manatad (See Iscalon).

**Mokoli`i:** also known as Chinamen's Hat. Mokoli`i was mentioned as a fishing ground to families of Waikāne. Uncle George Hoaeae, of Waikāne, recalls the *limu līpoa* growing on the *makai* side of Mokoli`i. He also added that if one is patient enough to wait for calm conditions, there are "big kine octopus" just outside of Mokoli`i (pers. communication w/ G. Hoaeae, 2/13/02).

**Channels:** Mrs Manatad identified two channels where she would lay net to catch *akule*. One was going from Mokoli`i to the Waikāne Pier. The second was from Mokoli`i going to Hakipu`u.

**Mullet Grounds:** Three main mullet grounds were pointed out by Mrs. Manatad. One wasin Kokokahi, near the present day YWCA, Kahalu`u in the bay and Hakipu`u in the bay.

**Access to Reef from Waikāne and Waiāhole:** According to Uncle Don Pacyau, it is possible to access the reef for fishing from certain points on land. These points include from the Waiāhole River mouth and from the Waikāne pier (Figure 18).

#### d. *Kū`ula* / Fishing stones

*Kū`ula* is defined as "any stone god used to attract fish, whether tiny or enormous, carved or natural, named for the god of fishermen" (Pukui and Elbert, 1986:187). *Kū`ula* is the name of an ancient fisherman to whom many fishing shrines are dedicated. Uncle Kalei Morita remembers his grandfather, John Kamaka, making offerings at certain *kū`ula* stones along the Waikāne coast. Uncle Kalei had knowledge of six *kū`ula* stones. Using the Kamaka land at the northern end of Waikāne as the basing area, he explained the general orientation of the *kū`ula*. "On my left going toward Hakipu`u, there'd be about three and then going toward my right over here, there's two and there's one more big one down by the pier [Waikāne Pier]. Although Uncle Kalei did not reveal the exact whereabouts of the *kū`ula*, his sharing does suggest there is at least one *kū`ula* offshore of the study area, if not more. He also added that the *kū`ula* stone nearest to the Kamaka land was for mullet, as was the *kū`ula* by the Waikāne Pier.

Another informant also talks about what appears to be a *ku`ula* stone located near the mouth of the Waikāne Stream. Uncle Don Pacyau does not call the stones a *kū`ula*, however his description of the use of the stones by his family suggests it to be a *kū`ula*. Uncle Don explains that after only being told once by his grandfather, to throw a share of the fish to the stones after each catch, he and his family has continued to follow the tradition.(Interview w/ D. Pacyau, 11/30/01)



Figure 18 Aerial Photograph of a Portion of Study Area in Waiāhole, Waikāne, 1933. Note the prominent sand bar leading out toward reef.

When asked about the story behind the *kū`ula*, Uncle Don shared this story told to him by his grandfather.

KB: Those stones, did they have a name?

DP: No, I don't think so. My grandfather told us, but I don't know how true it is, but he said one of the stones is—one is Waiāhole and one is Waikāne. I don't know what he mean by that. I know Waikāne is a man. But, I don't know what Waiāhole is. I don't know, woman? So, actually the two stones is like husband and wife. That's what he say, that time. But the stone is there yet.

Although Uncle Don and his family do not fish very often anymore, they still do use the *kū`ula* stone near Waikāne Stream mouth.

### e. Fishing Stories

Two tales of extraordinary sea creatures in Kāne`ohe Bay emerged from our talk story sessions with Waiāhole and Waikāne community members. The stories are similar in that both include sitings of giant marine animals. The first deals with a giant *he`e* [octopus]. Richard Paglinawan relates the story about his mother and uncle:

But the stories in that area are usually the spooky kind stories. And another one, which my mother them – There's always talk of a giant *he`e* in Kāne`ohe Bay. And my mother them, one time they went out with Rack 'em Up and all of that, they went out. They saw this big barrel thing in the water. And they wondered what the hell was that. When they got there, you know get long pole, eh? When they wen' jab 'em, it was one big squid. They got frightened. The squid was bigger than the boat. And so then they said: "Oh, the story true that there's a giant octopus." (Interview w/ R. Paglinawan, 11/26/01)

Perhaps the giant *he`e* Mr. Paglinawan's mother and uncle had always heard about is related to the legendary giant *he`e* of Waihe`e. In this legend, Keakaoku, on his way to Tahiti to meet his young bride, is attacked by a giant octopus. Keakaoku kills the octopus and flings him to Kahalu`u where the octopus fluid spreads all over (Sterling and Summers, 1978: 192).

The second fishing story revolves around a giant sting ray. In his interview, Uncle Don Pacyau describes a reef called "Circle Blue" which is where he claims the giant sting ray lives.

DP: Yeah. 'Cause I remember one time my uncle, David, was diving on the side of the reef and I seen him. I was a boat boy that time, see. And I see him diving, diving and then all of a sudden, I see him swim fast back to the boat. "Whoa, I seen 'em". "You seen what". "That sting ray", he tell me like that. "Where?" "Right there", but you cannot see him, but he seen 'em, that's why.

And he was shaking. When he came on the boat, he was shaking. He said, "So, big," he said. I don't know, I never see that. But, he seen it. So, he never did go back over there, that spot. I know my uncle seen that. I never seen him so scared and he big guy too, yeah. But, things under the water is double the size, when you see something under the water. Must be big, something like that. So, they claim that Circle Blue, that's where he live, that sting ray. (Interview w/ D. Pacyau, 11/30/01)

#### **f. Changes in Traditional Lifestyles**

Many of the community members alluded to or spoke outright about changes in fishing practices over the past several decades. Some attribute the changes to environmental factors that have adversely affected fishing habitat. Others emphasize the human element and the choices made by the younger generations.

In general, there is a consensus from the informants that fishing conditions have deteriorated over the decades. Mrs. Manatad remembers when she and her husband first moved to the southern end of Waiāhole (at that time considered part of Ka`alaea) in the 1930s, the ocean was much cleaner.

IM: Oh, this land before where we was staying, was good because the ocean was clean and no more all the rocks and sand. Before we had all sand, all clean the water. And, it's good to live that—not crowded you see. (Interview w/ I. Manatad, 12/19/01)

Uncle Don Pacyau also remembers cleaner waters surrounding the study area, waters which supported healthy stocks of *limu`ele`ele* at the river mouths.

DP: Yeah, we picked *limu*. That time, had plenty *limu*. Right in front this river, used to get the other hairy *limu*. They call that *`ele`ele*. Look like your hair, thin kind, green. Used to get plenty in front of this river. In those days, was clean, everything was clean. But now, there's nothing. All dead. (Interview w/ D. Pacyau, 11/30/01)

Studies completed in the last few decades regarding the water quality in the Kāne`ohe Bay have shown that water quality has declined significantly in the Bay in the last several decades (Kane`ohe Bay Master Plan Task Force, 1992:1). The decline is attributed to the accelerated growth of Kāne`ohe and outlying areas of Ko`olaupoko, in short, more people. One of the effects of declining water quality is the diminishing numbers and variety of fish. Many informants commented on the depleted numbers of fish. Uncle Kalei Morita commented that he no longer sees any *moi* whereas they used to be plentiful. When asked about the past, Uncle Don Pacyau remembers better days for the ocean:

KB: Tell me about the ocean in those days, how was it different from now?

DP: In which way?

KB: Just the way it look and the kind of fish you caught.

DP: Well, in those days. We used to drag net. No more the amount of fish now. You know what I mean. No more like before, anything now is not like before.

KB: Just talking about the amount of things.

DP: Like before, I told you what we caught. The amount is less now. Like I said, the *`ōpae lōlō* used to come like that kind size [showing about five inches with his fingers]. Now you can hardly see anything.

KB: Little?

DP: Yeah, little and hardly any already. Everything is just cut down.

The loss of fish habitat and good fishing conditions has led to the loss of fishing traditions. One prime example of a dying tradition was expressed during the Pacyau interview. Uncle Don Pacyau's sister was asking her brother about a particular net they used to use, the push push net to catch *`ōpae*. When asked if he still made the net, Uncle Don replied, "Yeah, I can make 'em, but no sense. No more the regular kine [*`ōpae lōlō*] we used to catch" (Interview w/ D. Pacyau, 11/30/01). Another example of a dying tradition is *hukilau* fishing, where a number of fishermen go offshore and beat the water with ti leaves and drive the fish into the net near the shore where the rest of the *`ohana* members pull the net onto the shore. According to Manatad, people used to go *hukilau* in the near shore areas because there used to be lots of fish there (Interview w/ Manatad, 12/19/01). Manatad adds that nowadays, you need to go way outside to catch plenty fish, the fish no longer come inside.

Fishing practices and traditional lifestyles have also been affected by state and federal laws which have been enacted in the last several years. One informant expresses dismay at the laws set forth to protect the turtle and the shark, claiming the laws have impinged on the native Hawaiian traditional fishing practices as well as causing an imbalance in the marine ecosystem, leading to excess numbers of turtles and sharks.

That's why I can't see today, when they stop the sharks, people cannot sell it. We ate fishcake from the shark for hundred years. Not one of us died. That was the best fishcake out. Now, they say we Hawaiians cannot eat the shark 'cause it's our *`aumakua*. Since when they worry what our *`aumakua* is? You cannot eat the turtle. Hawaiian staples were turtles and we always ate. Even right now, they should give us Hawaiians at least one turtle a week, or two turtle a month. Give us our staple back. In reality, if you raise this sharks and turtles without an outlet of it being taken away, what will the ocean have in years to come? Nothing but sharks and turtle. (Interview w/ E. Mahoe, 1/6/02)

Competing interests in Kāne`ohe Bay including commercial and recreational interests have forced the Manatads to make some changes in their commercial fishing operation over the years. Here, Manatad explains how her husband responded to such competition:

And then, my husband, he say, 'if that ground is good', then he fix the bag good and he leave the net one more time. Sometime he leave 'em two days. And before, they allow. But, now you cannot do that. You blocking the ocean, because plenty net. And now, plenty big shot. They get boat, you know they got da kine, what you call that, they run—I don't know what the name of that, jet ski. So, they complain, you know. They complain, 'oh, get plenty net over here' so the game warden try to stop us. So my husband say no, no. He'd rather get da kine net, gill. There you only surround and you pick 'em up right away. (Interview w/ I. Manatad, 12/19/01)

The human element involved with changing traditional lifestyles lies mostly with the younger generations who choose to follow different lifestyles than those of their parents. Many times, choosing a different lifestyle may imply what is considered to be an "easier" lifestyle. Uncle Don Pacyau alludes to this when he talks about the diminishing number of fishermen on the reef outside Waiāhole and Waikāne today.

KB: Used to have more fishermen out there, when you was growing up. You remember more people out there fishing than now?

DP: Oh yeah, because used to get more people live around here that time and more fishermen. But since everything fade away. Like the Kukuinui Family was fishing just like us all our life until they move-- fade away.

KB: What other families you remember fishing?

DP: Right now, I know the Manatad is fishing. But look like they fading away too because everybody get old, pass away, like that. Look like the new generation no like keep up with 'em. It's just like the taro farming. You know the taro farming? The old folks used to taro farm only. Like the kids, like my age all—kids, like my age that time. They no like continue the farming. Like, too hard work. So, they just pull out. That's why all the farming just went disappear 'cause they don't want to continue operating the farm...

## 2. Fishponds / *Loko i`a*

Fishponds were once a very familiar site in the Kāne`ohe Bay. A 1901 U.S. Fish Commission agent, John N. Cobb, listed 16 commercially operating fishponds at the time and estimated this number was approximately one half of what had been in existence thirty years prior (Cobb in Devaney *et al.*, 1982:139). Several *kama`āina* mentioned fishponds in the Waikāne portion of the study area. Some reported a fishpond in a swampy area adjacent to the shore (See Figure 5 "swamp"). One person thought the area looked like an old fishpond. "It's kind of swampy and the rocks on the side of the pond, certain areas



well built” (Interview w/ D. Pacyau, 11/30/01). A visit to the site verified the existence of a rock wall, constructed of angular basalt cobbles, well stacked and about three courses high. The wall was overgrown with weeds and was deteriorated in several sections. This could very well have been a fishpond, however no further information could be obtained.

A second fishpond was mentioned by several community members, this one located just north of the Waikāne Pier. Historic records account for this fishpond. In the Māhele awards, Land Commission Award 10158 to Manoanoa includes a boundary which is a fishpond “Kolowalu”. The records indicate the fishpond was being operated by Mr. Hall, of Hall and Dimond, a partnership who had been granted 1,698 acres in Waikāne during Kamehameha III reign. The name Kolowalu may have originated from ‘*Ke Kanawai Niaupio Kolowalu*’, or as Pukui and Elbert define it, “name of law in the time of Kū-ali‘i safe guarding the rights of commoners” (Fornander in Pukui and Elbert, 1986: 164). A diagram of Apana 2 of LCA 10158 depicts the *loko i`a* on its northern boundary and surrounded by *aka`akai* (*Scirpus validus*), a bulrush often found in marshy areas (Figure 19). This plant was formerly used as a temporary material in thatching or weaving (Neal, 1965:88).

Uncle Kalei Morita remembers the fishpond already being broken when he was growing up in the 1930s. Another person, former community member and married to the late Henry Koikoinui—a *kama`āina*, Evelyn Koikoinui recalls her husband talking about the ‘sacred fishpond’ of Waikāne. Mrs. Koikoinui says her husband would avoid going near the old fishpond at night for fear of running into the night marchers (see discussion of *Pō Kāne* on page 134).

Richard Paglinawan talked about a traditional practice of converting *lo`i kalo* into *loko i`a* in the Waiāhole area when the land in the study area contained *lo`i kalo*.

As a matter of fact, in some of the *lo`i kalo* over here [in the study area in Waiāhole south of the stream], when you *huki* out the taro, you would convert it to fishpond. And they would grow *awa* and mullet. They would grow it in there. I guess, part of it, the *kūkae* and everything, they rejuvenate the soil. And then replant again. So they would have it inside this area, all in this area. And there was a lot of – the fern that was called *hō`i`o* (*pōhole*) – yeah, the fronds, they would eat it...They would eat those ferns. Plenty in this area.(Interview w/ R. Paglinawan, 11/26/01).

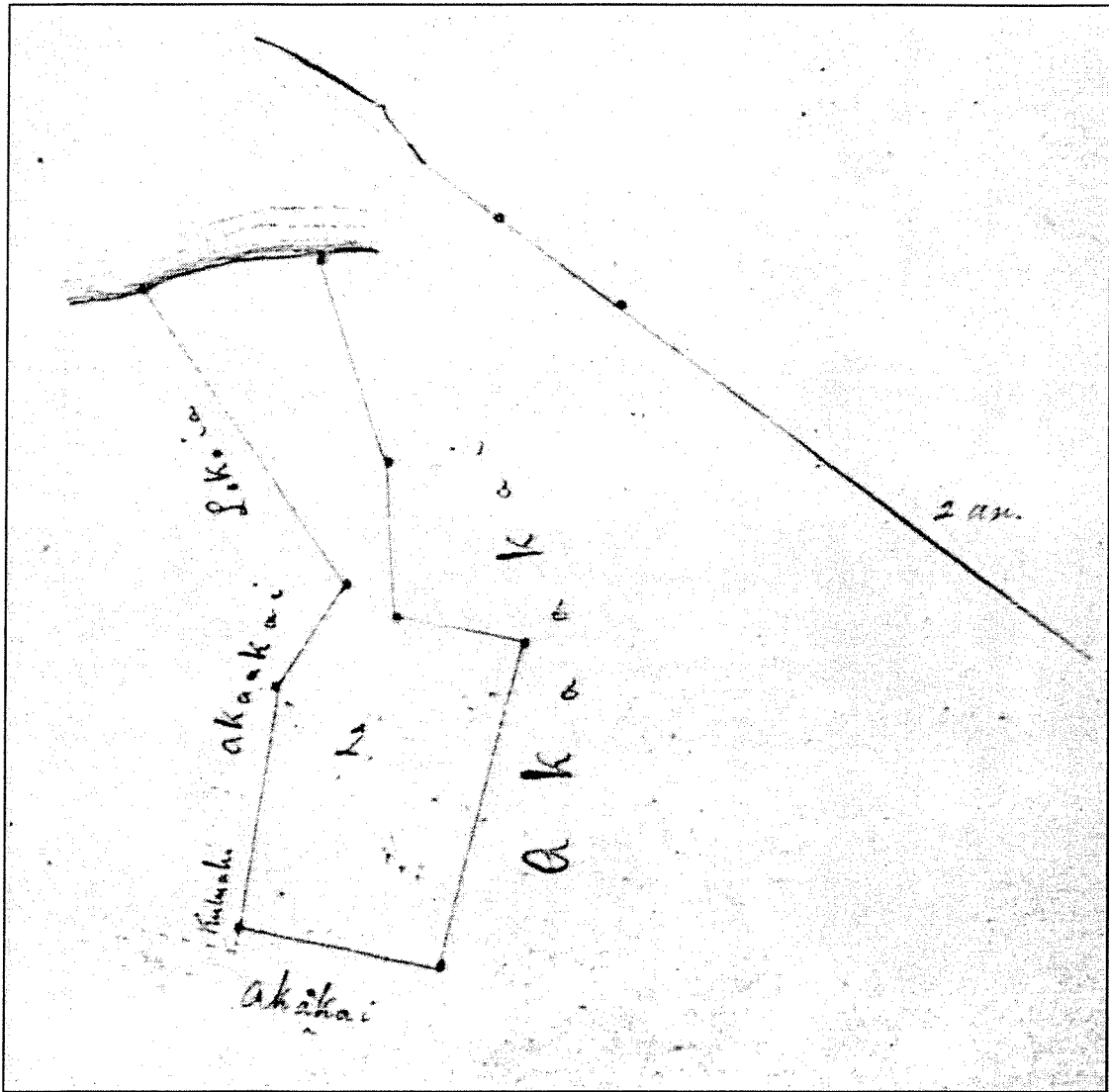


Figure 19 Diagram of Apana 2, Land Commission Award 10158 in Waikāne. Note the *lokoia* or fishpond and the *akakai* growing around it (*Scirpus validus*).

### 3. Rivers and River Resources

#### a. Rivers

Three streams flow through the study area, Waiāhole, Waikāne and an unnamed stream (or rather a stream that undoubtedly had a name in former times but which has not survived in modern memory) (See Figure 2). The Waiāhole and Waikāne Rivers are classified as perennial streams (Wilcox *et al.*, 1990). The “unnamed stream” is officially a tributary of the Waikāne River, however the two merge almost at the ocean. Waiāhole is the southernmost river and there is a 1922 historic bridge, the Waiahole County Bridge, spanning the river (Thompson, 1983: VII-120). Most people living in the area identify this stream as the Waiāhole River. Heading north, the next major bridge, also an historic bridge (1928) is called the North Waiahole Bridge. This bridge spans the “Unnamed Stream” and when asked, most *kama`āina* had no name for this stream. The northernmost stream that crosses the Kamehameha Highway and flows through the study area is the Waikāne Stream. This stream is spanned by the Waikāne Bridge, an historic bridge constructed in 1928. The Waiāhole and Waikāne residents refer to the Waikāne Stream as the Waikāne River. A 1901 map of Waiāhole depicts the names of three bridges in Waiāhole spanning the Government Road which is now called Kamehameha Highway (‘Uwau and Adjacent Lands’, Waiahole Oahu, map by J.S. Emerson, June 1901, RM 2034, Hawaii State Survey Office, Honolulu). The northernmost bridge is called Waianu Bridge, the middle bridge is referred to as Kaualoa and the southernmost bridge is identified as Kahilina Bridge. It is uncertain if any of these bridges spanned the Waiāhole Stream, although it is assumed that one of them did. The others may have spanned irrigation ditches or *auwai* in the area.

The streams that flowed through the study area were very important to the people of Waiāhole and Waikāne in general. At one time, the streams provided life-giving water for drinking as well as for bathing and cleaning, food, water for irrigation, and a place to have fun. Community members growing up from the 20s through the 60s recall fishing in the stream.

#### b. *āholehole*

Considered by some one of the best eating Hawaiian fishes, *āholehole*, called *āhole* in its mature stage, can be found in many different habitats such as on the reef, in bays and harbors and in the deep ocean (Hosaka, 1973:121). For the people of Waiāhole and Waikāne, *āholehole* came up more often in connection with the river than with the ocean. Several informants have fond memories of fishing for *āholehole* in the Waiāhole and Waikāne Streams. One person, who lives in Kahalu`u, but travels often to Waiāhole to fish and crab, describes how plentiful the *āholehole* still is in the Waiāhole River, even today (pers. communication w/ R.Santos, 12/7/01).

Traditionally, *āhole* was ceremoniously used to ward off evil or to induce love (Pukui and Elbert, 1986: 8). It was one of several *pua`a kai* that was used as an offering instead of pig. Today, *āholehole* is mostly known for its abundance in the streams of Waiāhole and

Waikāne. Uncle George Hoaeae used to throw net in the streams near the river mouth for *āholehole* in the 1920s and 30s (Interview w/ G. Hoaeae, 1/18/02). He would sneak up to the river at night and see “loaded” *āholehole*. Another excellent place to find *āholehole*, at least prior to the 1960s was at the Waiahole Poi Factory. *Kama`āina*, Richard Paglinawan, tells the story of fishing for *āholehole* at the poi shop.

Oh, I might add, the *poi* shop, for years, and I don't know when they operated, but Shige them used to dump all their [taro] or waste *kale`ai* into the river. And this river, if you went into it, below the *poi* shop, is about this high with all those taro peels. But you know there was the greatest fishing ground. [Laughs.] All of the fish would come up into the river mouth and up, *o`opu* and anything. So it was a great fishing ground. As a matter of fact, one time I told my uncle who was from downtown – He had a gill net and he wanted to cover the mouth of the stream. I told him, “Please, uncle, no do that because you goin’ catch *holehole*. And if you catch *holehole* we goin’ stay there all night trying to take it out of the net.” And, you know, *holehole* get plenty barbs. And, he’s older than I, so he said “No.” Okay, lay ‘em over there. But when we went the next morning over there, was just silver with fish; but getting ‘em out, boy you get poke all over. And I was cussing under my breath, cussing my uncle out. But that shows you the amount of *āholehole*. (Interview w/ R. Paglinawan, 11/26/01).

### c. *o`opu*

The *o`opu* is a favorite amongst old time residents of Waiāhole and Waikāne. Probably the most common fish gathered from the river, it is often associated with the *kahawai*, as in this *ōlelo no`eau*, “*Ka i`a moe kahawai*, the fish that lies in the stream” (Pukui, 1983: 149). Several species of *o`opu* exist, however none was specified by name. Uncle Don Pacyau did mention one *o`opu*, and he described it as transparent or yellowish-whitish, what he called “*haole o`opu*” (Interview w/ D. Pacyau, 11/30/01). In Uncle Don’s taste, this was a better eating *o`opu* than the “regular” *o`opu*. One stream study conducted in 1983 identified three species of *o`opu* for the Waiāhole Stream, *o`opu naniha* (*Awaous genivitatus*), *o`opu nakea* (*Awaous stamineus*) and *o`opu okuhe* (*Eleotris sandwicensis*) (Wilson Okamoto & Associates, Inc., 1983:55). No faunal assessment was done for the Waikāne Stream.

One of the most popular methods used to catch *o`opu* in the Waiāhole and Waikāne Streams was by hooking. Richard Paglinawan discusses the challenges of hooking *o`opu* in Waiāhole Stream:

‘Cause, when they catch *o`opu* – go get crayfish, bust the tail, take out the meat, and then put ‘em on diaper hooks, and then string, and with *haole koa* branch for fishing pole. And we’d go fishing along here...But the darn *āholehole* whack ‘em. They keep whacking ‘em and the *o`opu* no more chance

get at 'em. By the time `o`opu get at 'em, no more the bait. And we used to get mad. And when we catch one that was the biggest delight we had. (Interview w/ R. Paglinawan, 11/26/01).

Spearing, or “poking”, was another `o`opu fishing method mentioned. Uncle Don Pacyau explained that at night when the `o`opu are sleeping, they just stay in one place. This way, it was easy to spear them one by one and string 'em up. (Interview w/ D. Pacyau, 11/30/01)

One informant expressed how people around the area really enjoyed eating `o`opu, especially the *kūpuna* (pers. communication R. Santos, 12/7/01). After all, Russel Santos laughed, it only has one bone, the backbone, and people can slurp it up in one mouthful. Uncle George Hoaeae also recalls eating `o`opu in this way. When he was a boy, the old Hawaiian men used to chide him about not knowing how to eat `o`opu. He would tell them, “watch me” and slip a raw `o`opu in his mouth. He chuckled as he remembered how surprised they were (pers. communication G. Hoaeae, 1/18/02).

#### d. `ōpae

Having spent the first years of his life in Waikāne `uka, Uncle George Hoaeae was familiar with fauna of the fresh water streams. He knows of two varieties of fresh water `ōpae, the `ōpae oeha`a (*Macrobrachium grandimanus*) and the `ōpae kala`ole (*Atya bisulcata*) he would find in Waikāne Stream (Interview w/ G. Hoaeae, 1/18/02). He described the `ōpae oeha`a as a tough `ōpae that could be found anywhere along the river, including in the study area, close to the river mouth. Its distinguishing feature were its legs. As Uncle George puts it, “...one side get big leg, one side small leg.” According to Uncle George, the `ōpae kala`ole was black in color and only found up *mauka*, beyond the study area. The principal way to gather the `ōpae kala`ole was by looking under rocks.

As Uncle George Hoaeae was talking about `ōpae in his interview, he remembered one unique feature of the `ōpae kala`ole.

GH: *Kala`ole*. Black, eh. You can put salt. Hard for die, you know.

KB: Hard for die?

GH: eeiye, hard time. You put salt on top. They not gonna die right away. They walk all around with the salt on. That's why olden days, you cannot hide if you get `ōpae with you. They crawl outside, 'oh, you get fish for eat'. [Laughter]. You try fool them, but the shrimp will sell you out. You know, sometimes you tell, 'oh, I no more fish'. But, if you get da kine, he going crawl. 'Oh, you get fish'. [Laughter]. I heard that story way back and some old people, you tell me, 'hey, Keeki, *nana mai no oi*'. 'Look at 'em', they tell me... (Interview w/ G. Hoaeae, 1/18/02)

This story speaks to the significance of sharing in Hawaiian culture, particularly food. The story told by Uncle George's about the `ōpae kala`ole appears in Pukui's *Olelo No`eau* (1983: 145).

*Ka i`a hā`awe i ka pa`akai*, the fish that carries salt on its back. ‘The mountain shrimp (*`ōpae kolo*), a creature that does not die readily after being removed from the water. Once a stranger arrived at the house of a man noted for his stinginess. While the host loudly deplored his lack of any kind of meat to eat with the *poi*, a shrimp with a lump of salt on its back crawled out of a container in the corner. The selfish man had placed it there earlier, with the salt for seasoning, intending to eat it himself.’

Perhaps Uncle George has forgotten the Hawaiian proverb behind the *`ōpae kala`ole*, however he did recall the story associated with that shrimp.

### e. Swimming Holes

At one time, the streams provided a wonderful source of recreation for the people of the area, particularly the kids. *Kama`āina* growing up in the 1940s and 1950s tell stories of the endless hours spent fishing, overturning rocks in search of *`ōpae*, night fishing for *`o`opu*, and swimming in the Waiāhole and Waikāne Rivers. Just *mauka* side of both the Waiāhole and Waikāne Bridges were two favorite community swimming holes. Calvin Hoe, a farmer and educator originally from Hakipu`u but now residing in Waiāhole, tells about the swimming hole near the Waikāne Bridge

By the bridge in Waikāne, we used to go swimming over there. Had taro patches. I’m not sure who was taking care of the taro patches over there. Used to be kind of a flume-like thing that brought the water underneath the bridge and then to the taro patches where Richard Davis them were. And we used to dam up the bridge over there, go swimming. That was kind of a favorite swimming hole for Waikāne people. And Hakipu`u too used to come over there to go swimming. (Interview w/ C. Hoe, 12/13/01)

Richard Paglinawan also frequented the swimming hole near the Waikāne Bridge explaining that it was a favorite place to stop on the way home from church in Waikāne. The other favorite swimming hole was located near the Waiāhole Poi Shop and drew people from as far away as Kahalu`u until it was destroyed after the Keopuka Flood in May 1965.

RP: ...And right here in Wai`āhole *poi* shop, there was a concrete dam. I don’t know who built it but that was the community swimming hole. They came from all over, from Kahalu`u, Hakipu`u and all over. The families would come down and bring their dinner and would cook out and the kids would swim. And it’s a really beautiful spot.

CSH: That was one day a week?

RP: No, nearly every [day] they come down for take a bath. [*Laughs.*] But it was a social – families got together – we stayed sometime. And then from our house which is up here – after we *pau* we run bare ass, run all the way home – no need stay clothes. And it was not till the

Keopuka flood [in May 1965] that this bridge wen' collapse – this Wai`āhole Bridge. And if you go by the bridge, you goin' see the bridge is like this and then they filled-in between – they couldn't jack it up. So they filled it in-between and that was during the Keopuka flood, when that thing collapsed at that time. So the county went out, and to prevent further flooding occurring in this area, they bulldozed this area. Widened the stream. They knocked the swimming hole and everything – and that ended it. So that was kinda too bad. (Interview w/ R. Paglinawan, 11/26/01)

Mr. Paglinawan pointed out swimming holes all up the Waiāhole Stream *mauka* of Kamehameha Highway (See Figure 17). A leasee of the old Magoon Estate, now part of the study area in Waiāhole, also mentioned a swimming hole located adjacent to his lease land. Jimmy Medeiros has been leasing the land here for twenty eight years. He identified a place, not far from the stream mouth, where he and his family used to go swimming. When he first occupied the property in the 1970s and 80s, the swimming hole was about six feet deep, but since then, the river has changed and the swimming hole has been filled. Mr. Medeiros also recalled a pre-existing wooden platform built out over the river at the swimming hole, presumably used for fishing and crabbing.

#### 4. `Auwai, ditches

`Auwai (ditches) were built to irrigate the extensive networks of taro patches (*lo`i*) constructed by Hawaiians. `Auwai were such a natural and daily element in peoples lives in Waiāhole and Waikāne up until the 1950s and 1960s that many informants neglected to mention them. The ditches were used by most people in the valleys as sources of water for drinking, bathing, washing, irrigating and all necessary daily activities requiring water. As Richard Paglinawan describes it:

That `auwai, as far back as I can remember, that's where we had our drinking water, we took our baths, and did whatever it is in that. It was really clean. Of course they didn't have families above here before – very few. And so we used to – That used to be our drinking water and everything else. Until the county waterline came in the 1950's and then we had to go tap on this system. (Interview w/ R. Paglinawan, 11/26/01)

Besides the major diversion of water resources through the Waiahole Ditch System, different attitudes and beliefs toward water as a resource began to affect the community relations within the region, probably a reflection of what was happening in the Hawaiian islands in general. Traditionally, water rights were allocated “according to the agricultural needs of the farmers and according to the amount of labor each farmer contributed toward building and maintaining the system of ditches and auwais” (Van Dyke, 1979:143). Richard Paglinawan describes conflicts over water rights between neighbors that drastically impacted taro growing along the Kamehameha Highway just *mauka* of the study area. Referring to a certain family living up the Waiāhole Stream:

...what they did was that they blocked that [*`auwai*] and they told Kaya who lives right across [Wai`āhole Valley Road] over here, they told Kaya you gotta pay them rental for the use of that water. So Kaya tried to – with my uncle who lived in this house across here, this two-story house that was formerly owned by Chinese – He worked with Ironworks and his name is Clark, Joe Clark. He tried to get Kaya big pipes. And so from Wai`āhole Stream over here they tried to connect it up to this part here, to get the *`auwai* system flowing across here, to get water flowing into the *lo`is* in the lower valley by Kamehameha Highway. But they found out, there were two problems. Every time when heavy rain and flooding, that pipes would get broken. Secondly, there wasn't enough water so that the water was not cold. So that when it went and fed the taro patches all in this area it got affected. The taro becomes seedy and smelly. So he stopped cultivation, or he shut down his whole operation – all in this area. And that was in the late '60s. (Interview w/ R. Paglinawan, 11/26/01)

According to a local taro farmer, much of the traditional *`auwai* system in the study area portion of Wai`āhole is still intact (Interview w/ C. Hoe, 12/13/01). One map shows there are two traditional *`auwai* running through the study area in Wai`āhole (Figure 20). Mr. Hoe reported locations of three *`auwai* into the Wai`āhole study area with modern culverts spanning the Kamehameha Highway, two south of Wai`āhole Stream and one north of the stream. In the Waikāne portion of the study area, two *`auwai* are recorded in maps . The present condition of the Waikāne *`auwai* is unknown.

## 5. Springs

Only one spring has been noted for the study area. Two informants identified what is believed to be the same spring, located just *makai* of the “big curve” as you are heading from Ka`alaea into Wai`āhole. Manatad mentioned tapping this spring for water use when she and her husband first began living on the land at the Ka`alaea-Wai`āhole border. Handy (1940:95) identifies springs used to irrigate small terraces between Pu`u Kahea and the ocean which is the location of Manatad's lease land.

Farther up the main valley on the north side is a spring named for the god Kanaloa (to whom, with Kane, is attributed the opening of many springs throughout these islands). Near this spring is another named Ka-houpo-o-Kane (The-diaphragm-of-Kane). These springs were the sources of water for irrigating terraces north of the main stream below the ridge toward Waiāhole. Below this, also north of the stream, was another terrace section irrigated from a spring named Keahue (*Ibid*). A second informant, Uncle Kalei, remembers the spring from when he used to herd cattle in southerly Wai`āhole. Uncle Kalei related that according to legend, the spring flows





out into the Moli'i Fishpond at Hakipu`u (Interview w/ A. Morita, 1/4/02). His description of the location of the spring correlates with Manatad's.

## C. *Ka`āina*

### 1. Rice Cultivation

One of the oldest informants interviewed, George Hoaeae, witnessed some of the last vestiges of rice cultivation in the Waikāne Valley. Uncle George was born in Waikāne in 1916, after rice farming had reached its pinnacle. Rice had dominated the coastal lowlands of Waiāhole and Waikāne beginning the early 1870s. One 1878 map of Waiāhole shows large areas of rice *mauka* of the present day Kamehameha Highway and a small area cultivated in rice *makai* of the Highway (Waiahole Oahu, 1878, by J.F. Brown, RM 312). One source indicates that in Waikāne and vicinity (probably including Waiāhole), there were 200 acres of rice under cultivation (Coulter and Chun, 1937:21). By the time Uncle George was born, many of the fields which had been cultivated in rice were slowly being reverted back to taro, which had been growing there prior to rice and for generations before that (See Figure 12). Uncle George recalls his father planting rice up in Waikāne Valley.

GH: Yeah, yeah, my dad used to plant rice. We used to live up the mountain there. That's about three miles away from the highway. He plant there.

KB: He plant up there?

GH: Yeah, my dad. And then—well, I was young the time. And then, he close up. We took the rice down—way down where—way down. 'As where the rice mill was there. When we wen' move down there, the rice mill was there already. And then, 'as where we, you know, took our rice. I don't know what they do, and then all the rice get *pilau* from da kine. The rice come *pilau*, da shell eh. But, I don't know too much of that see.

KB: How old you was?

GH: Oh, about four or five.

KB: Oh, young. And what, you remember down by the highway. Had rice growing over there?

GH: Oh yeah, get, get, yeah. Oh, was plenty, plenty. Yeah, was plenty. All that Chinese guys stay there, but I don't know their names. When we came there for stay, nobody was there. And McCandless took over. I came down when I was about six, almost seven year old. We came down and stay down by Waikane, where Waikane stay now. (Interview w/ G.Hoaeae, 1/18/02)

Apparently even up until 1920, rice was a profitable cash crop. Even a small scale

operation, such as that run by Uncle George Hoaeae's father, would be sufficient to provide extra income to the family. According to Uncle George, his father would take the rice down to the mill on his horse. At the time there were several rice mills in Waikāne and Waiāhole. Then he would have the rice hulled and threshed at the mill and finally sell it.

Another *kama`āina* holds memories of another remnant of the rice plantations in Waiāhole and Waikāne, the water buffalo. Uncle Kalei Morita recollects the buffalo roaming wild along the coast in portions of the study area in the 1930s. As a young boy, it was his job to drive the cattle from the southern boundary of Waiāhole back to Waikāne each afternoon after school. It was then when he would see the wild buffalo grazing in the study area. The buffalo had been abandoned after the rice industry declined.

## 2. *Lo`i Kalo*

### a. Taro Cultivation

Taro cultivation has a long history in Waiāhole and Waikāne. Historic documents attest to the extensive taro *lo`i* in the study area in the past. The Native Register of the Māhele records numerous claims to lands in the study area with *lo`i kalo*. In the Waiāhole portion of the study area alone, approximately 104 *lo`i kalo* were claimed. Claims were also made for numerous *lo`i* which were lying fallow. The land claims record approximately 33 *lo`i kalo* in cultivation in the study area of Waikāne at the time of the Māhele in the mid 1800s.

Many of the older informants and community members in Waiāhole and Waikāne remember taro being cultivated in or near the study area up until the 1950s and 1960s. Most of this taro was sold commercially. The taro operations in the 1920s and 1930s were mainly run by two people, one named Murakami and the other Sakai. Murakami worked under Lincoln McCandless, property owner of much land in Waiāhole and Waikāne. Sakai was a Japanese businessman who owned and operated a store in Waiāhole, below the Waiāhole School. Mrs. Tsutsui, resident of Waikāne for 75 years and former owner of the Waikane Store, remembers Murakami as the "boss of Waikāne". She remembers him being in charge of the taro patches in the study area portion of Waikāne and Waiāhole. In Waikāne, taro was cultivated in wetlands behind (*makai* of) the houses which bordered the highway, but inland from the coastline. According to Mrs. Tsutsui, the land in Waiāhole under taro cultivation consisted primarily of lands north of the Waiāhole River. Mrs. Tsutsui remembered working for Sakai in the taro patches when she first moved to Waikāne with her family, the Moriwakis, in 1927. At that time, Sakai farmed about 30 acres located just *mauka* and Kāne`ohe side of Poi Factory.

The majority of the taro farmers in the Waiāhole and Waikāne in the twentieth century were not Hawaiian, but Japanese. Richard Paglinawan, growing up in Waiāhole in the 1940s, remembers several Japanese families growing small plots of taro in land *mauka* of Kamehameha Highway and south of Waiāhole Valley Road. The names of some of these Japanese growers include Kaya, Tshaka, Teruya, Serikaku, Koki, Hino etc... (Interview w/ R. Paglinawan, 11/26/01). Mr. Paglinawan recalls only two Hawaiian families with *lo`i*

*kalo*, the Kalauokaea and the Kawa`a families (Interview w/ R. Paglinawan, 11/26/01). Both families had their *lo`is* up in the Waiāhole Valley, *mauka* of the study area.

The Japanese started arriving in the Waiāhole and Waikāne areas soon after the decline of the rice industry in the early twentieth century. Large areas of land became available for lease and many Japanese families moved in to lease farm lands. The Tsutsui family engaged in farming cucumber, string beans, Chinese peas, sweet potatoes papaya and banana on ½ acre when they first arrived in Waikāne in the late 1920s (pers. communication, H. Tsutsui, 12/7/01). The Filipinos also came to the area in sizable numbers to farm. Uncle Don Pacyau's father was one of these Filipinos who came to Waikāne to work in the commercial taro farms and ended up staying. His sister, Diane Obedoza-Ahrens, explains how their father arrived in Waikāne.

KB: Did your father come here from the Philippines?

DP: Yep. No tell me when he came but..

DAO: He came to Hawai`i when he was about 14. He was born in 1911.

KB: So, around the thirties.

DAO: Yeah. To work. You know, like they all came to work in the pineapple fields and plantations. But he ended up doing taro somehow. I guess they called out for work and I guess he wanted to come this side. So, he got on a truck and ended up one day working in the taro. He didn't even know what he was gonna do. That's what he told me, so I got that first hand from him. Okay. But he ended up in the taro patches.

KB: Do you know where he was before he came to Waiāhole, where he was working?

DAO: Ooohh, let's see. Wahiawā? As far as he told me, Wahiawā. That's where they all were in the first place, congregating. Did plantation work, like that and then, after that, he came over here. But, he didn't move here right away. I think was for work just for the taro patches. And then after that, he met my mother. (Interview w/ D. Pacyau, 11/30/01)

With Filipino and Hawaiian roots, Richard Paglinawan also commented on the numbers of Filipino men who married Hawaiian women. Many part Filipino families continue to live and farm in Waiāhole and Waikāne.

The Hawaiians who were farming taro were cultivating up *mauka*, in accordance with what seem to be traditional patterns of land use. Up until the mid twentieth century, two Hawaiian or part-Hawaiian families were living down near the ocean in the study area and planting taro up in the *mauka* areas of Waikāne, the Kamaka (Morita) family and the Kaupe (Pacyau) family. Uncle Kalei Morita recalls walking up into the mountains to check

on his grandfather's, John Kamaka, taro patches.

AM: Growing up as a youngster, we used to walk from home up into the mountains to check his [grandpa's] taro patches and I'd be walking along beside him all the way up to the mountains and back home.

KB: And you helped him work in his taro patch?

AM: He had a old Chinaman that was staying up at the taro patch there, to take care of his [grandpa's] taro patch. And when it was time to harvest the taro then my Uncle them would go on the horseback and bring the taro back and they'd cook it and make it into *poi*. (Interview w/ A. Morita, 1/4/01)

Uncle Don Pacyau's grandfather had a similar routine.

DP: My grandpa? Yeah, he used to grow taro up Waikane Stream. He had one patch up there and he had a house up there to. And you know those things is heavy when you harvest, so he had one horse. They put the taro on the horse. The horse was trained. I don't know how they wen' train 'em, but they said no need guide him. The horse would come down and come right over here where his second house is. And the horse used to leave 'em over here, the taro. But I don't know about the horse going back, I don't know about that. (Interview w/ D. Pacyau, 11/30/01)

According to Uncle Don, his grandparents told him that the right to farm the Waiāhole and Waikāne area from "the mountain to the sea" was passed on to his great great grand father by an *ali'i*. This concept of *ahupua`a* and the associated land use of the *ahupua`a* was still a part of the cultural fabric of this area even up until the mid twentieth century.

### b. Taro Varieties

Most people consulted refer to the taro growing in the study area in the 1920s through the 1950s for commercial purposes as the "gray taro". No one could recall the name of the variety of taro that was grown. From the information collected by sources living in the area at the time, much of the commercial taro growing along the highway was either sent to the market or bought by Sakai, who owned the Waiāhole Poi Factory. Sakai even bought taro from Murakami, who was farming taro in portions of the study area for L.L. McCandless (Interview w/ G. Hoaeae, 1/18/02). Richard Paglinawan, however, has a different story regarding the final destination of commercial taro being grown adjacent to the highway.

What is interesting, the poi shop, Waiāhole poi shop, was owned by Shige Sakai. Now Sakai and his sister owned the store next door – that's Kanda's store. And Shige bought his taro, believe it or not, from Hanalei. He never bought his taro from the local taro growers. And the reason for that, I understood, is that because he preferred the *lehua* taro. These guys were

growing the other kind taro, the gray one. And he never liked that. So he was importing. Twice a week, he'd go down to the pier, pick up his taro on skiffs, and bring 'em, and then cook 'em. And all these guys here that were growing, Kaya and so on, sold their taro to Kalihi Poi and all those other poi [factories] downtown. (Interview w/ R. Paglinawan, 11/26/01)

Perhaps Sakai started out buying his taro from local growers, and later on turned to other growers for a different quality *poi*.

Because most informants did not directly participate in taro cultivation, most do not remember the different names of taro grown in Waikāne and Waiāhole. The oldest informant, Uncle George Hoaeae, did participate in planting and harvesting taro when he was a young boy and did recall some of the details. As one of the older siblings, Uncle George helped his father to maintain the bank of the taro patches and weed them. He remembers his father having several *lo`i* up *mauka* in Waikāne Valley though he doesn't recall exactly how many. Uncle George identified three varieties of taro his father used to grow, the *pi ali`i* [*pi`i ali`i*], the *haehae* and the *piko*. When cooked, Uncle George explained, the *pi ali`i* turns red, the *haehae* turns blue and the *piko* turns white. The Hoaeae used these three varieties to make *poi* which they pounded themselves. Handy (1940:12) describes the *pi`i ali`i* variety of taro as a favorite among *ali`i* and found all over Hawai`i. The *piko* variety of taro generally refers to the cut of the taro leaf where the "posterior edge of the leaf is cut down to the *piko*, the point at which the petiole joins the leaf-blade" (*Ibid*). There are several sub-varieties of *piko*, including *haehae*, although Handy also lists *haehae* as a separate variety of taro (*Ibid*: 32-34). The *piko haehae* is said to have originated from Ka'anapali, Maui where the heavy winds rip at the leaves.

### c. Preparation of taro

For many *kama`āina* families living in the Waiāhole and Waikāne area in the first half of the twentieth century, *poi* and rice were staples in their diets. Born in 1916, Uncle George Hoaeae remembers harvesting taro from their *lo`i* back in Waikāne Valley and preparing the taro to make *poi* (pers. communication w/ G. Hoaeae, 1/28/02). He and his siblings would harvest about half a bag of taro at a time. Then, his sisters would divide up the bags and because the taro was so heavy, each one would carry maybe a quarter bag. They would haul the bags from the *lo`i kalo* up a hill to the house. This half bag would last the sixteen member Hoaeae family almost a week. Uncle George stressed that they didn't have *poi* every day. His family would cook the taro and then peel it, sometimes with a piece of bamboo and often with a spoon. "Then, chip off on both end and then after that you pound 'em" (Interview w/ G. Hoaeae, 1/18/02; Figure 21).



Figure 21 Hawaiian Couple Pounding Poi, 1922. Used with permission by Bishop Museum.

During the 1920s and 1930s, the making of *poi* became more mechanized. Uncle Kalei Morita witnessed this within his own family.

KB: Did you help with the preparing of the *poi*?

AM: No, I was too small then. And when my Uncle them brought the taro back, then they cook the taro and sometimes in the evening, they'd pound *poi* you know on a board, with a stone. There'd be two people, one on each end pounding *poi*. And then after that, I know my grandfather bought a machine to grind the *poi*. He was one of the first that had machine to grind *poi*. (Interview w/ A. Morita, 1/4/02)

It is unknown when the Waiāhole Poi Factory was first built and opened. Uncle Kalei believed the Poi Factory wasn't opened until sometime after his grandfather died in 1936. Uncle George Hoaeae, however, remembers his family beginning to buy *poi* from the Poi Factory soon after moving from up in the back of Waikāne Valley down to near the highway around 1922. Whichever the case, the Waiāhole Poi Factory seems to have played a big part in the social fabric of the nearby communities. Auntie Elizabeth Mahoe grew up across from the Waiāhole Poi Factory in the 1930s and 40s and remembers how significant the place was for her.

But, that's where we get our taro top, the leaves. We get our taro. We just go down the Poi Factory with one plastic bag. You can say we were spoiled brats. But you like the taro that's soft and gummy. So, they let us climb the little step as we were children and pick up, throw in our bag what we like eat. 'Cause that's our staple is cooked taro and we have a cow. We milked the cow. The milk and the taro is what we eat, tide us over 'til lunch time. And this is what we eat every morning. (Interview w/ E. Mahoe, 1/6/02)

The Waiāhole Poi Factory has also provided employment for many people over the years. When Paglinawan was growing up in the 1930s and 40s, he remembers several members of the Hoaeae family working in the Poi Shop. Michihiro Miyagi, who did a lengthy study on land use in Waiāhole in 1961, reported that the Poi Factory employed eleven persons at the time, mostly of Hawaiian and Filipino ethnicity (Miyagi, 1963: 123).

Calvin Hoe and his family, a *kama`āina* and active member of the community, purchased the Waiāhole Poi Factory in 1971 after it had changed hands once. According to Calvin, the Hoe family converted the Poi Factory into an art gallery because they didn't know how to make *poi* and there was no taro (Interview w/ C. Hoe, 12/13/01). Taro cultivation had been dwindling for a long time. When Miyagi did his land use study in 1961, only five farmers were planting taro commercially in Waiāhole, all of whom sold their taro to the Waiāhole Poi Factory. Perhaps the business relationship between the Poi Factory and the farmers changed once Sakai sold the Poi Factory sometime in the 1960s.



#### **d. Resurgence of taro cultivation and a vision of taro cultivation in the study area**

In the last thirty years or so, a number of industrious *kama`āina* have been involved in an effort to revive taro cultivation in some of the abandoned *lo`i kalo* in the *mauka* areas of Waiāhole, Waikāne and Hakipu`u. Because much of the traditional local knowledge regarding taro cultivation has been lost, it was necessary to look to outside sources for help. One *kama`āina* who has spearheaded taro revival in the communities, Calvin Hoe, envisions taro growing in the study area as it once did.

And we, as a community, some of us in the community, were trying to develop a system similar to the community gardens in Honolulu and around the island. Where we could make one community taro patch. So that, just like how the community gardens assign areas for different people, different families – We thought that this would be a good place for that. Was very accessible and close to the road. And also it's so close to the road – We wanted to show that taro could be planted over there, should be planted over there. So we've been looking at this area at least ten years or so. And when the city acquired the land, I think we've been in conversations with the city as far as forwarding that idea about a community taro patch where people could learn how to plant taro and plant some taro to eat. About six, eight years ago we made this taro institute. We call it a taro institute to encourage people to plant taro. Because it's a traditional crop, a traditional food, and a very healthy food. We thought people should eat plenty. And so that more people can eat it. So we made that taro institute and we got a small grant from OHA and the scope of the grant was to identify taro lands, to take an inventory of taro lands, from Pu`u Kaua`i to Kalae`ō`io at the end of Kualoa, of that area. So of course we looked at all of this area. Identify the lands. Identify people who were interested in planting taro. And put them together in a training program. And then the other thing we wanted to do was to try to make land available to people. And so that's why we're thinking about the community garden concept for the *lo`i* in this area south of Wai`āhole Stream. And we're still trying to do that. (Interview w/ C. Hoe, 12/13/01)

Another educator, Emil Wolfgramm, envisions a similar cultural use for the Waiāhole Beach Park. He sees a “demonstration area for wetland, dryland field systems”, a combination of traditional wetland and dryland agricultural methods. (Interview w/ E. Wolfgramm, 12/3/01).

### **3. Legendary *Hau* Grove in Waiāhole**

Several informants directed attention to a *hau* grove growing near the Waiāhole Stream mouth (See Figure 14). The grove presently engulfs much of the point. Evelyn Koikoinui, married to the late Henry Koikoinui, specified that this *hau* grove was sacred to her husband. Henry Koikoinui was a *kama`āina* and avid fisherman who grew up in the study area and spent much of his life there. He and Elizabeth Mahoe, another informant, were siblings. Mrs. Koikoinui remembered her husband talking about the *hau* grove, but does not know why her husband thought it was sacred because he didn't like to talk about

those things (pers. communication, E. Koikoinui, 1/5/02). Another *kama`āina* tells the love story relating to this *hau* grove.

Pilani Pakī sets the story of the song “Ka Makani Ka Ili Aloha” in this area. Where a couple who split up and the husband went to Moloka`i, I think. And the wife was home in Wai`āhole. She was sad that he was gone so she went to talk to a *kahuna*. And the *kahuna* told her to talk to her husband into a water gourd and then put it into the ocean at Wai`āhole. And so that – Her husband was fishing someplace on Moloka`i, I think. And the gourd floated out over there and he heard his wife’s voice from the gourd and that brought him back to Wai`āhole. (Interview w/ C. Hoe, 12/13/01)

During his interview, Emil Wolfgramm pointed out the love story as a direct connection between the *hau* forest and northern Moloka`i. Mr. Wolfgramm felt the *hau* trees in this grove had a place in Polynesian voyaging. They “actually formed the *`iakos* for the voyaging canoes. The *`iakos*, the joining connectors between the two hulls.” (Interview w/ E. Wolfgramm, 12/3/01). Mr. Wolfgramm was clear in expressing the cultural significance of this grove and his desire to preserve the *hau* and possibly use it for future sea voyaging projects.

#### 4. Burials

Through consultation with community members, several areas with (or perceived to have) burials were identified within the study area. One known burial ground, two burial locales and one burial location were identified in Waiāhole and one burial locale was identified in Waikāne. The term burial ground suggests multiple burials and the term burial locale suggests a general area (not specific location) where burials are known or thought to be interred.

##### a. Burial Ground (Waiāhole)

A cemetery recorded on an 1897 Map of Waiāhole (See Figure 10) appears to coincide with the location of the burial ground. State Historic Site 50-80-10-1086, recorded in 1964, also seems to coincide with this burial ground:

The best preserved site consisted of a high mound of dirt, 8-12 inches high, ringed with a pavement of small pebbles. Portions of the site were delineated by rows of stones marking the house site. A rectangular plot of stones with pavement within the general paved area may possibly be a grave. A wall of stones ran from the site directly to the ocean. Numerous adze chips and partial blanks were found within the two house sites. (Kikuchi, 1964:2).

More recently, an archaeological inventory survey of the Waiāhole portion of the study area has relocated this site (Shideler *et al.*, 2001, *in progress*). Six rectangular alignments were recorded and are interpreted as grave sites.

James Medeiros has been leasing the land where this burial ground stands for the last twenty eight years. The portion of land he has leased once belonged to the Magoon Estate. In the time he has leased the land, Mr. Medeiros has built a pig pen and a dog kennel on the raised mound area which holds the burial ground. At the time, he did not realize there were graves there. Once he realized there were graves, he cleared the area of *hau*. Mr. Medeiros remembers people coming to visit the graves (Figure 22).

KB: So, what Angel Pilago had told you stories about this place too?

JM: No, he jus' was telling get night creatures walking around and get graves back there. He jus' point out the graves. But, he never show me had so many graves back there, I never did find them 'til after we build the pig pens. Then we notice the rock formation. Then about, roughly eight or twelve years ago, some people from Hilo came down and they wen' ask me where get graves over here. And then I showed 'em and they went over there and they started chanting and all kine and—but they jus' told me was great great great grandparents and—but they never tell me their names so I don't know who. They never tell me their names or who was buried there.(Interview w/ J. Medeiros, 1/24/02)

Mr. Medeiros described the people who came down as two ladies, maybe in their fifties, of Hawaiian ethnicity. They left a *kukui lei* at the graves which is still to be seen hanging on one of the *hau* stumps.

Raymond Kamaka, originally of Waikāne, has claimed to be a lineal descendant of those interred in the burial ground at Waiāhole. He associates the burial ground area with his ancestor Ka'opulupulu, a *kahuna nui* whose descendants were awarded land in Waiāhole.

#### **b. Other Waiāhole Burials**

A second burial location was also described by Mr. Medeiros. When he was digging a cesspool for house C (Figure 14), he dug up a human burial with a backhoe. This inadvertent find was located approximately fifteen feet NW of the NW corner of house C.

JM: Then back here, the back of the house about, roughly about fifteen feet when I dig for—dig the cesspool, I dug up bones, skeleton. So, I jus' got off the machine, push 'em back with my hand and bury 'em and jus' said I was sorry, that was it. Then from here to where the graves stay, is about. How far that about? Hundred feet?

Mr. Medeiros excavated to approximately two feet when he hit the human remains. He was able to identify the bones as human because he saw the hips and legs. He noticed the bones were all green, probably due to all the moisture in the ground. After reinterring the bones, Mr. Medeiros covered them up and dug a second cesspool more to the east. Based on Mr. Medeiros' recollection the inadvertently discovered human burial was located

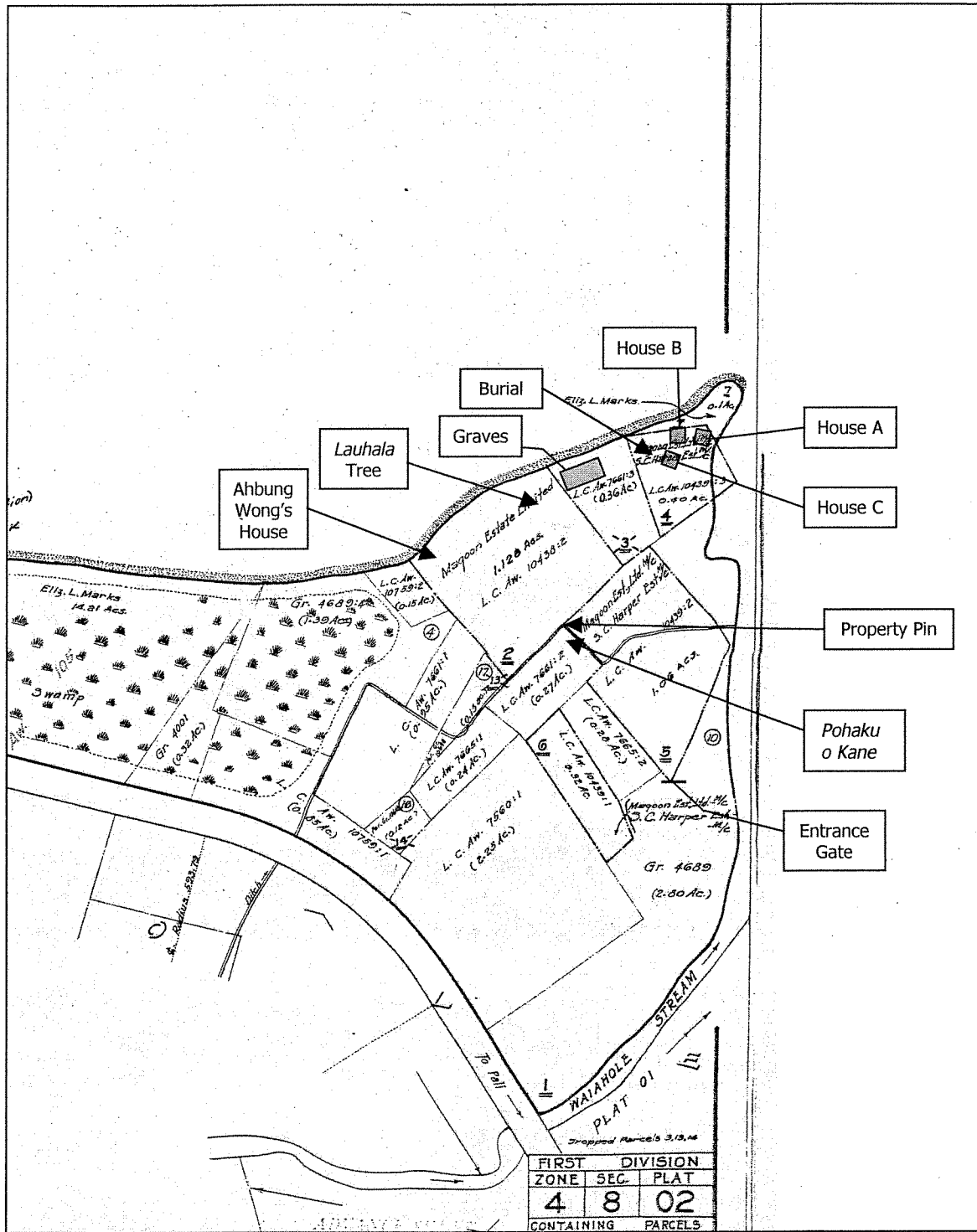


Figure 22 Approximate Location of Significant Sites within James Medeiros' Lease Land

approximately seventy feet SE of the burial ground. Whether this inadvertently exposed burial is part of the burial ground is unknown, though its proximity may suggest it to be.

Further *mauka*, toward the highway, Aunty Elizabeth Mahoe, identified an area of potential burials. Aunty Elizabeth spent her childhood on land in the study area and she recalls having funerals for family members in her house (pers. communication, E. Mahoe, 1/12/01). The deceased family members were buried on the Mahoe property, however Aunty Elizabeth doesn't remember the exact locations of the interments. She pointed out a general area approximately 150' from shoreline to the unmowed bank (holding water and electrical lines to the Medeiros lease land) and 150' from the bulldozer push line *mauka*. Aunty Elizabeth Mahoe discussed the desirability of protecting this area from subsurface disturbance.

A third identified burial locale is located on the southern edge of the study area. The Manatad family has been living on this land since 1934 while running their commercial fishing operation. Mrs. Incarnation Manatad related how her husband began to uncover burials when they first began to build there in the 1930s. Manatad specifies three burials and she thinks there may have been others, but she is not certain of the locations. She did however stress the *kamani* tree and the house as being two fairly accurate locations for known burials.

### **c. Waikāne Burial**

While talking story with 92-year-old Mrs. Tsutsui, former owner of the Waikāne Store, she revealed that the Turner family, an old time family, had a grave in the field in the back of the Waikāne Store, perhaps a bit north of the store (pers. communication, H. Tsutsui, 12/7/01; See Figure 24 (page 117).). Mrs. Tsutsui believes the grave is relatively old and probably has been plowed over in the recent past. Another informant, Calvin Hoe, believed his family was related to the Turners, but he did not know if the Turner family was still in the area (Interview w/ C. Hoe, 12/13/01). The exact location of the grave is unknown.

## **5. Pohaku o Kāne**

In the Waiāhole portion of the study area, a large upright basalt stone was found during the archaeological inventory survey of that area (Shideler *et al.*, 2002:37). At the time it was found, the stone was lying on its side. The leasee for the land, Mr. Medeiros, also pointed out the *pōhaku* and indicated that at one time the stone was standing vertically upright. (pers. communication, 2/11/02; See Figure 22). He added that the stone was part of a small mound that was raised up compared to the flat land which surrounded it. Under the vegetation lying on the ground surface of the mound were many small basalt cobbles. The mound also contained many ti plants which Mr. Medeiros indicated he had not planted. In the NW corner near the edge of the mound, Mr. Medeiros pointed out a hole approximately 1m by 1m. He mentioned the hole had been there since he first came, at which time it was about 1.5 m deep. Mr. Medeiros stressed that he had never altered the mound.

The stone is thought to be a *pōhaku Kāne* or *pōhaku o Kāne*. Kamakau (1964:32) describes the *Pōhaku o Kāne* as a “place of refuge, a *pu`u honua*, for each family from generation to generation. It was not a *heiau*; it was a single stone monument (*he wahi`eo`eo pohaku ho`okahi*), and a *kuahu* altar with ti and other greenery planted about”. Offerings were made at the *kuahu*. Often these consisted of red fish and *`oloa tapa* (*Ibid*:32). An *imu* was prepared to bake the pig and *`awa* was chewed. The purpose of the *Pōhaku o Kāne* was to free the family from wrongdoing and provide a sacred place to ask the Gods for blessings (*Ibid*:33).

The true significance of this rock was lost when the family who was its keeper and benefactor left the land. Its location is near the present property line and in the corner of an LCA (LCA 7661:2), where an old *`auwai* divides LCA 10438:2 and LCA 7661:2 (See Figure 20). The proximity of the *pōhaku o Kāne* and the mound to the burial ground, recorded house sites and a second known burial suggests that human activity in this area was intensive. In addition, Mr. Medeiros commented on the quantities of stone artifacts that he and his family had collected from this area, particularly NW of the burial ground (or N of the *pōhaku Kāne*). He describes his family finding *poi* pounders, *`ulu maika*, adzes, knives, squid lures (*kākala*), bone fish hooks, sinkers and even a rock in the shape of a foot.

## 6. Place Names

Place names or *wahi pana* are an integral part of Hawaiian culture. “In Hawaiian culture, if a particular spot is given a name, it is because an event occurred there which has a meaning for the people at that time” (McGuire, 2000:17). The *wahi pana* were then passed on through language and the oral tradition, thus preserving the uniqueness of the place. Hawaiians named all sorts of objects and places, points of interest which may have gone unnoticed by persons of other backgrounds.

Hawaiians named taro patches, rocks and trees that represented deities and ancestors, sites of houses and *heiau* (places of worship), canoe landings, fishing stations in the sea, resting places in the forests, and the tiniest spots where miraculous or interesting events are believed to have taken place (Pukui and Elbert, 1974:x).

See the list of place names for Waiāhole and Waikāne (pps 22-24 of this study). The names are written as they appear on the maps and in the records. The true spelling and placement of the diacritical marks for some is unknown. Most of the place names are thought to be *`ili* or *mo`o* within the *ahupua`a* (Figure 23).



## VI. OF THE SPIRIT WORLD

Almost everyone who was consulted at any length regarding traditional practices in Waiāhole and Waikāne would share a story that was *`e`ēpa*, or inexplicable or mysterious in nature. For some who shared stories, the mysterious quality of the story did not seem to bother them; rather, it was a part of their life. For others, however, the stories shared seemed to trouble the teller, as if some greater meaning was yet to be revealed.

Pukui describes how the realm of the spirits is imbued in the daily life of Hawaiians:

A Hawaiian oneness with the living aspect of native phenomena, that is, with spirits and gods and other persons as souls, is not correctly described by the word *rapport*, and certainly not by such words as sympathy, empathy, abnormal, supernormal or neurotic; mystical or magical. It is not "extra-sensory," for it is partly of-the-senses and not-of-the-senses. It is just a part of natural consciousness for the normal Hawaiian—a "second sense," if you will, like the Keltic "second sight"—but it is not "sight" only, or particularly, but covers every phase of sensory and mental consciousness. (Handy and Pukui, 1972:117).

The people who shared stories for Waiāhole and Waikāne were not all Hawaiian or part-Hawaiian, but included Filipinos, Portuguese, and Chinese born in Hawai`i. Having grown up with a culture which acknowledges a spiritual aspect to nature and interprets it in a certain way has made these individuals more sensitive to such phenomena.

### A. *`Aumakua*

Kamakau defines *`aumakua* as family ancestral dieties (Kamakau, 1964:28). Pukui writes that the *`aumakua* could act as a "spiritual go-between" with the living and the *akua*, who were not always so easily approached (Pukui, 1972:35). For Aunty Elizabeth Mahoe, who grew up in the study area, her *`aumakua* are often remembered in association with the fishpond at Kualoa.

So, they tell—the fishpond—my grandfather, my father telling us this story. Grandpa takes him—he was only about maybe five years old and the grandpa took him to the fishpond down Kualoa and he told him 'Grandpa going down there'—they figure their *`aumakua* is eel and shark. So he going down in the fishpond, feed the eels. 'I'll be right back, you just stay here and wait.' And my father was only five. He cried, screaming, yelling. Then he gets up—gets out, 'I told you, stop this crying. I was coming back. Look I'm back'. And he not even wet. But he went in the pond and feed his *`aumakua*, the eel and the shark. That's how I know that's our *`aumakua* too, the eel and the shark. (Interview w/ E. Mahoe, 1/6/02)

For Aunty, her *`aumakua* live on in the story told to her by her father Joseph Ho`okano.



Contrary to the popular belief that people did not eat their *`aumakua*, Aunty Elizabeth related that her family did eat shark.

That's why all this *haoles* today, so to speak, that says they have to cut off the Hawaiians from eating sharks because that's their *`aumakua* and it's our *`aumakua*. We ate it because that was our staple, our food to eat. *`Aumakua*, no *`aumakua*, you gotta eat. So we ate it. (Interview w/ E. Mahoe, 1/6/02)

A second story about *`aumakua* comes from Uncle Kalei Morita and also points to Kualoa, more specifically Mokoli'i (Chinamen's Hat). Uncle Kalei remembers hearing about the story of the "old lady Parish on the turtle" (Interview w/ A. Morita, 1/4/02). "Old lady Parish" refers to Libbie Nawahinekawai Peck Parish who was born in Waikāne in 1892 and grew up with Ka`akaualani and Kaukukālā, *kahuna nui* of the Sacred Lands of O`ahu. (Interview w/ T. Parish, 7/27/98; in Shideler, 2000, *report in progress*)

AM: Take her out on a canoe, go fishing with him [Kaukukālā]. Then he'd put her on the island [Mokoli'i] and he'd tell her stay there, the turtle going come get her. Then she look around, she see this big turtle over there, she jump on the back and the turtle bring direct home, right up until the shoreline. (Interview w/ A. Morita, 1/4/02)

Generally, informants did not talk about their *`aumakua* and beliefs related to *`aumakua*. The tradition does call for some discretion as Pukui points out, "Hawaiians didn't go around talking about their *`aumākua*" (Pukui *et al.*, 1972:V.I:41).

## B. *`Uhane*

One definition of *`uhane* is "the vital spark, that, departed from the flesh, lived on through eternity, rewarded for virtue or punished for transgressions in life. Thus *`uhane* is "spirit" in the immortal sense", and the "soul" of Christian concept. Or, as immortal spirit or soul, the *`uhane* might return to visit the living and so be termed a "ghost" (Pukui *et al.*, 1972:193). Many informants report seeing visions or ghosts in the study area, particularly in Waiāhole. The *`uhane* appear differently for different people. Some see apparitions, others hear noises and still others sense odors or fragrances out of the ordinary.

### 1. The *`uhane* of Waiāhole Point

Several people talked of a ghost frequenting Waiāhole Point, at the mouth of Waiāhole Stream. James Medeiros leases land on the *mauka* (northwest) side of the stream and Prisco Bagio leases land on the *makai* side of the point. One person, who has been living with Mr. Bagio for the last few years, described hearing a woman singing in Hawaiian at night. When questioned, he described the woman's voice as young. He also said she sometimes talked, what might be proper, or schooled English and sometimes he could hear her talking to a man. She didn't appear every night and sometimes not for long periods of time (pers. communication w/ Walter, 12/7/01). This type of supernatural voice or sound is termed *`ūlāleo* in Hawaiian (Pukui *et al.*, 1972:11).

`*Ūlāleo* was also experienced by Manatad at Waiāhole Point. She went out fishing by Waiāhole Point with her family and had a strange experience.

IM: Yeah, across the poi shop, he get one da kine—squatters over there. I don't know now if still yet get. I go fishing over there, across now. He get just like one small bay, one small bay where I lay over there. Me, my son Kalo, the one living in Kauai, and Veronica and my son-in-law Kapule, four of us. All right. And we pick up the net. When we pick up the net, we get—my son-in-law, he heard the *ukulele*; they play Hawaiian music. But no more house.

KB: Now, tell me where is this again.

IM: You know where the poi shop? And across, he get one road going in.

KB: Yeah, where the squatters get.

IM: Yeah, he get one road going in. And he get some Filipino squatters. Yeah, Filipino. All right. Right across that by the ocean.

KB: By the ocean where the stream comes into the ocean. Right there?

IM: Yeah. That's where we hear noise, but the rain was kind of drizzling, just drizzling. Not heavy rain. And then, just like we pull in the net, but just like they dragging us to the shore, you see. And my daughter Veronica was hiding in the bow and he tell that, 'oh ma, we better go home, go home'. I said, 'no, we have to pick up all the net'. And so, I pray, I pray, and I tell my son, but I start the motor because when we pick up the net we have to start the motor. But, the motor, the propellor, he stuck already in the sand. Just like we going to the shallow instead going out. And then I tell my son, I said, 'oh, you better go down and push the boat toward, by Kipapa. That's Kipapa over there. All right, then he went and I start the motor, no because the motor when die because the propellor, he stuck already, no can da kine. And so, he went start the motor and I wen' go full speed come over here. Oh, they all run in the pier, they no even take the fish from the net 'cause they was so scared. Because, even me—my hair stand up because they sing loud, the *ukulele*. You can hear the *ukulele*, but nobody over—no more house. Yeah, that's the one over there. That's why get funny because that's all—all this area all Hawaiian. (Interview w/ I. Manatad, 12/19/01)

Not only was the Manatad family hearing music, Manatad was feeling as if the family boat was being pulled toward shore by some inexplicable force. Her description of the location correlates with the `*ulāleo* heard by Walter.

A fisherman and crabber who has worked in the piggery of the Medeiros lease land also referred to the lady who sings and talks at Waiāhole Point (pers. communication, R. Santos, 12/7/01). Mr. Santos inferred a story that the lady lost her husband and is still trying to find him. Mr. Santos feels there is a connection between the `*uhane* who calls out

at night and the burial ground on Mr. Medeiros' lease land; he thinks that if he could find the Hawaiian ladies from Hilo who visited the burial ground, he could help the *`uhane* get to the world she needs to go to (pers. communication, R. Santos, 12/7/01).

In his twenty eight years leasing land at Waiāhole, Mr. Medeiros has had many *`e`epa* experiences. He and other certain members of his family have seen visions including a *wahine* ghost, smelled her perfume, had family members under spells of possession, and gone through certain types of bad luck that Mr. Medeiros attributes to *`uhane* and a particular house on the property. Mr. Medeiros claims the *`uhane* is a woman, but he does not feel she is a malevolent presence.

## 2. *`uhane wahine*

Mr. Medeiros has witnessed several times the vision of a woman walking by. He describes the vision as a "white cloud", "Casper the Ghost" kind of apparition. The features are not clear, but he "knows" it's a woman, especially by her perfume. Mr. Medeiros associates the *wahine* ghost with both House A and the burial ground near his house (C), however he does not sense her as a malevolent presence. It is unknown whether this *`uhane wahine* is the same as the woman heard at Waiāhole Point, though it is possible. The burial ground, House A and Waiāhole Point are all in close proximity. In his interview, Mr. Medeiros talks about the vision.

JM: ...You know, I never did keep notes when things li' dis wen' happen. Then, we see people walk by in white cloud, you know look like—feel like a person. Sometime, you can smell perfume on 'em. So, could be one *wahine* we see all the time, but then my neighbor said he seen one guy. But, I only see one *wahine* all the time. You can smell perfume when they going out. And we don't have no electricity here. We have generator. At night when the thing pass the generator, we stay in the garage, we see 'em coming and the generator jus' surge down, then once they pass, the thing come back up strong.

KB: What does she look like? How do you know it's a woman?

JM: No more face. Can see shape like a woman.

KB: So, you can see her shape?

JM: Yeah.

KB: You can see her hair?

JM: No, but you can tell—you know. It's a woman. Then, from house A, the thing go out toward house B and toward house C and then go in the back where get one grave. We see 'em walking that way. You see the thing moving. I see it.

KB: Have you ever watched her go to the grave.

JM: Yeah.

KB: And then what happens?

JM: I ain't gonna go look. But I seen 'em, my son seen 'em Fred Jr., my daughter Dana seen 'em. And where we are, my daughter yelled to the mother, 'look, look ma, there she walking out'. They say it's a woman too, and my wife cannot see 'em. Jus' like only certain people can see 'em. (Interview w/ J. Medeiros)

This type of vision could be interpreted as an *akua lapu* or *lapu*. *Akua lapu* are understood as "ghosts, apparitions, or evil spirits. According to the older people, the *poe akua lapu* were spirits of deceased persons seen in the night in burying places and elsewhere. Their purpose was to frighten people" (Kent, 1986:409). Similar to those individuals who shared about the *uhane* at Waiāhole Point, Mr. Medeiros feels as if the ghost that wanders his land was there before his time and is more like a lost soul than a vindictive one.

### 3. Burial ground

Other strange occurrences concerning the burial ground on his lease land were shared by Mr. Medeiros. Mr. Medeiros described a strange force which protects the burial ground. At one time, when he and friends were attempting to clear trees and rubbish from an area just *mauka* of the mound containing the burial mound, they were not able to. Numerous attempts were made with heavy equipment and a bobcat to clear the area and "the thing just push the machine away" (Interview w/ J. Medeiros, 1/24/02).

Another time, a friend reported a fire burning just behind the burial mound. Mr. Medeiros described the fire as a flame shooting out of the ground, blue and very hot. When he stepped into the mud near the fire, his leg sank about a foot and a half down into the mud. When he lifted his leg, there was no mud on his foot. "Yeah, they all freaked out because how come no more mud and I walking through there like nothing." (Interview w/ J. Medeiros, 1/24/02)

Apparently, Mr. Medeiros has some unfinished business with the burial mound.

JM: Yeah, but see I was told by—when my wife wen' go see the psychic about this kine stuff, they said I build something, I'm supposed to tear 'em down. 'As why we getting problems and the pig pen, I never did tear 'em down yet. They told me I'm supposed to get 'em off. 'As when they see 'em, 'as what they was telling and I never did tear 'em down. (Interview w/ J. Medeiros, 1/24/02)

### 4. The *Kamani*

At the edge of the land where Manatad has lived for many decades, there is a *kamani* tree which has remained untouched. When the Manatads first moved to this land in the 1930s, Mr. Manatad cleared much of the land of vegetation. Manatad describes when her husband came to the *kamani* to cut it down, he heard a voice, "...He said one old lady. Night time. He wen' da kine that. Just like he [she] tell 'don't you cut that tree'" (Interview w/ I. Manatad, 12/19/01). Since,

then, the Manatad's have never cut that *kamani* tree. Manatad has also taught her children and grandchildren to let the *kamani* alone.

IM: Oh yeah. You know when I go lay net over here, you know by the *kamani*. I smell cigar. And then my daughter tell me, 'ma, I-'. I say, 'no, no, you no talk'. They know that cigar, because how come you can smell cigar over there. Nobody over there in the *kamani*. And I told my grandchildren, I said, 'your father don't go in the *kamani*'. The *kamani* is very da kine so nobody go over there. You have to respect. (*Ibid*)

The *kamani* tree (*Calophyllum inophyllum*) is considered a sacred tree in many parts of Polynesia and has documented uses as medicine as well as in fabricating Hawaiian calabashes (Neal, 1965:586). Neal also writes of a *kamani* grove on Moloka'i made famous by navigators. One long time resident claims that formerly there were many more *kamani* trees lining the shoreline in the study area (pers. communication, G. Hoaeae, 1/28/02).

### C. *Pō Kāne*

“On the 27<sup>th</sup> night of the lunar month was kapu in its meaning of “sacred” to the god Kane. On this night, spirits of departed chiefs march over the pathways trod in life. Anyone in the pathway of the marchers might be killed. The spirit of a relative could rescue him or the victim could save himself by stripping and lying flat in the path. This may account for the fear that visions can kill” (Pukui *et al.*, 1972: 22). Often called “night marchers” in modern times, several informants in the Waiāhole and Waikāne area are very familiar with them. Some of the informants recognize them as marchers of the night and others describe stories which appear to be night marchers. The following is a synopsis of *pō Kāne* stories told.

Uncle Kalei Morita describes a night marchers path that began at the ocean in Waikāne, passed by the Kamaka land at the edge of Waikāne and went up to Kukuianiani Heiau on Pu'u Pueo. He has never seen anything, but has often heard the drums associated with the procession (pers. communication, A. Morita, 12/7/01). This path is outside of the study area.

Uncle Don Pacyau had an experience when was a boy which to this day still mystifies him.

DP: Well, I can't remember how old I was. I remember, maybe I ten or twelve years old, I think. I heard something back of our house. Let's see, stomping like. So, I open the back of my window; our house window is wooden kind window 'cause no more glass or whatever. It's the window, the kind you just push 'em like that with a stick and you look out. But, I seen more than five of them, men only, walking, with their head down, without shirt, but with pants, camouflage kind pants. I don't know what kind, green, black or what. You know, camouflage kind. So, I ask my Grandma, 'Grandma, get somebody in the back'. I think she already knew something like that. She came by the window, 'Shut that window'. 'Who's that?'. 'Never mind, just shut that window'. But, in my mind, I seen everything already, the person or whatever was, that human being, anyway, walking with

their head down. Never did look up. I don't know where they wen' end, they just—I just close the window—I don't know where they went. I can show you the spot too, anyway. But, I don't know where they went. Yeah, in the back.  
(Interview w/ D. Pacyau, 11/30/01)

Although he did not identify this experience as having seen night marchers, the fact that they were in a line and walking from *mauka* to *makai* and particularly Uncle Don's grandmother's reaction suggests they may have perceived as been night marchers.

A third path is suggested to be in Waiāhole. A long time neighbor of Mr. Medeiros, Xavier Cougat, actually felt there were two paths through the Medeiros land, though he only identified one (pers. communication, X. Cougat 1/21/02). Mr. Cougat felt that on *Pō Kāne*, it was the *menehune* who marched through the land at Waiāhole. He told us the story that was repeated again during an interview with Mr. Medeiros.

JM: Yeah, him [Cougat] and his old lady was sleeping in the car 'cause they nevah build the house yet. And had—they had people walking over the car, but they never think nothing. The next morning—

KB: He heard people walking?

JM: You know da kine. Not really walking, but you know da kine, the car shaking like somebody going over the car. Then the next morning, he show me the footprint. Small little feet. But, I don't know. Like from this grave and get one path go to the river. (Interview w/ J. Medeiros, 1/24/02)

The path mentioned goes from the burial ground near the Medeiros' house through the bathroom of Mr. Cougat's house to the Waiāhole Stream (pers. communication, X. Cougat, 1/21/02).

Finally, Manatad relates a story which may or may not have been a *Pō Kāne* experience. She remembers hearing her dog barking one night at the ocean. When she looked out the window, she saw lights moving on the water. Her husband thought it was probably people going to *hukilau*, but she knew that people no longer went *hukilau* in the near shore areas. She had no explanation. (Interview w/ I. Manatad, 12/19/01) The Manatad's location at the boundary of two *ahupua`a*, Waiāhole and Ka`alaea makes it a particularly suitable place for a *Pō Kāne* path.

#### **D. Akua Lele, Fire Balls**

*Akua lele* are defined as “flying gods, usually a poison god sent to destroy, sometimes in the form of fireballs” (Pukui and Elbert, 1986:15). Pukui and Elbert liken them to *akua hānai* and *akua kumuhaka* which revolve around manipulating spirits to manifest one's will. Kamakau links *akua kumuhaka* to Mauna Loa, Moloka`i, famed for other types of sorcery (Kamakau, 1964:134). According to Kamakau, *kalaipāhoa* woods (*kauila*, *nīoi* and *ohe*) obtained at Mauna Loa were carved into images which absorbed the *mana* or spiritual power of the place.

When the *kahu* of the *kumuhaka* god wished to harm (*make*) a person, he would

secretly take his god out in the evening and scratch the breast of the image on the left side. Even if the image was but the size of a hand, the *kumuhaka* god would fly from the house and stretch out, swelling and diminishing, swelling and diminishing, swelling and diminishing, and tapering off into a streaming tail (*Ibid*).

Three of the Waiāhole, Waikāne *kama`āina* consulted have witnessed fire balls; some refer to the phenomenon as *akua lele*. Most describe it as a large, round ball of fire that is either rolling or flying and has a tail. Aunt Elizabeth Mahoe said she has seen fire balls “plenty times” (pers. communication, E. Mahoe, 1/12/02). Once she asked her mother why her father swore so much when he came into the house. Her mother explained that it was his way of keeping the fireballs away, ‘cause somebody had sent the fireballs to the house to destroy the house.

Uncle Don Pacyau remembers seeing a fireball rolling down Kamehameha Highway towards Kualoa when he was a young boy.

KB: Tell me about the fireball.

DP: I don’t know how we seen that, but somebody said, ‘something is rolling on the road, there’s a tail on the back’. What? I never know what was that. I never did hear of that kind stuff. So my grandmother said, ‘grab the ti leaf’, whatever we had ti leaves and all kind, ‘stand front the driveway’, that two side driveway. I don’t know; I stayed in the front and somebody else was over there. I don’t know who was. ‘Just wave the ti leaf’. I seen ‘em. But somebody told us before that, so I don’t know who say that [warned them].

KB: Somebody yelled?

DP: I think so. Something like that. So, I went over there, I told my grandmother. My grandmother said ‘Just go over there and shake the ti leaf’. So, I just went go over there and shake the ti leaf and the stuff went roll right in front me on the road like this. Right, that road [pointing to Kamehameha Highway]. With a long tail, as it rolled like that. You shake the ti leaf like that. From there on, nobody said nothing after that. Funny, though. All the time, nobody ask questions after that. ‘What is that, how come?’ And whatever. Only my grandmother said, ‘the stuff go in your yard, whatever, somebody going get sick’. That’s all.(Interview w/ D.Pacyau, 11/30/01)

To appease the *akua* and quiet the malevolent action, Kamakau recommended offerings of coconut, red fish, pig and *`awa* (Kamakau, 1964:135). More common methods of diversion of “spirits” in modern times were described in the stories told here, swearing and shaking of the ti leaf. The old timers seem to agree that these types of experiences are rare these days, not like before.

## E. Kana

Another common theme in the *mo`olelo* of this area is the giant man. All who have seen the giant man describe him as coming from the sea. Richard Paglinawan heard this story of how his uncle saw a giant man:

Well, we have hole toilet in the old days. And the hole toilet was close to the *`auwai*. And it's facing the bushes. So you go down and either get your kerosene lamp or if you no scared you go down – And my uncle one time was sitting and taking a crap when all of a sudden – He looked up and he thought it was two trees. And he never pay attention. And when he started coming out, he looked up, these two trees came together. And then he went out. Then he could see the head. He got so frightened. And now he was in his forties. He started screaming for help. And everybody started running down – my aunty, Recarte, all started running down. He was clawing up the ditch. He'd somehow fell into the *`auwai* and he was trying to get out of it. When he got out he was telling that he had seen this giant man. We was all laughing: "Nah, no can be Kana." He said: "Yeah – big man." And finally my mother them, of course, they older – they told: "Eh, maybe you wen' drink too much or something." But in hindsight maybe the story of this giant man who frequented Kāne`ohe Bay area, including Wai`āhole and Punalu`u, was real because somebody saw – So that's the ones that I know of [in the *makai* portion]. (Interview w/ R. Paglinawan, 11/26/01)

Mr. Paglinawan mentioned that his family would always talk about the giant Hawaiian man. The family sometimes referred to the giant as Kana, a demi-god. From what he remembered, Kana typically came out at night and also was known in the Punalu`u and Kahana areas. During his interview, Mr. Paglinawan felt there may be some relationship between Kana and Kanaloa. In Hawaiian mythology, Kana appears in association to Moloka`i's northern coast, specifically the valleys of Pelekunu and Waikolu and particularly the dividing ridge between the two valleys, Haupu (Thrum, 1998:63). In the legend, Kana fights Kape`epe`ekauila to return Hina, Kana's mother, to her rightful husband Hakalanileo. In the Thrum version, Kana must rescue Hina from the fortress Haupu which grows into the heavens. With the help of his grandmother, Uli from Hawai`i, Kana is able to grow taller than the Haupu fortress and return Hina to Hakanileo (*Ibid*: 63-73).

Manatad also reports having seen a giant man long ago.

...And then, I don't- if you believe this tall man. They get tall man. Tall man, you know. Just like one giant. And I seen that. You know, he passed by the ocean and then you can see the leg, but you no can see the head. All right. But, if you swear, that thing, just like he knock down your house just like nothing. He would shake your house, but you know you think it shake, but no shake, you see. And so, my husband said, 'you no talk-' because he know about Philippines say, 'you no talk'. I say, 'okay'. I said, 'yeah, but too long the leg. Where he going?' I was young, I don't know eh. My husband said, 'no, no, no, you no talk all right'...



(Interview w/ I. Manatad, 12/19/01).

Throughout her life in Waiāhole/Ka`alaea, Manatad has had many *`e`epa* experiences. She describes them as “da kine” and has a healthy respect for the Hawaiian spirits that passed through her land before her.

In talk story sessions with Aunty Elizabeth Mahoe, the discussion of giant men led to an experience she had with a giant dog. Aunty said she had witnessed the shadow of a giant dog in Hakipu`u, outside of the study area (pers. communication, E. Mahoe, 1/6/02). The man-eating dog-man, Kaupe, is known to frequent the Hakipu`u area “in the clouds hovering over the mountain” (Sterling and Summers, 1978: 186-187).

## VII. SUMMARY (Refer to Figure 24)

A Hawaiian traditional cultural practices assessment has been conducted for 78 acres in the Waiāhole and Waikāne coastal flatlands for the Waiāhole Beach Park Expansion. A concerted effort was made to contact knowledgeable informants of the area. Nine knowledgeable individuals were identified and interviewed. Four of the individuals currently live in the study area or have lived there in the past. Four individuals have spent considerable time in the Waiāhole Waikāne areas and have intimate knowledge of the *ahupua`a*. One individual grew up in Hakipu`u, but has some knowledge of the study area. In addition to the interviews conducted, research was carried out at the Hawai`i State Archives, the Bureau of Land Conveyances, the Hawai`i State Survey Office, the State Historic Preservation Division, with Waihona.com and the Cultural Surveys Hawai`i Library.

Research and community consultation for this area suggest Waiāhole and Waikāne Ahupua`a are extremely rich in cultural traditions. Written sources document the area's connection to the Kumulipo, a creation story of Hawai`i. Legendary figures such as Māui, Hi`iaka, Kamapua`a, Laka, Kāne, Hua`a, Kapunohu, Olopana appear in the historic documentation relating to the two *ahupua`a*. Waikāne was noted as a *pu`u honua*, a place of refuge in Ko`olaupoko. Waiāhole is listed as one of several *ahupua`a* given first to the *kahuna* Lonoawohi and later to the *kahuna* Lonomauki. The many place names documented for Waiāhole and Waikāne reflect the areas colorful history of gods, demi-gods, famed *ali`i* and *kahuna* who have become a part of the spirit of the place.

Many Hawaiian and part-Hawaiian families still live in Waiāhole and Waikāne. After initial consultations suggested there were many knowledgeable individuals living in the area, it was decided to focus the consultations on the study area, and families who had specific knowledge of the study area. The individuals consulted and interviewed described many traditions and practices, some which have faded, others which are still very alive and others which had faded, but are now being revived.

A few informants still held memories of legendary associations in Waiāhole and Waikāne. The place of these *ahupua`a* in the Hawaiian Creation Myth was mentioned. Two informants pointed out place names in the *ahupua`a* and in the greater Kane`ohe Bay significant to Polynesian voyagers of the past. Stories of a *heiau* in Waikāne and oral testimony obtained for nearby Kualoa Ethnographic Study allude to the *kahuna* tradition that once unified the lands from Waiāhole to Kualoa.

Fishing traditions and gathering ocean resources remain strong in the area. Almost everyone consulted talked about fishing, crabbing or gathering shellfish or *limu* along the shoreline of the study area. Different types of fishing mentioned include net fishing such as *huki huki* net, *moe* net, throw net, bag net and `ōpae net. Other types of fishing identified include diving, trapping, hooking, *lama lama* fishing or torch fishing at night. The ocean resources typically caught near the study area include *āholehole*, *pāpio*, *akule*, *kumu*, *weke*, *awa*, `ama (mullet), *hīnālea*, *manini*, *palani*, *uhu*, *kala*, *alalauā*, *moi*, *he`e* (*tako*, squid), turtle, lobster and shark. The community also communicated a strong tradition of

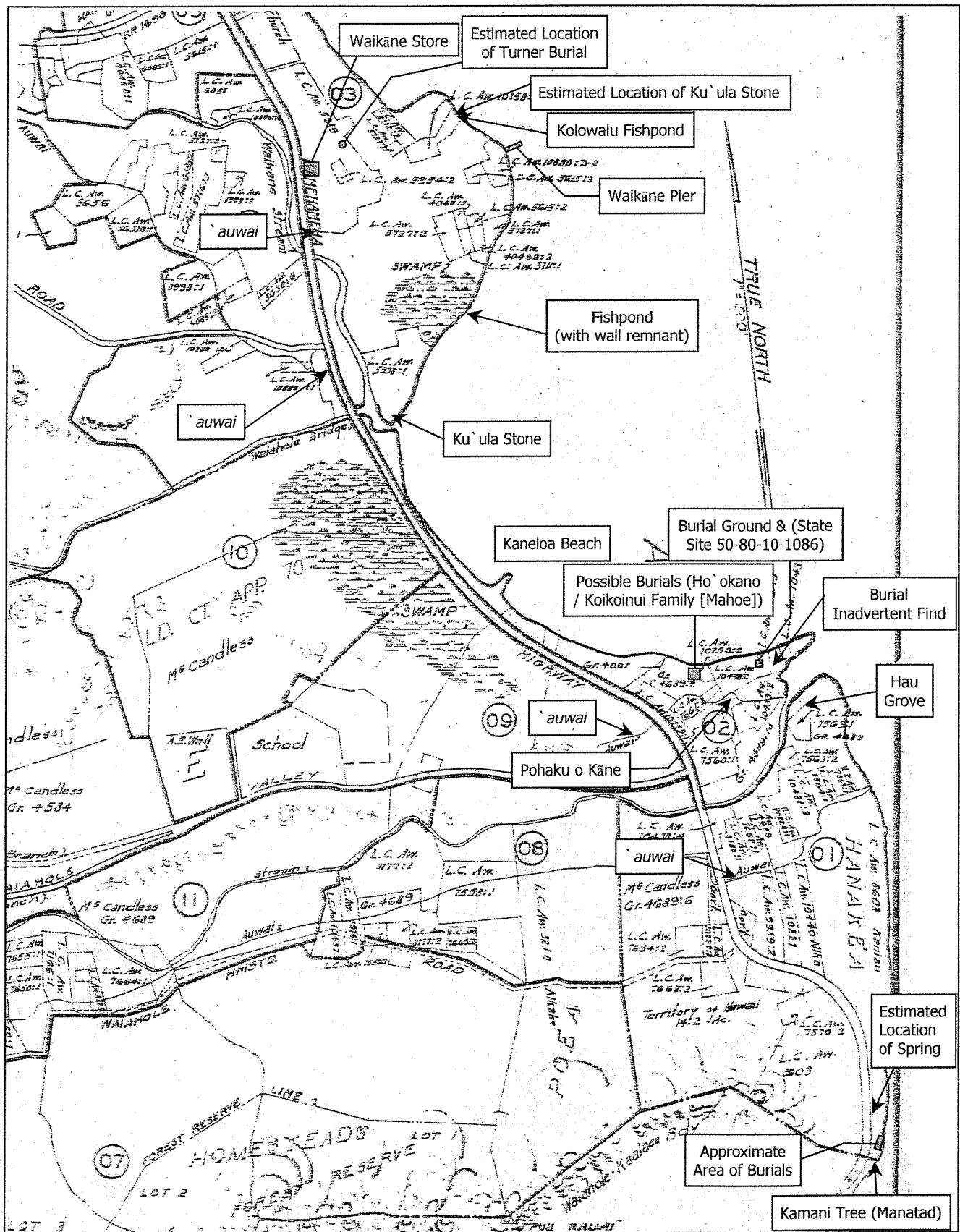


Figure 24 Portion of TMK 4-8 Showing Approximate Locations of Traditional Cultural Properties in the Study Area as Described by Informants.

gathering in the near shore environment adjacent to the study area. This area has been rich in `ōpae lōlō, a variety of crabs including *kūhonu*, `ala`eke and *mo`ala*, Samoan crab, and the red or Hawaiian crab, a few species of edible marine snails such as the *kūpe`e* and the `ōlepe and several species of *limu* such as *manauea*, `ele`ele and *līpe`epe`e*. Further offshore, *limu līpoa* was collected.

Several fishing grounds and geographical references used in fishing were shared by those familiar with them. The bay between Waiāhole and Waikāne, referred to as Kaneloa Beach by one, was indicated as a particularly excellent fishing ground in the past. Two *kama`āina* shared stories of sightings of giant marine animals. Most informants expressed concern and sadness over the deteriorating conditions of the ocean resources due to environmental degradation, overfishing and changes in the younger generations. Despite problems, families continue to frequent the shoreline and waters to fish and gather.

Two fishponds were identified in the study area during talk story session, both in Waikāne. Also, the traditional practice of reverting *lo`i kalo* to fishponds was also mentioned as something which used to occur within the study area. The streams flowing through the study area, particularly the Waiāhole and the Waikāne Streams are an important feature for people living in the area, not only because of the *āholehole*, `ōpae and `o`opu that are caught there, but also as a main artery to the health of the valley and as a source of recreation and gathering place, as illustrated by the many swimming holes informants pointed out.

Five `auwai were identified in the study area, three in Waiāhole and two in Waikāne. Up until the 1950s, water from the `auwai was used for household consumption, drinking water and in irrigation for for the rural communities that lived in the two *ahupua`a*. There is interest in restoring the `auwai for the taro revitalization efforts. Other water resources in the study area include one spring.

Rice was planted in the study area in the late nineteenth century, early twentieth century. Only one informant could remember rice cultivation and processing during his lifetime. Based on informant testimony, taro was grown in the study area up until the 1950s or 1960s. Māhele records suggest extensive taro *lo`i* in the study area. In the twentieth century, much of the taro cultivation in the study area has been carried out by Japanese and Filipinos, who moved into the area attracted by available lease land and agricultural opportunities. In the lifetimes of many informants, taro cultivation has faded and in the last few decades has begun to come back. Many community members would like to see taro growing in the study area once again.

A *hau* grove, considered sacred by some, was identified in the Waiāhole portion of the study area. The grove is attached to a legend which may have connections to Moloka`i. Also in Waiāhole was a *pōhaku o kāne*, or family altar. One *kama`āina* mentioned the possibility of finding *kuahu* or altars in the area. Five areas of burials in the study area were identified during interviews and community consultation. Four of the burial areas are in Waiāhole and one is located in Waikāne. Lineal descendants are noted for some burials.

Although plants were not stressed during interviews, a few informants pointed out plants which they felt held significance. An *‘uhane* presence was felt associated with the *kamani* trees found on the Manatad land near the boundary of Waiāhole and Ka`alaea. the *kamani* is known to have been more common in the study area in past years. One family also mentioned that there used to be a special variety of *hala* growing on their land in the study area. Other plants mentioned in an indirect way include *niu*, (coconut) used in making *‘ōpae* nets, *ti* used in preparation of fish and to ward off *akualele*, and *‘aki`aki* as habitat for the *‘ōpae lōlō*. *‘Uhaloa*, a common medicinal plant, was indicated in the place names of Waikāne. A bulrush, *‘aka`akai*, is documented surrounding the Kolowalu fishpond in an historic record.

Traditions pertaining to the less tangible realm of the spirits were also shared by informants. Several had stories about spirits, *‘aumakua*, ghosts, *akualele* or fire balls, *pō kāne* or night marchers and giant men. Some told their stories in relation to the study area and others in a more regional context. This type of cultural tradition often goes unacknowledged, however it is a very real part of these communities

## VIII. RECOMMENDATIONS

The Waiāhole and Waikāne region is one of the few remaining areas of O`ahu with many Hawaiian traditions and cultural practices still intact. Although questions regarding opinions of the Waiāhole Beach Park were not posed, several people gave opinions. Many seemed to favor the park, especially in the sense that it would provide a place for social gathering. Others viewed the park not only in terms of recreation, but also as a place to continue cultural traditions such as taro and other types of cultivation, possible aquaculture, fishing and spiritual practices. One individual held the view that the land in Waiāhole and Waikāne was condemned for the people of that area and homes for the people of the area were needed, not more parks. The one unifying strand in everyone's view is that the park land is for the people of Waiāhole and Waikāne. This is not in the exclusive sense that only members of those communities could use the park, rather that the people of Waiāhole and Waikāne would be responsible for the vision of that park and caretaking that vision. With that in mind, it is important that the following recommendations be carried out in conjunction with the community. Place specifics are located, as far as possible, on Figure 24.

### A. Specific Recommendations

#### 1. *Ku`ula*

Two *ku`ula* stones were identified for the Waikāne portion of the study area. One has been clearly identified as being located on the eastern side of the Waikāne Stream at the stream mouth. The second *ku`ula* was said to be near the Waikāne Pier, though its exact location was not recorded.

*Recommendation: When archaeological work is done in Waikāne, an attempt should be made to locate the ku`ula near the Waikāne Pier.*

*Recommendation: Both ku`ula in Waikāne be preserved in place.*

#### 2. Fishponds

Two *loko i`a* were described in Waikāne, one named Kolowalu and the name of the second fishpond has been lost. The following recommendations are made because of the significance of fishponds in Ko`olaupoko in general and the communities' vision of possible future use of the fishponds.

*Recommendation: Both fishponds in Waikāne be preserved in place.*

*Recommendation: Further archaeological and cultural work be done on the fishponds.*

#### 3. Spring

One spring has been located in the study area, in Waiāhole. This spring has legendary associations with Moli`i Fishpond in Hakipu`u.

*Recommendation: Preserve spring in Waiāhole portion of study area.*

#### **4. Lo`i Kalo and `Auwai (Taro)**

Taro cultivation has a long history in the study area. Based on historic documentation and oral testimony, portions of the study area were being cultivated in taro from long before the Māhele up until the 1950s or 1960s. The influx of Japanese and Filipino people into the area in the first half of the twentieth century was largely influenced by commercial taro operations. Many of the descendants of those Japanese and Filipino families still live in Waiāhole and Waikāne. Older Hawaiian or part-Hawaiian informants still remember their parents and grandparents working in the *lo`i*, many of which were located up in *mauka* areas. However, the tradition faded as economic opportunities changed and land was taken away. Today, there has been a revival of old agricultural traditions, particularly in taro cultivation. Some families consulted have been growing taro now for more than twenty years. There is great interest in growing taro in the study area. The study area has already been considered for future taro cultivation and portions of some of the irrigation ditches or *`auwai* which were used in traditional agricultural practices are still intact.

*Recommendation: Work with interested members of the communities to define the location and extent of taro lo`i envisioned in the study area. Design other park features with taro lo`i layout in mind.*

*Recommendation: In further archaeological work in Waiāhole and Waikāne, identify and investigate `auwai.*

*Recommendation: Preserve what remains of the `auwai system in both Waiāhole and Waikāne.*

#### **5. Burials**

Five areas of burials in Waiāhole and Waikāne were identified during consultation with the community. Lineal descent is claimed for four of the five burial areas. Raymond Kamaka claims to be a lineal descendent to burials found in the burial ground near Waiāhole Point (State Site: 50-80-10-1086) and including the burial that was inadvertently found nearby (Interview w/ Medeiros, 1/24/02). Elizabeth Mahoe (Ho`okano/Koikoinui family) remembers funerals at her house in Waiāhole and believes there may be burials in the land she grew up in. Burials have been found at the Manatad's lease land though no claims of direct lineal descent were made by any of the interviewees. The burial in Waikāne was mentioned by Horuko Tsutsui of the Waikāne Store, who believes the burial belonged to the Turner family, a family that once lived in the area. Based on the value that Hawaiian families place on burials, particularly the *`iwi* of their ancestors, the following recommendation is suggested:

*Recommendation: The burial areas identified by informants during consultation for this study be avoided. Park design should take into account the locations of the burials and plan accordingly. If other burials are identified before or during sub-surface activities related to the construction of the park, lineal and cultural descendants should be consulted. In particular, Raymond Kamaka expressed the desire to be contacted if burials are unearthed in Waiāhole and Waikāne.*

*Recommendation:* Prepare a burial treatment plan.

## **6. Waiāhole Point**

Informants told many stories of *uhane* and spirits which are part of Waiāhole and Waikāne. One area where there is a concentration of *uhane* stories is at Waiāhole Point, where the Waiāhole Stream empties into the sea. Just *mauka* of the point is the burial ground (Site 50-80-10-1086) and the location of the inadvertent burial discovery (Interview w/ J. Medeiros, 1/24/02). Also near this area is a *pohaku o kane* (Site 50-80-10-6396), also described as a *kuahu* or altar by one informant. A legendary *hau* grove is just across the stream from the burial ground. Some know the legend, some just believe the grove was a sacred place. One, possibly more paths associated with *pō kane*, or night marchers, is known to pass through this area. Stone artifacts suggesting human habitation have been identified here. Undoubtedly an area rich in cultural traditions, many *kama`āina* expressed concern over destruction or alteration of this special place.

*Recommendation:* The area encompassing the *pōhaku o kane*, burial ground, *hau* grove and both sides of Waiāhole Point be maintained as a natural and cultural preserve.

## **B. General Recommendations**

### **1. Fishing Grounds**

Fishing was identified as a very important traditional practice to the people of Waiāhole and Waikāne. The variety of fishing methods and the sheer numbers of fish and other marine resources gathered indicate a long and rich fishing tradition. Several informants voiced concerns about overfishing, environmental degradation and loss of traditions.

#### **a. Overfishing**

Some worry that reducing vegetation in the park area, particularly along the shoreline will open up access and aggravate an already existing overfishing problem. This has already been experienced with the clearing of the vegetation along Kamehameha Highway in the area of Kaneloa Beach.

*Recommendation:* Create a park design which would create limited access opportunities to the shoreline so that fishing would still be accessible, but perhaps not so easy.

#### **b. Environmental Degradation**

One informant describes how erosion has accelerated in the area that was cleared a few years ago to open up the view plane along Kamehameha Highway. Erosion and sedimentation is one of the great water quality concerns in the Kāne`ohe Bay in general and is one of the principal causes of species decline. One way to limit erosion in the near shore environment, which is an important area of crabbing, gathering shell fish and *limu*, is to keep the shoreline vegetated.

*Recommendation:* Protect the shoreline from erosion by planting native plant species such as



*kamani, hala, mīlo, niu, and hau.*

Other plants which were once common in the area and served to stabilize the shoreline were the `aki `aki grass and `aka `akai bulrush. `Aki `aki also served doubly as habitat for the `ōpae lōlō which was once found in great numbers.

*Recommendation: Plant `aki `aki grass, `aka `akai bulrush or other native grasses and sedges in the inter tidal zone and near fresh water outlets to stabilize shoreline and create new habitat for native crustacean species.*

## **2. Rivers**

The river continues to provide the community with opportunities for fishing and recreation. Although finding `ōpae and `o `opu is not so easy as it once was, people still travel to the river to make a go at it. The stream mouths of both Waiāhole and Waikāne are a particularly sensitive area, environmentally and culturally and several individuals expressed concern about keeping those areas intact. Environmentally, the stream mouth is a very productive zone and an excellent fishing ground. Culturally, the āholehole is part of the name sake of Waiāhole and the people are invested in preserving its habitat.

*Recommendation: Create a park design and plan park construction with the intention of protecting the riparian zone and thus the water quality of the Waiāhole and Waikāne Streams.*

## **3. Plants**

The use of Hawaiian plants to create a Hawaiian sense of place is important. There are many individuals in Waikāne & Waiāhole who feel the Waiāhole Beach Park should be culturally oriented.

*Recommendation: In park design and construction, preserve as many of the native species of plants in place as possible. When landscaping is necessary in park, choose Hawaiian plants.*

## **4. Place Names**

The use of Hawaiian place names helps an area preserve its history, sometimes through legend and sometimes through reference to a cultural or natural resource.

*Recommendation: With community input, use documented place names to name park features or user areas.*

## **5. Further Work**

Several traditional properties and practices were identified from the area north of Waiāhole Stream to the Waikāne Stream mouth. In addition, some traditional cultural properties were reported for the shoreline areas of the Waikāne portion of the study area. There does seem to be a void in the information collected for the land area of Waikāne and south of Waiāhole

River. Although there are several families currently living in the Waikāne portion of the study area, most of them have not been there for longer than a few decades. Two long time families were identified in the area, the Lagapa family and the Chartrand/Villanueva family. Attempts were made to contact both families, however circumstances did not allow for further consultation.

*Recommendation: If there is to be further expansion of the park into the Waikāne area, attempts should be made to contact at least the Lagapa and Chartrand/Villanueva families.*

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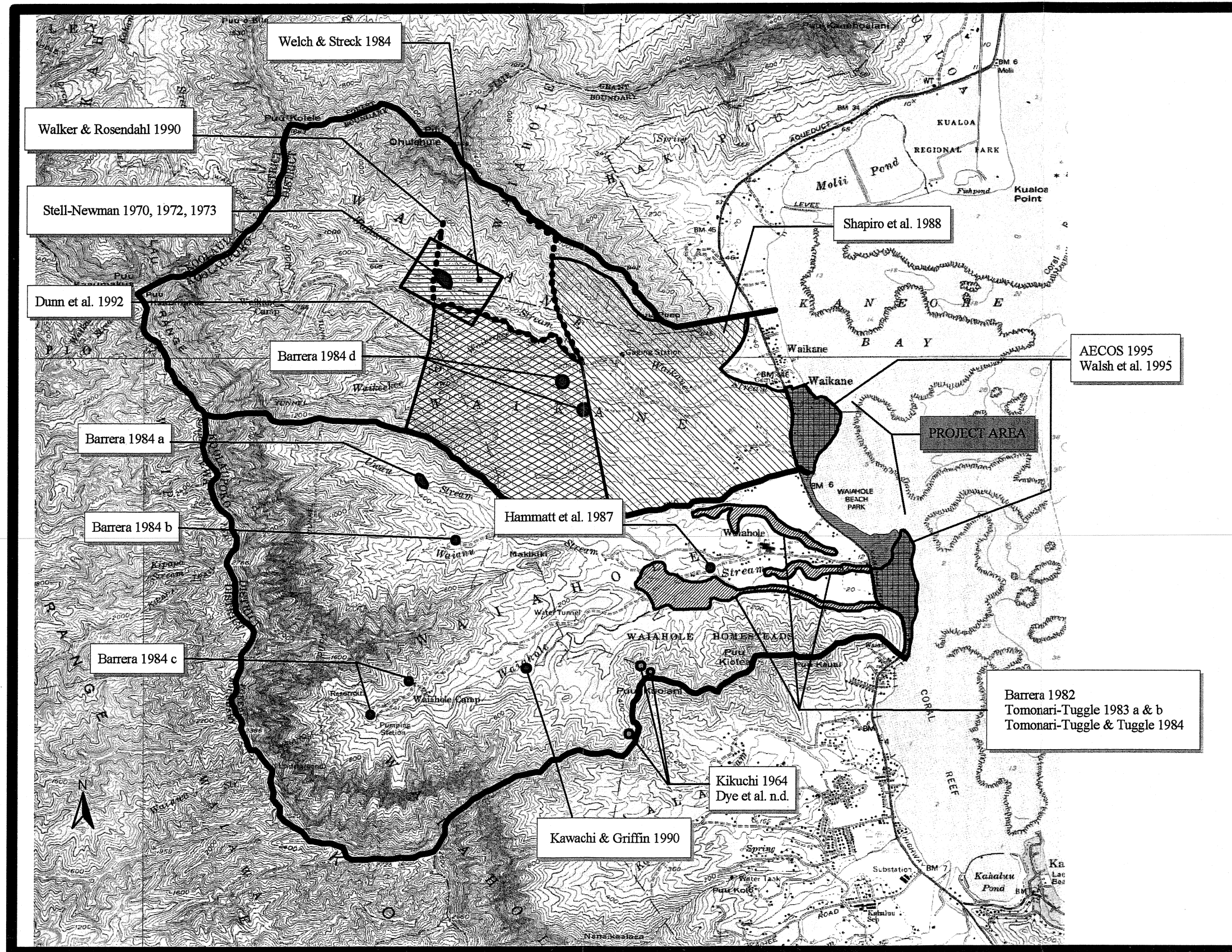


Figure 13 Map Showing Previous Archaeological Surveys (Inventory and Data Recovery) and Previously Identified Sites

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**AN ARCHAEOLOGICAL INVENTORY SURVEY  
OF AN APPROXIMATELY 21-ACRE PARCEL  
AT COASTAL WAIĀHOLE *AHUPUAʻA*,  
KOʻOLAUPOKO DISTRICT, OʻAHU  
(TMK 4-8-02:1,2,4-12)**

Prepared for

Dept. of Design and Construction,  
City & County of Honolulu

by

David Perzinski, B.A.

David W. Shideler, M.A.

Tony Bush, B.Ed.

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Hallett H. Hammatt, Ph.D.

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27 November 2002

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## I. I. INTRODUCTION

At the request of the Department of Design and Construction, City and County of Honolulu, Cultural Surveys Hawaii conducted an archaeological inventory survey with sub-surface testing of an approximately 21 ac. parcel (TMK: 4-8-02:1,2,4-12) situated in the traditional land division, or *ahupua'a* of Waiāhole, District of Ko'olaupoko, Island of O'ahu. Portions of the parcel are to be developed by the owner, the City and County of Honolulu, as part of Waiāhole Beach Park improvements.

### A. A. Project Background

The *Conceptual Master Plan for Waiāhole Beach Park* shows the primary development activity to be focused in the southern portion of the park where active recreation including several ball fields, a restroom facility, road connections (storage lanes, driveways), a parking lot (+/- 60 stalls), a picnic area, and a people's open market site are envisioned. Accessible walkways and a bike path are envisioned for the long, narrow northwestern portion of the project area. The higher impact infrastructure related to the park development is planned for near Kamehameha Highway with more passive recreational use planned for areas adjacent to the sea and Waiāhole Stream. The plans are conceptual in nature and the build-out is planned in phases covering perhaps many years.

### B. B. Project Area Description

The project area at Waiāhole comprises approximately 21 ac. It is bound on the west by Kamehameha Highway, on the east by the sea, on the north by Waikāne Stream delta and on the south by the north bank of Waiāhole Stream (Figure 1 and Figure 2).

These parcels are situated at the *makai* edge of the Waiāhole and Waikāne Stream valleys, both of which originate on the windward slopes of the Ko'olau Mountain range. The majority of the terrain is nearly flat and consists predominately of flood plain and beach deposits less than 40 ft. above mean sea level (a.m.s.l.). The valleys contain numerous intermittent streams and several that flow year-round, including Waikāne, Waiāhole and Waike'eke'e streams.

Two soil types are present in the project area; Pearl Harbor Clay in the northern and southern portions and Hanalei silty clay in the central portion. The Pearl Harbor Clay permeability is very slow, and soil is difficult to work with. On the other hand, the Hanalei silty clay is very fertile and permeability is moderate. (Foote *et al.* 1972:Sheet 58).

Temperatures, within the project area, range from an average (mean) minimum of 60° F. to an average maximum of 85° F. (Kapaka Makai Station, 10 ft a.m.s.l.). Rainfall averages 60 - 80 in. per year (Juvik and Juvik 1998:56).

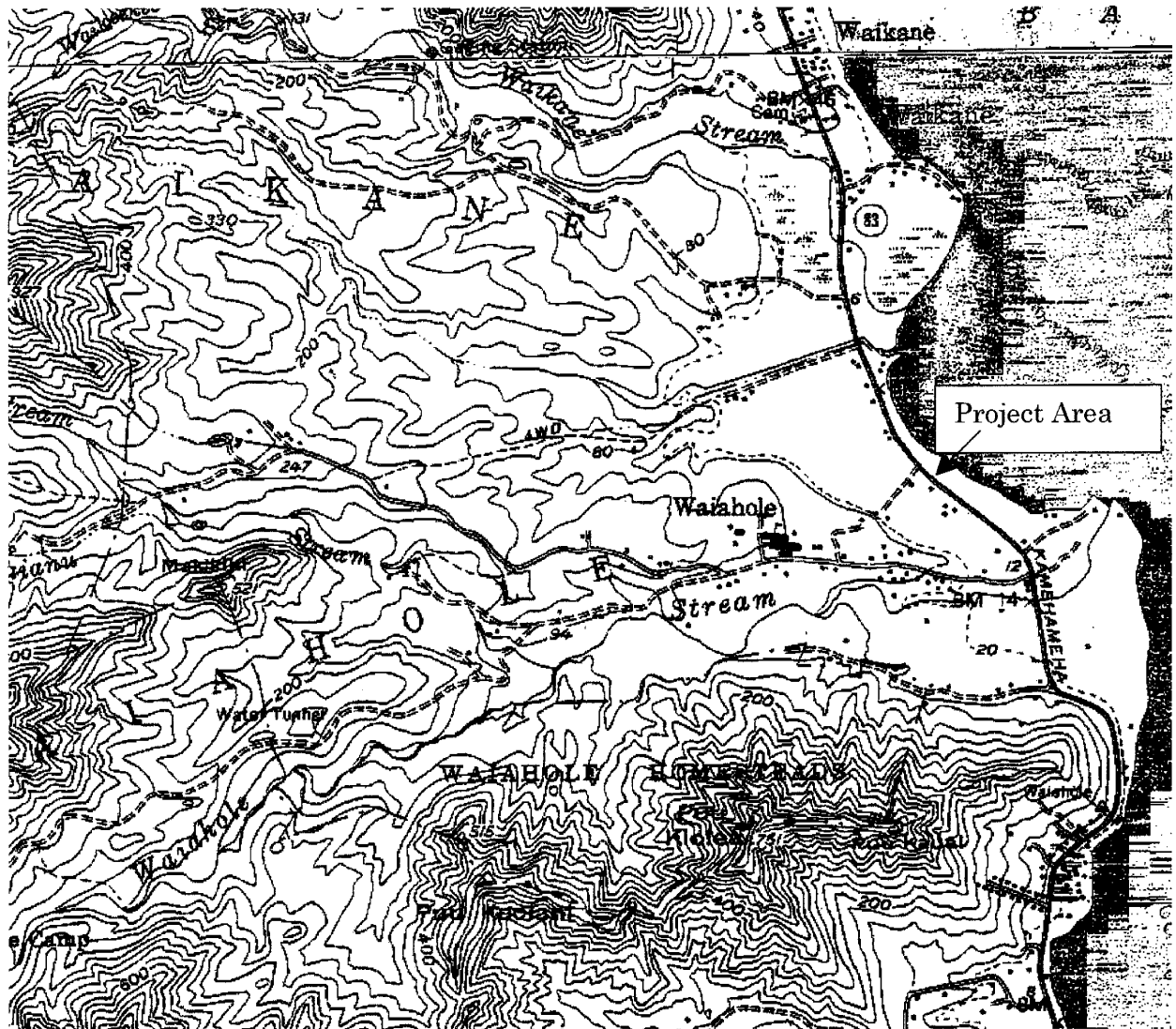


Figure 1 Portion of USGS 7.5 Minute Series Topographic Map, Kaneohe and Kahana Quadrangles, Showing Waiāhole and Waikane Ahupua'a, Waiāhole Beach Park Project Area, and Areas of Previous Archaeological Study

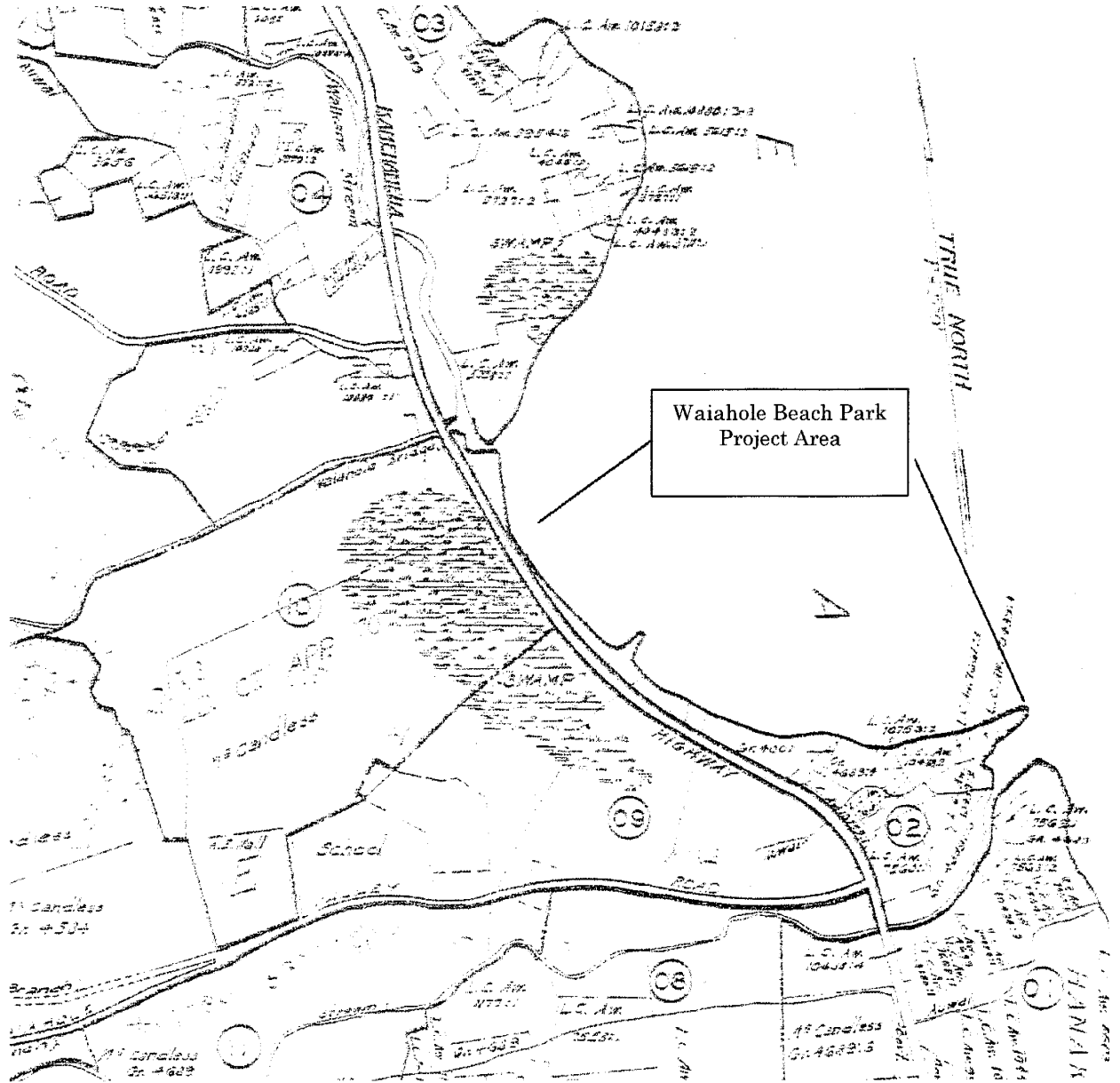


Figure 2 TMK Map 4-8, showing Project Area Makai of Kamehameha Highway and LCA in the Vicinity

### C. C. Scope of Work

The Scope of Work for this project conforms to State Historic Preservation Division draft Guidelines (Title 13, Sub-Title 13, Chapter 277, 5/12/99) for “Rules Governing Standards for Archaeological Inventory Surveys and Reports”.

The following archaeological inventory survey scope of work was utilized:

1. A complete ground survey of the entire project area for the purpose of site inventory. All sites were located, described, and mapped with evaluation of function, interrelationships, and significance. Documentation included photographs and scale drawings of selected sites and complexes. All sites were assigned State site numbers.
2. Limited subsurface testing to determine if subsurface deposits are located in the project area, and, if so, evaluate their significance. Appropriate samples from these excavations found were analyzed for chronological and paleoenvironmental information.
3. Research on historic and archaeological background, including search of historic maps, written records, and Land Commission Award documents. This research focused on the specific area with general background on the *ahupua`a* and district and emphasizes settlement patterns.
4. Preparation of a survey report include the following:
  - a. A topographic map of the survey area showing all archaeological sites and site areas;
  - b. Description of all archaeological sites with selected photographs, scale drawings, and discussions of function;
  - c. Historical and archaeological background sections summarizing prehistoric and historic land use as they relate to the archaeological features;
    - d. A summary of site categories and their significance in an archaeological and historic context;
  - e. Recommendations based on all information generated, specifying what steps should be taken to mitigate impact of development on archaeological resources - such as data recovery (excavation) and preservation of specific areas. These recommendations are developed in consultation with the client and the State agencies.

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Discussions were held with Dr. Sara Collins in advance of the fieldwork confirming the need for sub-surface testing that would be widespread within the project area but also focus on the area of known LCA and areas adjacent to streams to recover both cultural data and paleo-environmental data if found.

**D. D. Methods**

Background research included a review of previous archaeological studies on file at the State Historic Preservation Division of the Department of Land and Natural Resources, a review of geology and cultural history documents at Hamilton Library at the University of Hawai'i, the Hawai'i State Archives, the Mission House Museum Library, the Hawai'i Public Library, and the Archives of the Bishop Museum. Further research included a study of historic photographs at the Hawai'i State Archives and the Archives of the Bishop Museum, a study of historic maps at the Hawai'i State Archives and the Archives of the Bishop Museum, and a study of historic maps at the Survey Office of the Department of Accounting and General Services.

Information on Land Commission Awards was accessed through Waihona Aina Corporation's *Māhele* Data Base (Waihona `Aina Corporation <[www.waihona.com](http://www.waihona.com)>).

CSH archaeologists Anthony Bush, David Perzinski, Alike Anixt, and Todd Tulchin under direction of William Folk accomplished the archaeological inventory survey and sub-surface testing in the project area. Fieldwork consisted of a ground survey, mapping, photography and test excavation trenches at relevant locations within the project area. Additionally, two core samples were taken for pollen and C<sup>14</sup> analysis. Dr. Jerome Ward completed pollen analysis. Beta Analytic, Inc completed C14 analysis.

For each trench, the following steps were taken:

- 1) The excavated trench was located on the large project area map by means of compass bearings and taped measurements to features on the ground and located on the project area map by land survey.
- 2) Each trench and sediment profiles exposed in the trench were described, noting special characteristics, artifacts, or midden found.
- 3) Photographs were taken and stratigraphic profiles of at least one wall of the trench were drawn.

## II. II. HISTORIC BACKGROUND RESEARCH

There have been numerous studies done on this part of O`ahu and a great deal of primary research has been carried out on the *ahupua`a* which border Kane`ohe Bay, including Waiāhole and Waikāne. The following background summary builds upon four of these studies in particular; *Land Use at Waiāhole Valley Oahu* by Michihiro Miyagi (1963), *Sites of Oahu* by Sterling, and Summers (1978), *Kane`ohe: A History of Change* by Dennis M. Devaney *et al.* (1982) and *Limited Historical Documentary Research Land of Waikāne, Ko`olaupoko district, Island of O`ahu* by Helen Wong Smith (1990).

### A. A. Traditional Accounts of Wai~hole

Pukui (1983:180) relates a poetical saying referring to the demi-god Maui at Waiāhole; probably drawing upon Kamakau's 1869 account given below:

*Ke ala kike `eke`e a Maui.*

*The winding trails of Maui.*

She explains:

Trails made by Maui when he was pursued by those who wished to destroy him. One trail was at Waiāhole, O`ahu, one at Keka`a between Lahaina and Kā`anapali, and the third at Kealakahakaha, Kahakuloa, Maui.

Samuel M. Kamakau relates that:

Maui, son of Kalana, was one of the ancient chiefs of Maui who made roads twenty centuries ago. The roads in his day were straight, and the people were accustomed to running along straight roads; so when certain persons ran after Maui to kill him he made the road go zigzag and it was called "the zigzag road of Maui." (*ka alanui kike`eke`e a Maui*). One is at Waikāne and Waiāhole in Ko`olaupoko on O`ahu... (*Ke Au `Oko`a* October 14, 1869)

This myth may account for some of the winding roads in Waiāhole. It might be the explanation as to why the path is in a certain location or has a certain configuration such as switch-backs. Alternatively this may be a traditional explanation associated with the stream named Wai-ke`eke`e ("Lit. "Crooked water") in Waikāne .

Another poetical saying (Pukui 1983:186) was:



*Ke kalo pa`a o Waiāhole.*

*The hard taro of Waiāhole.*

She explains, probably drawing upon the 1865 account of Kaehuaea given below:

A reminder not to treat others badly. One day, a man went to Waiāhole, O`ahu, to visit his sister, whom he had not seen for many years. She was absent, and her husband neither asked the stranger in nor offered him any food. When hunger possessed the visitor he asked if he might have some taro to eat. His brother-in-law directed him to his taro patches and told him to get some from there. The man went to the patches and then continued on his way. When the woman returned she was told of the visitor, and by her husband's description she knew that it was her brother. She rebuked him for his lack of hospitality. When they went to their taro patches they found all the taro pulled up and hacked to pieces.

Kaehuaea (1865) relates the following account:

The solid taro of Waiāhole, according to the opinion of the public, was a very hard taro. It was not so, it became famous because of the strange deeds of a man, Kuapunohu, a warrior. He went about Ko`olaupoko to find some one to challenge. His sister was living there with her husband Imaole. She went fishing while he remained at home. The stranger said to the native son, "Have you two any food?" The native son answered, "We have food but standing in the patch." The stranger thought that he was going to have to suffer with hunger so he asked the native, "Where is your patch?" The native gave him specific directions and he went 'til he came to the border of the taro patch. Here he broke off the tip of his spear and used it as a prod. He reached out for two taros, cut them into small pieces and laid them on the fire. He continued doing this until he made a big work, clearing up the whole patch of four acres and burning it up like the blowing away of the sea of Ukoa. "Serves him right." said Kuapunohu as he went off. (*Na Mea Kaulana o Waiāhole, Ku`oko`a Sept. 16, 1865*)

This myth describes, land usage, and the attitude and values of the people previously living in the Waiāhole region. Waiāhole has fertile soil, and was reknown for the cultivation of taro. The saying would appear to be a rebuke to the attitudes of the residents once living there who may have had a reputation as not being very accommodating and hospitable towards strangers. When a resident fails to offer food and accommodations to a stranger on his land (his brother-in-law), his wife later finds out and rebukes him for his lack of hospitality towards his brother-in-law. When the man allows the stranger to help himself to some taro, and doesn't

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bother to help the stranger, he eventually pays for his laziness and unaccommodating attitude. He learned his lesson later when he saw that all his taro was pulled up and wasted by his brother-in-law.

In the *Legend of Halemano* (Fornander ,1919 Vol. V, Part II) Halemano [the romantic anti-hero of Oahu] met up with the heroin of this tale, Kamalālāwalu (a Fickle Puna, Hawai'i island princess) in Waialua, O'ahu. There they resumed living together, but their living situation wasn't as harmonious as it was before. With her sad and unfulfilled heart, Kamalālāwalu set out and journeyed:

She journeyed to ... Kualoa where she met Waiāhole, a chief of that place who was a single man. He took Kamalālāwalu as his wife and they resided there [near Kualoa] together.

*Holo mai la o Kamalālāwalu... a Kualoa. Loa`a o Waiāhole, he `li`i no laila e noho ana, a`ohe ana wahine; lawe a`e la ia ia Kamalālāwalu i wahine nana, a noho iho la lāua ma laila.*

When Hua`a the king of Puna received word that Kamalālāwalu was residing on O'ahu with another chief he said:

Yes, we have given her our properties with the idea of getting her to be our wife, but we did not succeed. Let us therefore go and make war on those with whom she is now living.

*Ae, ua lilo ka kaula waiwai ia ia no kona kino, aka, aole i loa ia kaula kona kino, nolaila, e holo kaula e kaula i kona wahi i noho ai*

King Hua`a did just that. He sent a massive fleet of men in about eight thousand canoes (*he mau man wa`a*) to make war with chief Waiāhole's people. King Hua`a's men landed at Makapu`u.

...they advanced overland, going by way of Kāne`ohe. At Kāne`ohe proper they met the enemy and the fighting began. Early in the battle O'ahu was routed and a great slaughter took place at Waiāhole.

*...a makaukau lākou, hele mai la lākou mauka a hiki i Kāne`ohe. Ho`omaka ke kaula, ma ia kaula ana, ua he`e honua o O`ahu nei, a ua luku ia o Waiāhole.*

After the battle, Kamalālāwalu was found alive and taken by the Kings of Hawai`i, Hua`a and Kulukulua, back to Hawai`i island.

This tale presents the idea of a massive slaughtering of Hawaiians in the Waiāhole area (or of the forces of the chief Waiāhole) during a battle over possession of a princess, but the historical accuracy of this tale remains uncertain. If there was such a great slaughter of the forces of Waiāhole it could have been elsewhere at Luluku (Lit. “Destruction” in upland Kāne`ohe for example).

Fornander (1919, Vol. V, Number I, pp. 214-225) relates the *Legend of Kapunohu* which has many similar motifs to both Kaehuaea’s account of Kuapunohu (magic spear, strife with brother-in-law as a result of a perceived slight over food) and the Legend of Halemano (a big island chief comes to visit an O`ahu woman, lands at Makapu`u, and slays the forces of O`ahu) and explains the proverb of the hard taro of Waiāhole. In this legend the strife with a brother-in-law as a result of a perceived insult over food is clearly set in Kohala, Hawai`i Island. After many adventures, Kuapunohu visits his sister named Konahuanui in Ko`olaupoko, O`ahu and harvests fabulous quantities of taro to eat. For reasons unexplained:

When the fire lit, he took some of the taro and cut it up and threw the pieces into the fire and in this way used the taro for firewood. Because of this action of Kapunohu, the saying “the hard taro of Waiāhole”, is known from Hawai`i to Ni`ihau.

*...a mai la ke ahi, pela no kana hana mau ana, a lilo iho la ke kalo i wahie no ke ahi. Nolaila, ma kēia hana ana a Kapunohu, ua kapaia “kalo pa`a o Waiāhole,” he `ōlelo kaulana loa ia mai Hawai`i a Ni`ihau.*

In the *Legend of Kapunohu* the hero’s fabulous strength in pulling taro (presumably from Waiāhole) recommends him to his brother-in-law Olopana. Olopana makes Kapunohu his commander in battle (*alihikaua*), Kapunohu goes on to kill the ruling chief of O`ahu Kākuhihewa and Olopana rules all of O`ahu.

Raphaelson (1929:24) reported Waiāhole’s fame as the place “where hard taro grows, taro so hard that “*hoi kalopa`a i Waiāhole*” is a catchword that means an obstinate man.”

Raphaelson (1929:24) goes on to relate “There is a beautiful tale about Waiāhole and Waikāne, a place beyond. These two were man and wife, it is said. They loved each other for many years, and even today their mists embrace in the upper clouds.”

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Waiāhole was clearly considered a desirable and well watered land. Samuel Kamakau relates that:

When O`ahu came under the rule of Kama-pua`a, he gave the land containing the word *wai* to the kahuna Lono-a-wohi to distribute. Later the land was redistributed by Kahiki-`ula and the older brothers of Kama-pua`a because the kahunas had a monopoly of the well-watered lands, and the kahuna class were given the lands of Waimea, Pūpūkea, Waiāhole, and Hakipu`u in perpetuity, and these were held by them until the days of Kahahana. Kahekili and Kalanikupule confirmed this gift to the kahunas, and so did Kamehameha...Waiāhole belonged to the priests of Lono-mauki. (*Ka Nupepa Ku`oko`a* November 16, 1867)

Richard Paglinawan (1964) related four traditions of Waiāhole including I) a tradition of a *Mo`o* of Waianu Stream, II) a *Kūpe`e* gathering expedition's encounter with a spirit, III) an *Ōpae* gathering expedition's encounter with an *Āuku`u* spirit, and IV) an account of fish lookouts.

### B. B. Traditional Land Use

The district of Ko`olaupoko was rich in many of the resources utilized by traditional Hawaiians. The exploitation of marine resources is evidenced by the multitude of fishponds around the coastal fringe of Kāne`ohe Bay and by the existence of numerous fishing shrines. It has also been recognized that traditional land divisions within the district (*ahupua`a* and *ili*) extended out into the sea, delineating discrete fishery areas. Inland from the coast, rich alluvial soils, an equable climate and abundant water supply allowed the extensive cultivation of traditional crops, especially wetland taro (Figure 3). Handy and Handy characterized the *ahupua`a* in the region as each having,

a broad coastal plain which was converted by Hawaiians into an almost continuous expanse of *lo`i* irrigated with water from large streams flowing out of the deep valleys that cut back into the Ko`olau range. The hinterland must have produced great quantities of sweet potato, yam, banana, upland taro, *wauke*, *olonā*, and *`awa*. Undoubtedly the population was large... (1972:452).

The valleys were described by early visitors to the region as both "in a high state of cultivation" and evidence of prehistoric field systems (*lo`i*) and irrigation channels (*auwai*) have been found throughout the valley floors. The upland forests and ridges that divide the valleys undoubtedly contained a wide variety of valuable resources as well, one of which is known to have been a high-quality basalt that was quarried and used in the manufacture of stone tools.

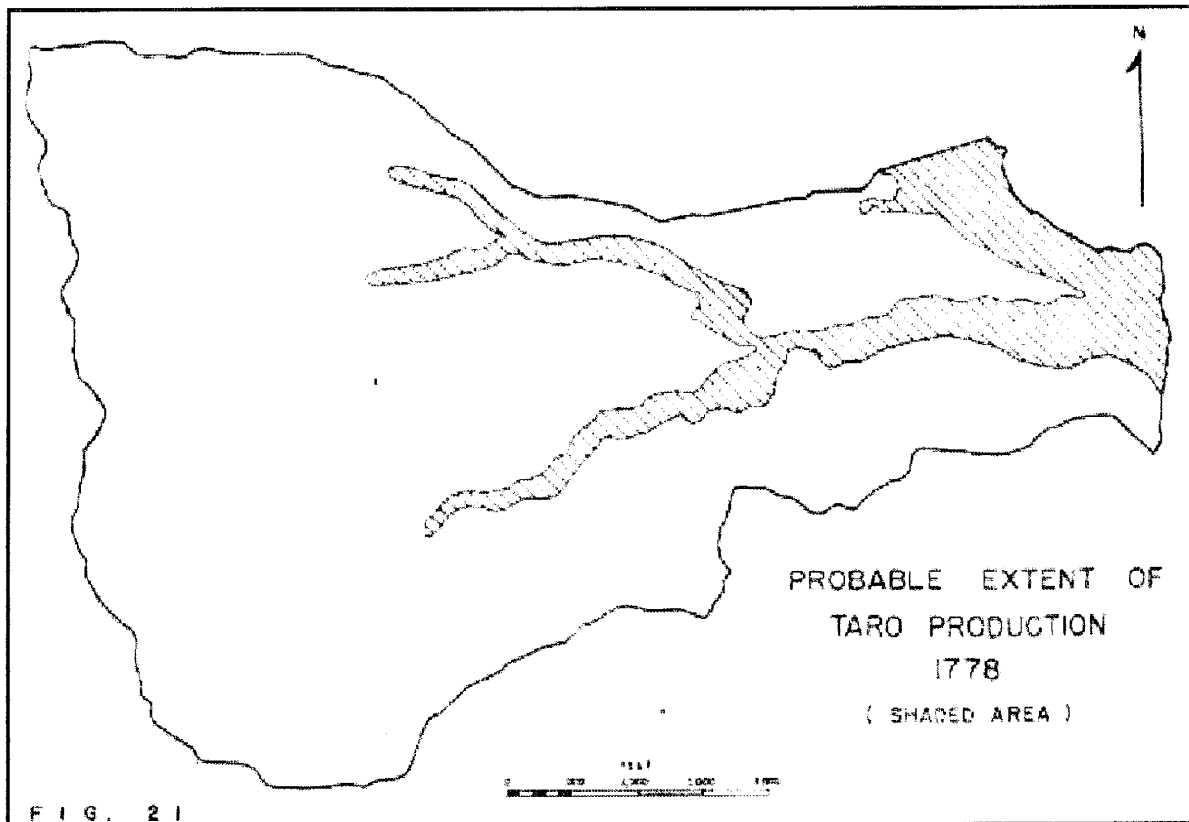


Figure 3 Probable extent of *taro* production - 1778 (from Miyagi 1963:79).

Archaeological sites identified within Waiāhole and Waikāne reflect many of the traditional activities associated with the utilization of these resources, including agriculture, habitation, tool manufacture, and religious observance. Irrigated taro fields have been identified along the streambeds from the upper reaches of the valleys to where the streams meet the sea. Site 1078, Waikāne Taro Flats, represents a portion of the field system within Waikāne, and has been entered on the National Register of Historic Places. Paved areas and enclosures have been found in close proximity to the fields and have been interpreted as habitation sites. Adz quarries have been identified on the ridges between the valleys, and evidence of the manufacture of stone tools has been found throughout the valley floors. The quarry sites that comprise the Waiāhole Quarry Complex have been recommended for inclusion in the National and State Registers. Sites of religious and/or political significance include Kukuianiani *Heiau* (Site 317), located near the coast of Waikāne, Ka'awakoa *Heiau* which at one time stood in close proximity, and several upland sites interpreted as agricultural shrines. Historical accounts have also indicated that Waikāne used to contain a *holua* slide, behind the present day Catholic Church, although no physical evidence of this site has been found.

Dating analyses from archaeological studies suggest that occupation of Waiāhole Valley may have begun around *ca.* A.D. 1200 (Tomonari-Tuggle and Tuggle 1984:I-16), while the bulk of activities probably occurred in late prehistoric and early historic times (*e.g.* Shapiro *et al.* 1988:36, Dunn *et al.* 1990:14). Early census data indicate that in 1831-32, a total of 419 persons

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lived within the two valleys of Waiāhole/Waikāne (Schmitt 1973:19). The population was probably considerably higher at the time of European contact though, since by the 1830's, the native Hawaiian population had already been severely diminished by contact with western diseases, and many of the native inhabitants from these outlying districts had begun moving to the newly burgeoning population centers, such as Honolulu.

Many researchers believe that the Hawaiian population reached its maximum at around the time of western contact. In his study of land use at Waiāhole, Michihiro Miyagi found that:

In the later period of Hawaiian occupancy... all the land in the valley suitable for the cultivation of taro was probably so utilized (refer to Figure 3). The intensive use of the land is indicated by the existence of *kuleana* on small strips of stony land along the tributaries in the valley head. Remains of taro-patch dikes can still be seen in the rough areas above the forest reserve boundary. If such unfavorable areas were utilized for taro, it can be concluded that there was some measure of pressure on the resources of the valley. (1963:78)

In his analysis of land holding patterns based on land claims made at Waiāhole during the Māhele, Miyagi found that the majority of *kuleanas*, lands granted to commoners, were used for the cultivation of taro and were located in the lowlands "in relation to high water table and the possibility of water diversion from streams" (1963:76). A small number of holdings were located in *kula*, or open pasture areas, "but their numbers and size is small as compared with lowland plots... they were probably utilized for house lots and gardens" (*ibid*: 76-77). The distribution of LCAs within the project area seems to fit this general pattern as well (Figure 4 and Figure 5).



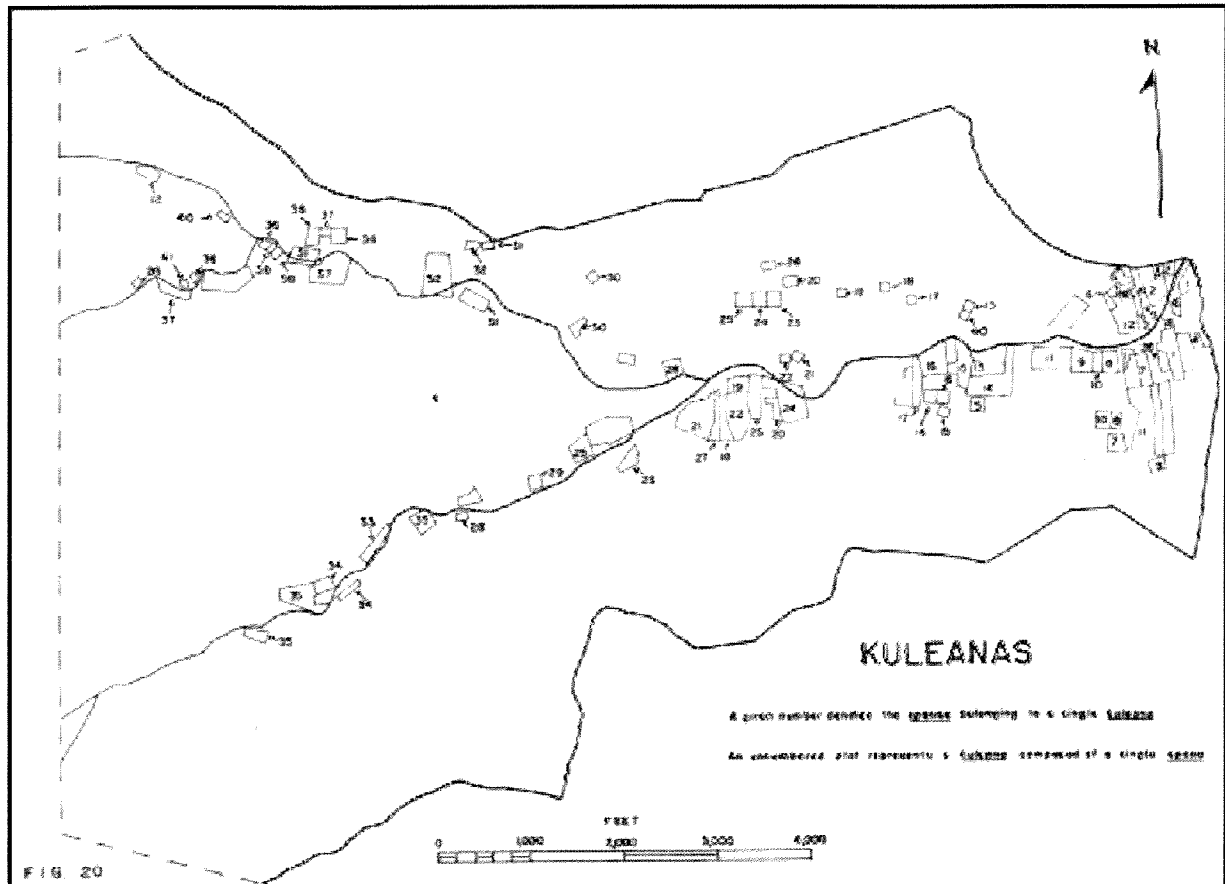


Figure 5 Distribution of *kuleana* awards at Waiāhole (from Miyagi 1963:73).

### C. C. Māhele Records

Two *ʻili* at Waiāhole (Hopeka and Makawai) were kept as “Crown Lands”. Six *ʻili* at Waiāhole including Apua, I, Makanilua, Poahamai, Poea and Uau were taken as “Government Lands”. There were a total of fifty-three small (less than 10 acre) Land Commission Awards (LCA *kuleana*) awards at Waiāhole for a total of 106.89 acres. The average size of these awards was 2.02 acres and the range was 0.47 to 5.6 acres. There were, however, four larger awards at Waiāhole: LCA 105 to William Walker (81.6 acres), LCA 5936 to Puʻuiki (225 acres), LCA 7137 to Kahoʻohanohano (93 acres), and LCA 8603 to Kaniau (57.2 acres). Subsequently there were three large grants of land; grants 702 and 703 (total 264.68 acres) to Kekakeiki in 1860 and grant 874 (113.33 acres) to Kaopulupulu in 1862.

There were six LCAs in the southeast portion of the project area near Waiāhole Stream (summarized in Table 1, shown in Figure 4 above). These parcels appear to have included five house lots, 35 *loʻi*, some *kula* land (probably pasture) and two plots (*mala*) of *ʻawa*.



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Table 1 Land Commission Awards of Record within the Project Area

LCA # R.M.#	Awardee	`Ili	Land Use	Landscape Features	Amount
7560:2	Kekaulaau Kaleihohia, grandson & heir	Uwau	5 lo`i 6 lo`i kula house site	stream, road Palaukae & Wahahae	2.25 Acs Award 2 ap. 3.07
7661:1 2 & 3	Kaukaliu	Kaalae	3 lo`i 2 lo`i house lot & kula	house lot adjoins kalo land. LCA 10438 notes this as Kaukaliu's house lot	3 ap.; 1.58 Acs. R.M. 2130 shows 7661 on shore as apana 3, with church & cemetery
7665:1 & 2 R.M. 2130	Kukuinui	Kaaniu	1 lo`i 1 lo`i 2 lo`i house lot	not mentioned	4 ap. 2.12 Acs R.M. 2130 shows ap. 2 off shore as well as one apana 2 between Nahaina & next to Kaukaliu
10438:2 10438:1 R.M.2130	Naeole Kameo, daughter, heir (wife of Judge Kalili)	Kaipikookau	1 lo`i (out into estuary) 4 lo`i (1.128 ac.)	path, sea beach and house lot, sea beach, Kaukaliu's house lot & Gov. land	4 ap. 5.6 Acs (Ap. 2 1.128 Ac)
10439:1, 2 & 3	Nahaina	Kaalae	4 lo`i, 1 lo`i, house lot 2 mala 'awa	[on beach] not noted in testimony	3 ap. 1.78 Acs

## Archaeological Inventory Survey

LCA # R.M.#	Awardee	`Ili	Land Use	Landscape Features	Amount
107549:1 & 2	Palaukai	Kalaipahoa	6 lo'i, house lot	road	2 ap. 1 Ac.

The Dove “Public Lands Map of Waiāhole” (Registered Map # 2130) dated 1897 (refer to Figure 4) appears to show three structures within the project area. Of particular interest is the symbol indicating a church in LCA 7761 `Apana 3 (awarded to Kaukaliu, spellings on maps differ). A small graveyard is known in this immediate area. The “church” symbol may simply stand for this graveyard or there may indeed have been a small church here serving the Waiāhole community for which there is no other known church site. This is something of an enigma. The first Congregationalist Church in Ko`olau was the Kāne`ohe Station that served as something of a mother church. While there are references to meeting houses at Waikāne and “Koloa” (presumably Kualoa) in the *Kāne`ohe Station Report* for 1860 and to the Kahana congregation by 1880 there appears to be no reference to a discrete Waiāhole congregation. Possibly the church was Catholic, Mormon or even Chinese, or the symbol may only allude to a family graveyard. The Catholic and Congregational Churches of Waikāne have been the major foci of Christian life in Waiāhole of long-standing.

#### D. D. Historic Land Use

The amount of land in Waiāhole under cultivation appears to have decreased throughout early historic times, as it had throughout the Kāne`ohe Bay region. This period saw a steady decline in the native population and an increasing amount of land left fallow or converted to pasture for cattle grazing.

It can safely be assumed that by the time the *kuleana* were awarded [around 1850] there were many parcels of land that were not being cultivated by the Hawaiians primarily because of depopulation, roaming cattle, and the requirements of the Kuleana Act. (Devaney *et al.* 1982:12)

The rate of population decline slowed after 1849 and the population began to increase in parts of O`ahu in 1853, but the population of Ko`olaupoko continued to decline until 1872 (Kittelson 1972, cited in Devaney *et al.* 1982:13). The population increase outside of Ko`olaupoko reflected the emergence of the sugar cane industry and the development of Honolulu as a port city. Ko`olaupoko was not directly affected by these developments because the land was not suited to the cultivation of sugar cane and it was removed from the growing population center of Honolulu.

#### Period of Chinese Rice Cultivation at Waiāhole

The population increase at Ko`olaupoko began in the 1870s', and seems to have been

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directly related to the development of a rice growing industry in the region which began in the late 1860's or early 1870's. Rice production throughout the islands was attributed primarily to the Chinese:

Having first been brought to the islands to serve as sugar plantation laborers, many remained in the Islands following the completion of their contracts. Their accumulation of capital enabled them to rent land and turn to rice cultivation utilizing their traditional knowledge of methods of production which they had brought from China. (Miyagi 1963:106)

Citing Bowser, Miyagi noted that by 1879, "there were at least six rice plantations, seven rice planters and one rice mill operated by a water wheel at Waiāhole. The lowlands formerly utilized for taro were ideal for planting and Waiāhole stream provided an abundance of water for irrigation" (Miyagi 1963:106). An 1897 map of Waiāhole shows the location of the areas under rice cultivation at that time, and shows the location of the mill and several "rice floors scattered throughout the valley" (Monsarrat 1897a). Another 1897 map of Waikāne also shows a considerable amount of land under rice cultivation, a rice mill, and, interestingly, an upland portion of the valley planted in coffee (Dove 1897).

Other sources indicate that there were three rice plantations in Waikāne in 1880 (Bowser 1880:484 cited in Devaney 1982:51), and 200 acres of land were under rice cultivation in 1892 (Coulter and Chun 1937:72 in Miyagi 1963:108).

Young's memoirs (1975) of his childhood in Waikāne relate that rice cultivation in the period of *ca.* 1906-1926 amounted to some 250 ac. with approximately 150 of those acres grown by Sing Tai Wai. Young's map indicates extensive rice cultivation on the north side of the Waiāhole Stream mouth seaward of Kamehameha Highway within the present project area (Figure 6). Sing Tai Wai employed 20-25 year around workers and 15 - 25 more itinerant laborers during planting and harvesting time. The rice mill at Waiāhole was known as the Lansing Mill. The proprietor, Theodore F. Lansing grew rice but also milled the rice of other growers. Young notes that the major transportation link to Honolulu during this time period was a daily roundtrip by stagecoach owned by Chinese living in Ka`alaea with a terminus at the Wing Wo Tai Mill in Waikāne. Most of the activities in the region were centered in Waikāne. Later, a passenger truck owned by Hung Yew Yuen of Waikane served transportation. The Dove Map of 1897 (Figure 7) indicates that present day Kamehameha Highway follows closely the "Government Road" of the late 1800s.

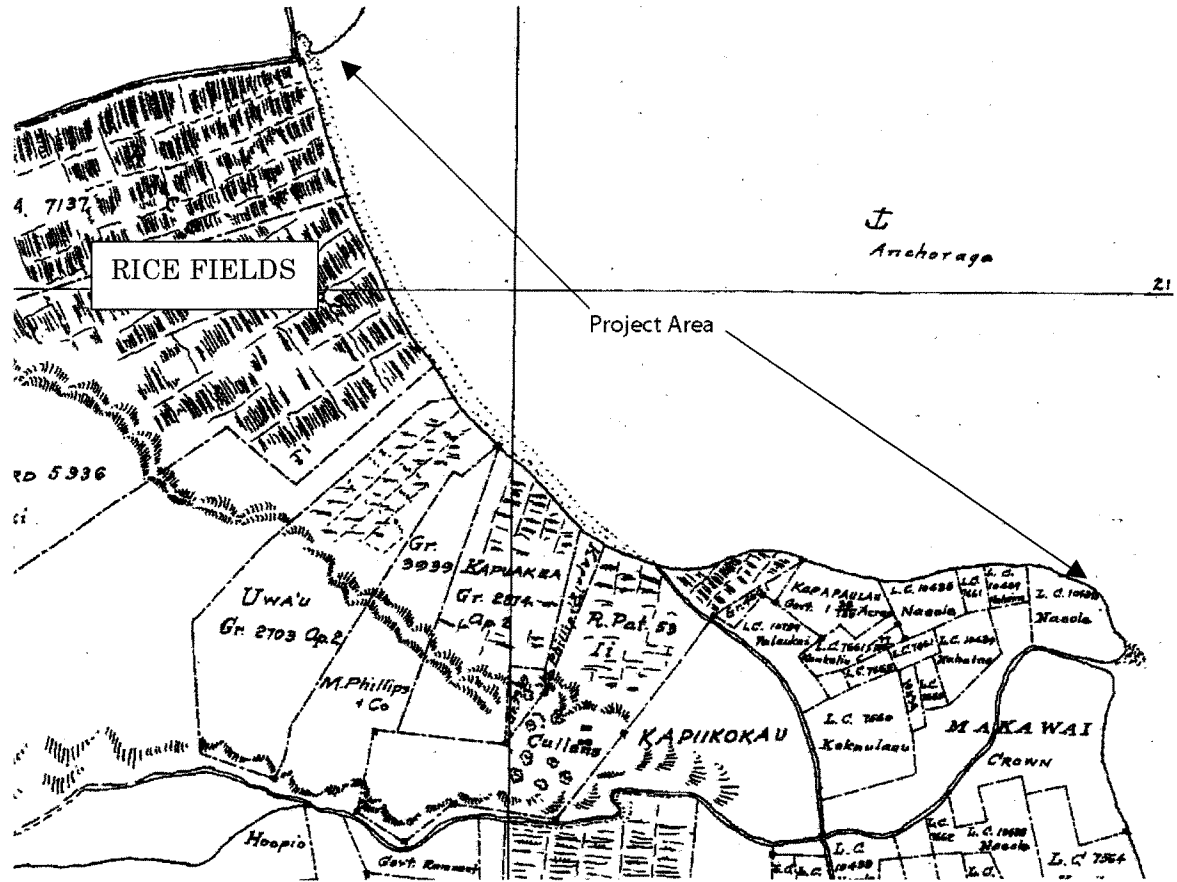


Figure 6 Map of Waiāhole, Waikāne & Hakipu'u showing extent of rice cultivation and other infrastructure ca. 1910 (from Young 1975:6)

## Archaeological Inventory Survey

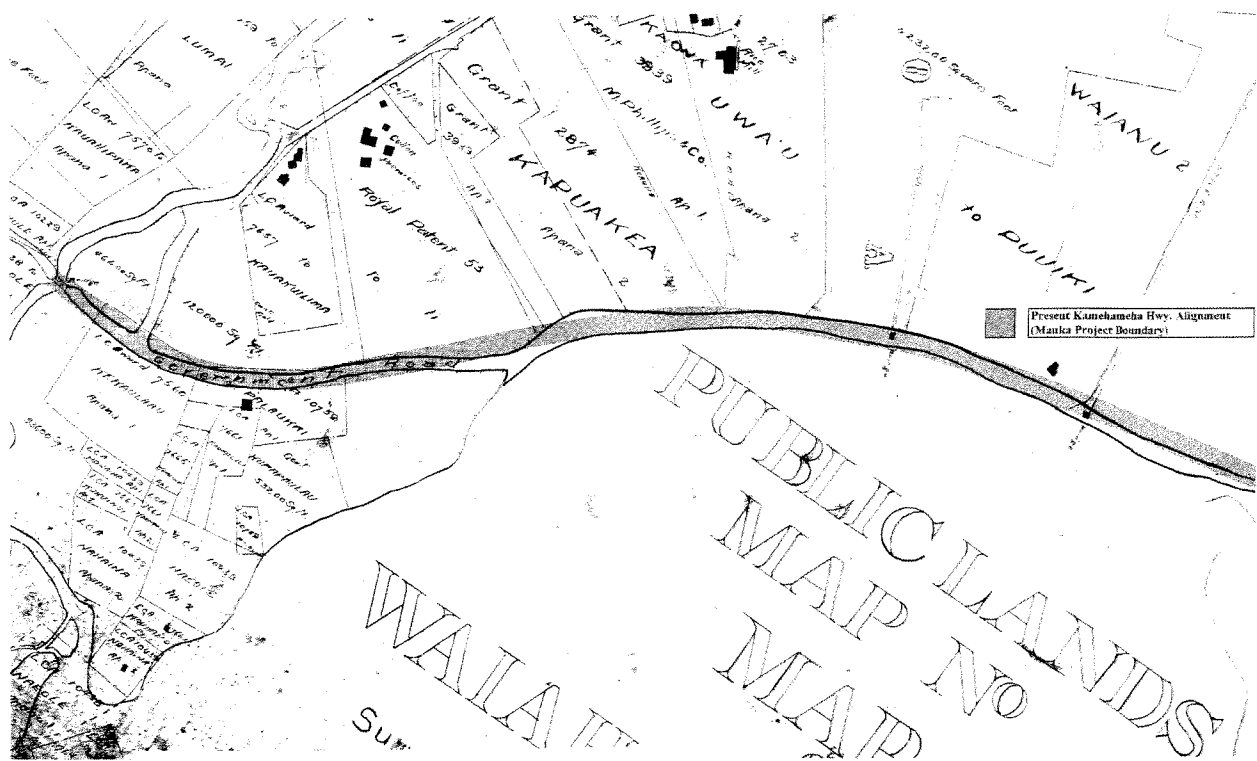


Figure 7 Portion of Public Lands Map of Waiāhole, O'ahu (Dove 1897) with an overlay of present-day Kamehameha Highway (*mauka* project area boundary)

Young relates that during the period from 1913 - 1917 a contingent of 50 - 60 Chinese males were recruited to work on the Waiāhole Tunnel Project. They were used to build the railroad bed and trails from the seashore to the tunnel site. None of the Chinese did any tunneling, however, the Japanese did it all. Young notes that during this period there were as many Chinese as native Hawaiians living in this region. The rice industry reached its peak in Hawaii about 1910 then rapidly declined. Practically all of the Chinese rice fields were idled by 1925.

While rice cultivation came to dominate the landscape at Waiāhole and Waikāne, taro cultivation remained common (Figure 8) and other crops, particularly commercial crops of introduced vegetables, were grown. Introduced vegetables and fruits grown during this period included cabbage, radishes, onions, turnips, beans, lotus root, litchi, mango, lungan, pomelo, and banana (Devaney *et al.* 1982:53). A coffee orchard was identified on an 1897 map of Waikāne and was mentioned by Miyagi as being identified on a 1902 base map as well (Miyagi 1963:114). Citing an informant, Miyagi notes that "the farmers of the valley sent their taro and other products to Honolulu by way of the Pali Road as late as 1910" (*ibid*:108).

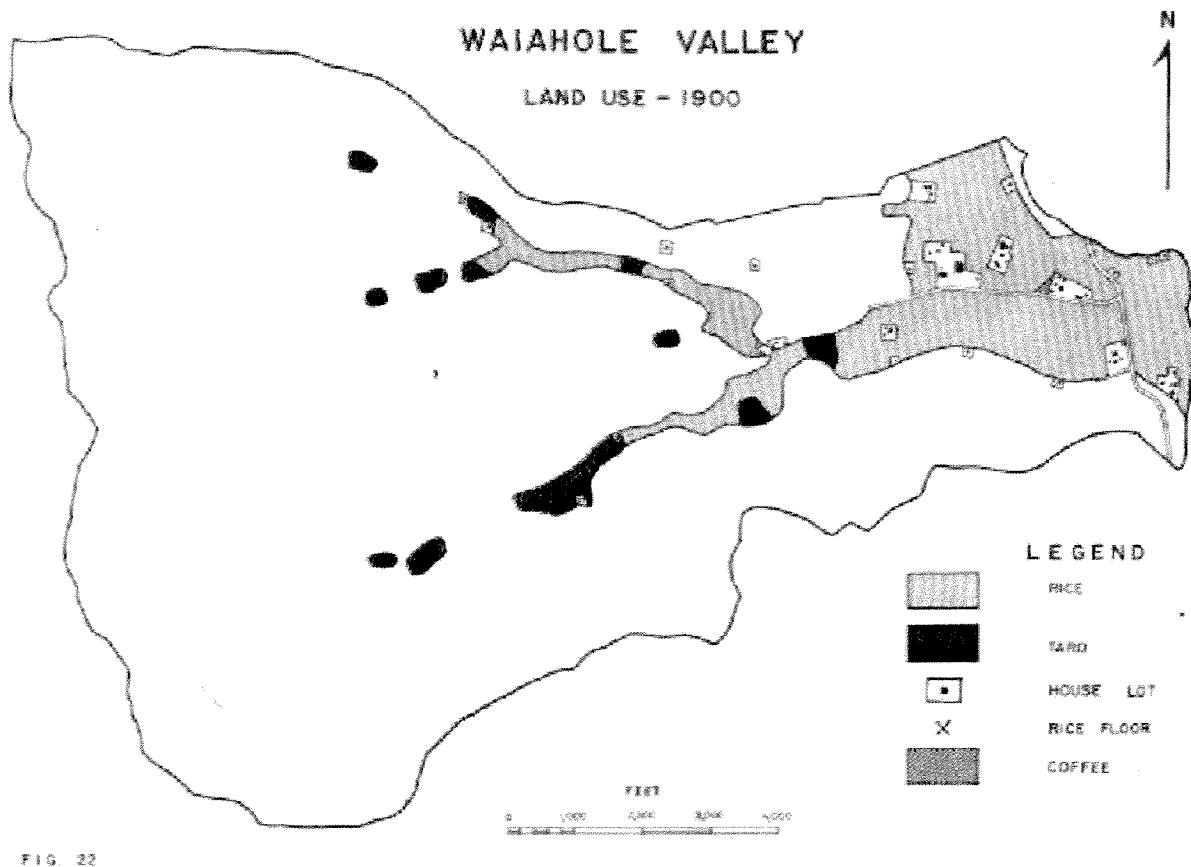


Figure 8 Land Use Map of Waiāhole ca. 1900 (from Miyagi 1963:110)

Pineapple planting also occurred for a brief time "by individual Chinese and Japanese farmers on moderately sloped hill land where rice and taro could not be grown" (Miyagi 1963:115):

The pineapples were hauled from Waiāhole to the Waikāne landing by train, and from Waikāne were sent by boat to the Libby Cannery at Wailau... there are still railroad tracks under the heavy brush at Waiāhole. (Ferreira 1940:9, cited in Miyagi 1963:115)

The train and railroad used to transport pineapples is likely the same railroad that was constructed by the Waiāhole Water Company in 1913. Condè and Best wrote, "ten miles of railroad were built, including an ocean pier. One portion of the railroad was laid at the landing at Waikāne..." (1973:337). The railroad was built so that supplies could be brought in during the construction of "an engineering feat of epic proportions"; a system of tunnels through the Ko'olau Mountains that supplied water to the Oahu Sugar plantations on the leeward side of the island. Once the tunnel system was complete and operational in 1916, the railroad was removed (*ibid*).

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The pineapple industry proved to be very short-lived in the region and the Libby Cannery at Wailau was moved to Honolulu in the early 1920's. It is believed that many of the agricultural fields and, perhaps, houses were abandoned at this time:

The intensive period of land use in the valley was not long lasting... Java plum and guava invaded the abandoned fields. Pasture choking shrubs reduced the grazing area. Old roads from this period still remain in some sections and abandoned house sites can be noted in the now tree-covered area where pineapple was planted (Miyagi 1963:116).

Since the decline in rice production, land use in the valley may best be characterized as "diversified agriculture." Writing in 1963, Miyagi characterized this as the "Japanese Period" because in Waiāhole, Japanese farmers gradually replaced Chinese farmers and dominated land use through the 1930's and 1940's (*ibid*:132). By 1961, the four major land uses at Waiāhole were identified as diversified agriculture (consisting primarily of bananas, papaya and taro), grazing (primarily dairy, but also beef cattle), residential use (as of September, 1962, 453 persons resided in Waiāhole), and forest (including the *pali* with no trees, wooded areas, waste land, and shrub land) (Figure 9). Miyagi concluded that in the 1960's, land use was in a general state of decline in Waiāhole and "will probably continue to follow its trend of decline while the area awaits the development of the future" (*ibid*:163). Miyagi's work indicates that in 1961 there were two areas of residences within the present project area as well as an area of *taro* cultivation.

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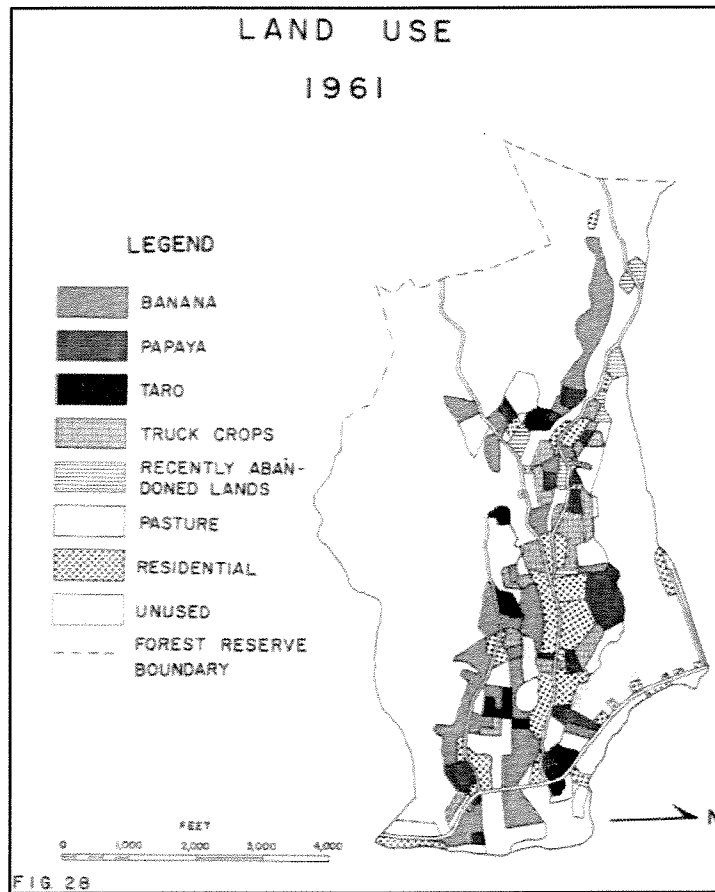


Figure 9 Land Use Map of Waiāhole ca. 1961 (from Miyagi 1963:136).



### III. III. ARCHAEOLOGICAL BACKGROUND RESEARCH

#### A. A. Previous Archaeological Studies

Previous archaeological and historical studies in Waiahole and Waikane *Ahupua'a* are shown in Figure 10, summarized in Table 2, and are described briefly in the text.

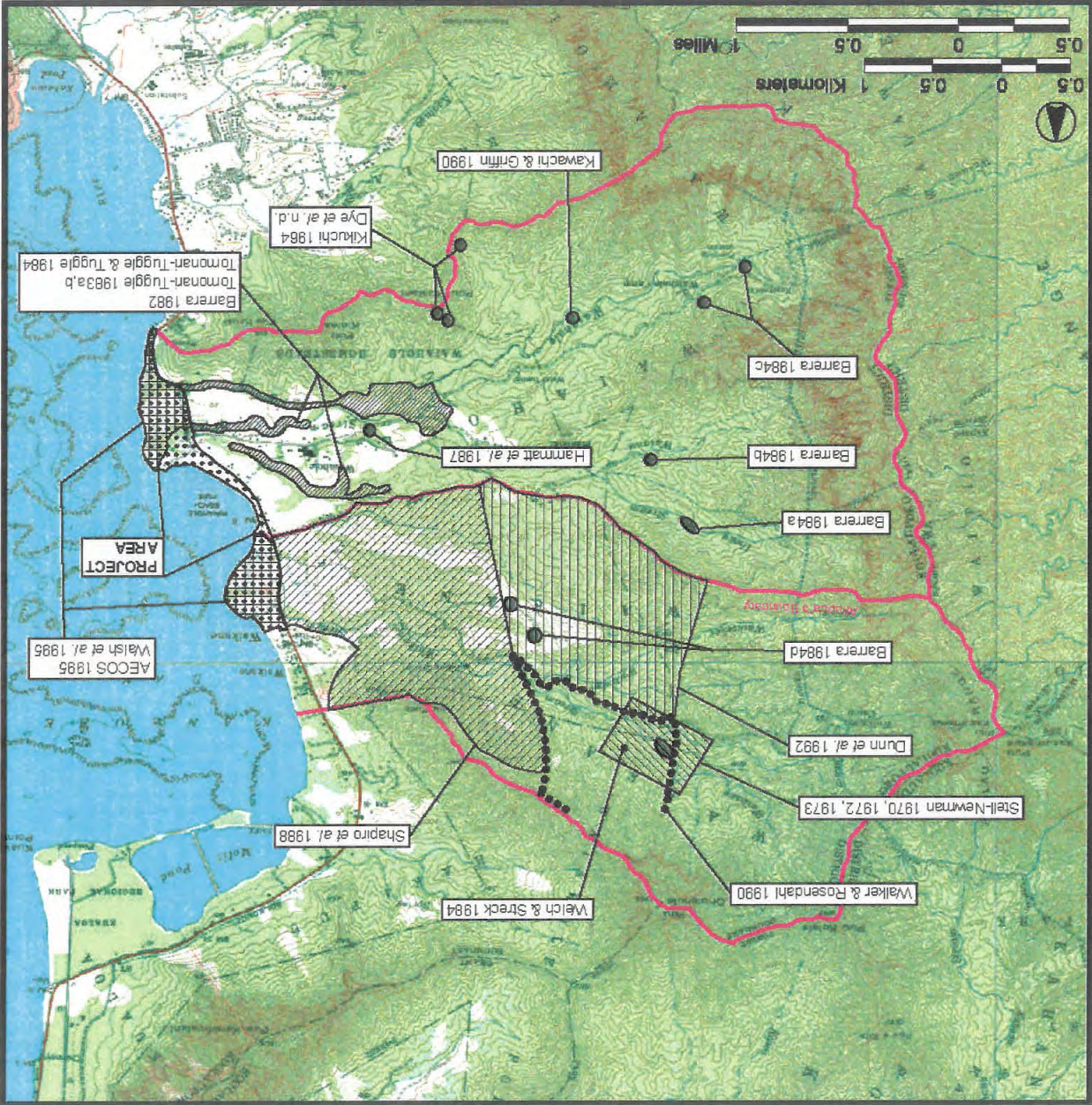


Figure 10 Map of Previous Archaeological Studies

## Archaeological Inventory Survey

Table 2 Previous Archaeological and Historical Studies in Waiāhole and Waikāne *Ahupua`a*

Source	Area of Study	Nature of Study	Findings
McAllister 1933	Island wide	Archaeological Survey	Designates Site 317 Kukuianiani <i>Heiau</i> and Site 318 Ka`awakoa <i>Heiau</i> at Waikāne .
Miyagi 1963	Waiāhole Valley	Historical Land Use Study - M.A. Geography	Documents changes in landscape.
Kikuchi 1964	Waiāhole Valley	Archaeological Survey	Discusses adz quarry & other sites. Gives 4 traditions of Waiāhole from R. Paglinawan.
Handy & Handy 1972	Hawai`i in general including Waiāhole- Waikāne	“Native Planters” studies	Documents conditions <i>ca.</i> 1935 noting evidence of traditional Hawaiian land use.
Stell Newman 1972	Site 50-80-06- 1078 in the back of Waikāne Valley	Site Form for Site 50-80-06-1078 known as Waikāne Taro Flats	Describes numerous terraces along Waikāne Stream.
Griffin & Pyle 1974	Lower one- third of Waiāhole- Waikāne	Archaeological Reconnaissance & Historical Investigation	Results described as disappointing. A number of <i>lo`i</i> and misc. walls were observed <i>mauka</i> and <i>makai</i> of the hwy. Kikuchi (1964) sites could not be relocated.
Young 1975	Waiāhole, Waikāne, Hakipu`u	Chinese History in Windward O`ahu	Documents Chinese rice cultivation <i>ca.</i> 1906-1926.
Napoka 1977	Waikāne Valley	Report of field trip	Mentions a number of traditional cultural sites.
Barrera 1982	Waiāhole Valley Agricultural Park	Archaeological Reconnaissance	Notes an abandoned system of taro terraces in the vicinity of LCA 10230.
Tomonari- Tuggle 1983a	Waiāhole Valley Agricultural Park	Archaeological Reconnaissance	Identifies 28 sites including habitation areas, lithic workshops and traditional and historic agricultural sites.

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Source	Area of Study	Nature of Study	Findings
Tomonari-Tuggle 1983b	Waiāhole Valley Agricultural Park	Executive Summary	Executive summary and update of previous document.
Barrera 1984a	Uwau Stream, Waikāne	Archaeological Survey	Notes a possible <i>'auwai</i> .
Barrera 1984b	Waianu Stream Waikāne	Archaeological Survey	No Sites.
Barrera 1984c	Near Waiāhole Camp, Waiāhole	Archaeological Survey	No Sites.
Barrera 1984d	2 areas central Waikāne	Archaeological Survey	No Sites.
Tomonari-Tuggle & Tuggle 1984	<i>Mauka</i> portion Waiāhole Valley floor	Mapping & Excavation Report	Documentation of work at Sites 50-80-10-3509, -3510, -3511, -3512, -3513 and -3526. Reports 8 $c^{14}$ dates from Site -3512.
Welch & Streck 1984	Upper Waikāne Valley	Archaeological Survey	Describes Site -2889 a shrine and -2890 a <i>lo'i</i> complex.
Hammatt <i>et al.</i> 1987	Lithic workshop Site -3512, central Waiāhole Valley	Archaeological Testing	Documents adz flaking and habitation activities. Reports 1 $c^{14}$ date.
Shapiro <i>et al.</i> 1988	Waikāne Golf Course project, seaward Waikāne	Archaeological Reconnaissance Survey	Identified 29 sites (60 component features) incl. ag., boundary, tool manufacture, habitation, transportation and religious sites.
Kawachi & Griffin 1990	Site 50-80-10-4246, central Waiāhole Valley	Field check	Documents numerous agricultural terraces.
Walker & Rosendahl 1990	50ft. wide fence corridor project, north central Waikāne Valley	Intensive Archaeological Survey	Identified three sites (7 component features) incl. Ag. terraces, mound & <i>'auwai</i> and a foundation remnant of a road.

## Archaeological Inventory Survey

Source	Area of Study	Nature of Study	Findings
Dunn <i>et al.</i> 1992	Proposed SMF/HDI Golf Course, central Waikāne Valley	Archaeological Inventory Survey	Identified 13 sites (100 component features) incl. ag., charcoal production, military, road remnant, temp. habitation and indeterminate function.
Dye <i>et al.</i> 1985	Pu'u Kuolani, Waiāhole	Adz Quarries Study	Evidence of adz manufacturing at 3 sites.

McAllister described two sites, Kukuianiani and Ka`awakoa *heiau* at Waikāne, but noted that Ka`awakoa *heiau* had been destroyed by the time of his survey (1931). He mentions no archaeological sites at Waiāhole.

Handy and Handy, although not archaeologists, were interested in the traditional agricultural use of the land and made observations about features that are now considered to be archaeologically significant.

There were formerly *lo`i* throughout the seaward lowlands of Waiāhole. Some were in swampy lands, but most of them were irrigated by the stream from which the *ahupua`a* takes its name. Groups of *lo`i* adjoining Waikāne were planted up into recent times (Handy and Handy 1972:453).

Miyagi (1963) wrote an M.A. thesis in geography on "Land Use in Waiāhole Valley, O`ahu" which has been used extensively in later studies. He documents land use during three major periods, pre-contact, 1778 to 1920 and 1920 to 1961.

Kikuchi (1964) observed that:

The entire length and width of [Waiāhole] valley was once extensively terraced into taro patches, *lo`i*, and was irrigated by a network of ditches, *auwai*, of which only *makai*, or seaward portions of Waiāhole are still maintained. Traces of abandoned taro plots and ditches can be readily distinguished along the paths and inland trails. (Kikuchi 1964:1)

Kikuchi also found considerable evidence of the manufacture of stone tools within the valley, including a lithic scatter in a bulldozed field (later designated Site 50-80-10-2476), two adz quarries on one of the ridges along the edge of the valley (later designated Sites 50-80-10-2472 and -2475). Within the seaward portion of the *ahupua`a* he identified two house sites within several large *hau* tree groves "where the stream enters the sea" (later designated Site 50-80-10-1086). He described one of these sites as follows:

The best preserved site consisted of a high mound of dirt, 8-12 inches high, ringed with a pavement of small pebbles. Portions of the site were delineated by rows of stones marking the house site. A rectangular plot of stones with pavement within the general paved area may possibly be a grave. A wall of stones ran from the site directly into the ocean. Numerous adze chips and partial blanks were found within the two house sites. (Kikuchi 1964:2)

This site is believed to lie within the project area.

T. Stell Newman, archaeologist with the Division of State Parks conducted a survey along Waikāne Stream in 1970 as part of the state-wide site inventory locating two sites, State Site 50-80-06-1057, a partial rectangular enclosure along the north bank of Waikāne Stream approximately 1 km. inland from Waikāne Town, and State Site 50-80-06-1078, a series of taro terraces in the upper reaches of Waikāne Stream including flat beds and two beds with remnants of interior mounds and numerous *`auwai*. Newman filled out a National Register Site Form in 1972 for Site 50-80-06-1078 which has been called "Waikāne Taro Flats". Newman recommended a natural park of some type be set aside here. Site -1078, Waikāne Taro Flats, with boundaries defined to include a large area beyond the known features, was nominated to the National Register of Historic Places and entered on the Register on April 11, 1973.

Griffin and Pyle's (1974) reconnaissance of the lower one-third of Waiāhole-Waikāne found a number of *lo`i* and miscellaneous walls *mauka* and *makai* of the highway. They found no evidence of the habitation sites identified by Kikuchi. They remarked, "it was evident that much of the sites within the study area have been destroyed, otherwise obliterated, or are in an advanced stage of deterioration" (1974:4). Griffin and Pyle summarized their findings as follows:

The results were, from an archaeologist's point of view, disappointing. The beach area revealed only a low seawall at the edge of the beach-turf line. This wall is undatable and may be of recent origin. In a few locations taro *lo`i* are still observable behind the beach. In general the disturbance of the various site predicted areas are bad. Pasturage of cattle seems to have eradicated even the *lo`i*, in most cases.... it is as if someone has taken an eraser and wiped clean the reminders of the former Hawaiian occupation of this part of Waiāhole-Waikāne. (1974:15-16)

With the exception of Kukuianiani *Heiau* in Waikāne "all the sites encountered during field operations are considered marginal." (1974:4) Griffin and Pyle provide a historical overview of the area drawing heavily upon Miyagi (1963)

Archaeological Inventory Survey

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Young (1975) was born in Waikāne in 1900 and produced a memoir of his early memories of the Chinese community in Waiāhole, Waikāne, Hakipu`u *ca.* A.D. 1906-1926. His data are incorporated in the historic land use section of this study.

Nathan Napoka (1977) reported on a field trip with members of the Kamaka family to examine historic *taro lo`i* in Waikāne Valley. He comments on a number of culturally important sites including: Waiokāne, a spring of magical waters, a series of stones known as Manu kōlea, water channel and a house site, a circular cinder hill known as Pu`u Menehune, a stony cliff known as Pōhaku Wela that emitted smoke at certain times as a portent of things to come, a famous mountain peak known as Pu`u Pueo and a remnant of Kukuianiani *Heiau*.

Barrera (1982) presents the results of a brief reconnaissance and literature review in support of the Waiāhole Valley Agricultural Park project. He notes an abandoned system of taro terraces in the vicinity of LCA 10230. He concludes, "the entire valley of Waiāhole is probably eligible to the State and National Registers of Historic Places as an archaeological district" (Barrera 1982:3).

Tomonari-Tuggle (1983a & b) reports on a more in-depth archaeological reconnaissance survey in support of the Waiāhole Valley Agricultural Park project studied previously by Barrera (1982). This consisted of 5 discrete survey areas in the central portion of Waiāhole Valley. She documents twenty-eight sites, nineteen of which were in the area of the juncture of Waiāhole and Waianu Streams. These sites included residential areas, stone tool manufacturing workshops and agricultural features related to both traditional taro cultivation and historic rice cultivation. A brief history of settlement and land use is provided.

Dye *et al.* (1985) studied a Waiāhole quarry complex located on opposite slopes of a small ridge that trends north into Waiāhole Valley from Pu`u Kuolani. Kikuchi reported quarrying activity in the area (1963). This complex includes Sites 50-80-10-2472 (B.M. Site # 50-Oa-G2-7), 50-80-10-2475 (B.M. Site # 50-Oa-G2-8) and 50-80-10-2476 (B.M. Site # 50-Oa-G2-9). The study (Dye *et al.* 1985: 65) relates that Dr. Patrick McCoy did some mapping and collecting at the complex in 1982 but there are evidently no reports of this work. The study relates that Kikuchi (1982) published descriptions by Macdonald of two thin sections from the complex. This study recommended nomination of Sites 50-80-10-2472 (B.M. Site # 50-Oa-G2-7) and 50-80-10-2475 (B.M. Site # 50-Oa-G2-8) to State and National Registers of Historic Places

In 1984 William Barrera carried out a series of four archaeological surveys of proposed well locations in Waiāhole and Waikāne, at Uwau Stream, Waianu Stream, and two areas in central Waikāne and near Waiāhole Camp in Waiāhole. Three of these modest studies reported no sites with the Uwau Stream study noting only a possible *auwai*.

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In 1984, Tomonari-Tuggle & Tuggle documented excavation and mapping work at Sites 50-80-10-3509, -3510, -3511, -3512, -3513 and -3526 all located near the confluence of Waiāhole and Waianu Streams and previously described in their earlier work (Tomonari-Tuggle 1983a & b). They report six  $c^{14}$  dates from Site -3512 (the locus of most of their research) and concluded the site was used for both agriculture and habitation from the late pre-contact times into the historic period. They report some relatively early carbon date (Beta 100031) of *ca.* A.D. 1040-1480 from Site -3512.

In 1984 Welch and Streck prepared an archaeological survey report for the Commanding Officer Marine Corps Air Station, Kāneʻohe Bay describing a Hawaiian shrine in Waikāne Valley (Site 50-80-06-2889) and evaluating the impact of an ordnance removal project. The shrine consisted of an *ahu* or stone cairn, a terrace, two basalt retaining walls and a circular petroglyph located on a ridge, known as Mortar Hill, above the valley at about 90 m. above mean sea level. This study also assigned Site # 50-80-06-2890 to another adjacent complex of abandoned taro *loʻi* which was evidently in production as late as 1928 when aerial photographs of the valley were taken. “Al and Ray Kamaka say that the shrine is currently used as a family *heiau* to make offerings of crops and to chant to Lono, the god of rain and agriculture.” (Welch and Streck 1984:14). David Welch prepared a historic site form for Site 2889 on July 18, 1984.

Cultural Surveys Hawaii (Hammatt *et al.* 1987) carried out archaeological testing of a lithic workshop (Site -3512) located on a low knoll overlooking the confluence of Waianu and Waiāhole Streams that was identified in a survey by Tomonari-Tuggle in 1983 and tested by her in 1984. Both habitation and flaking activity were documented. Final stage flaking of adzes took place at the site and this is suggested to have been the single most important economic activity at the site. The one  $c^{14}$  date recovered, 1655-1950, was regarded as consistent with six of the dates reported by Tomonari-Tuggle. The earliest Tomonari-Tuggle dates are questioned because of their apparent shared stratigraphic context with later dates (Hammatt *et al.* 1987:41).

PHRI (Shapiro *et al.* 1988) carried out an archaeological reconnaissance survey in support of a Waikāne Golf Course project, in 300 acres of seaward Waikāne just *mauka* of the highway identifying 29 sites (60 component features) including one previously identified site (Kukuianiani *Heiau*). These included agricultural, boundary, tool manufacture, habitation, transportation and religious sites (cemetery, burial, shrine and *heiau*). The one  $^{14}C$  date recovered was AD 1430-1640.

The State Historic Preservation Division conducted a field check (Kawachi & Griffin 1990) documenting several terraces in central Waiāhole Valley designated Site 50-80-10-4246.

PHRI (Walker & Rosendahl 1990) carried out an intensive archaeological survey of a 50 ft. wide fence corridor bounding TMK: 4-8-14:6 in central Waikāne Valley. This study identified three sites (State Site 50-80-06-1078, -4116 and -4117 with seven total component features) including four agricultural terraces, an agricultural mound & *auwai* and a boulder alignment

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**Archaeological Inventory Survey**

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foundation remnant of a road. This study includes a “Limited Historical Documentary Research Land of Waikāne ...” study by Helen Wong Smith as Appendix A.

PHRI (Dunn *et al.* 1992) carried out an archaeological inventory survey of an approximately 407 acre proposed SMF/HDI Golf Course study area in central Waikāne Valley identifying thirteen sites with 100 component features all within stream basins. Most of the features (68) are pre-contact agricultural features, but nine were related to historic charcoal production, three to temporary habitation and one to a ceremonial function. Site -4356 appears to have been a major pre-contact/post-contact agricultural complex with forty-six designated features. Eight c<sup>14</sup> dates are reported with the oldest of AD 1400-1640.

AECOS Inc. (1995) carried out a Natural Resources Inventory of two coastal areas of Waiāhole & Waikāne adjacent to the present project area with descriptions of vegetation, fauna, wetlands and streams offering insights on the history of land use in this area.

Cultural Surveys Hawaii (Walsh *et al.* 1995) carried out an archaeological assessment of coastal areas of Waiāhole & Waikāne adjacent to the present project area. This study notes vaguely defined fields with *lo`i* type soils and a possible *auwai* and buried cultural layer with possible water-worn basalt flakes and charcoal in the Waiāhole project area. In the Waikāne project area historic structures including the Waikāne Store (possibly dating to 1897) and a wooden pier (possibly dating to 1913) were noted. Additionally, seawalls, historic roads (one of which may overlie a railroad berm) and remnant historic sites evidenced by historic artifact scatters were noted.

### **B. B. Summary of Previous Archaeological Dating**

Archaeological dating (Table 2) has been reported from four prior studies (eight dates from Tomonari-Tuggle & Tuggle, 1984; one from Hammatt *et al.* 1987; one from Shapiro *et al.* 1988; and eight from Dunn *et al.* 1992). Beta Analytic, Inc analyzed all eighteen dates. With the exception of two dates on wood which both came back as modern, all of the dating has been on charcoal. Of the eighteen dated samples, thirteen (72.2%) yielded date ranges entirely post-dating AD 1650. Four of the reported date ranges would be consistent with habitation *ca.* AD 1400-1650. The oldest reported date range (1040-1480) could well lie within this *ca.* AD 1400-1650 period as well. The study by Hammatt *et al.* (1987:41) questioned the earliest Tomonari-Tuggle dates because of their apparent shared stratigraphic context with later dates. The subsequent work by Shapiro *et al.* in 1988 and Dunn *et al.* in 1992 would seem to clearly validate occupation at Waikāne as far back as *ca.* AD 1400-1650. The absence of earlier dates is somewhat surprising given the widely held belief that occupation in windward O`ahu occurred relatively early in the Hawaiian cultural sequence (Kirch 1985:69). Certainly nothing like the early occupation reported at other windward O`ahu sites at Bellows, Kawainui and Kahana can be supported at this time.



## Archaeological Inventory Survey

Table 3 Previously Reported Carbon Dates for Waiāhole and Waikāne

Reported Sample No.	Reference	Provenience	C 14 Years B.P.	C13/C12	C13 adjusted C14 Age	Calendar Range A.D.
3512-1	Tomonari-Tuggle & Tuggle, 1984 App. 3 p.17	Waiāhole Site 3512	Modern	-	-	Modern
3512-2	Tomonari-Tuggle & Tuggle, 1984 App. 3 p.17	Waiāhole Site 3512	Modern	-	-	Modern
Beta 100028	Tomonari-Tuggle & Tuggle, 1984 App. 3	Waiāhole Site 3512	Less than 130 B.P.	- 23.48 0/00	Less than 130 B.P.	Post 1820
Beta 1000289	Tomonari-Tuggle & Tuggle, 1984 App. 3	Waiāhole Site 3512	180+/- 50 B.P.	- 23.26 0/00	210+/- 50 B.P.	1690-1790
Beta 100030	Tomonari-Tuggle & Tuggle, 1984 App. 3	Waiāhole Site 3512	480+/- 60 B.P.	- 27.67 0/00	440+/-60 B.P.	1450-1570
Beta 100031	Tomonari-Tuggle & Tuggle, 1984 App. 3	Waiāhole Site 3512	720+/- 220 B.P.	- 26.49 0/00	690+/- 220 B.P.	1040-1480
Beta 100032	Tomonari-Tuggle & Tuggle, 1984 App. 3	Waiāhole Site 3512	Less than 140 B.P.	- 27.76 0/00	Less than 140 B.P.	Post 1810
Beta 100033	Tomonari-Tuggle & Tuggle, 1984 App. 3	Waiāhole Site 3512	160+/- 70 B.P.	- 26.52 0/00	130+/- 70 B.P.	1750-1890
Beta 21086	Hammatt <i>et al.</i> 1987:39	Waiāhole Site 3152	190+/- 70	- 29.4	120+/- 70 B.P.	1655-1950
Beta 25830	Shapiro <i>et al.</i> 1988: 35	Waikāne Site T-23	390+/- 50	- 25.1	390+/- 50	1430-1640
Beta 40931	Dunn <i>et al.</i> 1992:15	Waikāne Site 1078	450+/- 70	- 27.3	420+/-70	1400-1640
Beta 40705	Dunn <i>et al.</i> 1992:15	Waikāne Site 4356	170+/- 60	- 28.6	120+/-60	1650-1955#

## Archaeological Inventory Survey

Reported Sample No.	Reference	Provenience	C 14 Years B.P.	C13/C12	C13 adjusted C14 Age	Calendar Range A.D.
Beta 40926	Dunn <i>et al.</i> 1992:15	Waikāne Site 4361	90+/- 50	- 28.8	30+/ -50	1683- 1739 1810- 1930 1955#
Beta 40927	Dunn <i>et al.</i> 1992:15	Waikāne Site 4361	70+/- 50	- 28.6	10+/ -50	1690- 1732 1810- 1920 1955#
Beta 40706	Dunn <i>et al.</i> 1992:15	Waikāne Site 4361	120+/- 50	- 27.6	70+/ -50	1670- 1770 1790- 1950 1953- 1955#
Beta 40707	Dunn <i>et al.</i> 1992:15	Waikāne Site 4361	210+/- 50	- 28.6	160+/ -50	1650- 1950
Beta 40929	Dunn <i>et al.</i> 1992:15	Waikāne Site 4362	50+/- 60	28.8	100. 2+/- 0.7% modern	-
Beta 40928	Dunn <i>et al.</i> 1992:15	Waikāne Site 4362	240+/- 70	- 29.8	170+/ -70	1527- 1557 1630- 1950

### C. C. Summary of Past Land Use Patterns

It seems probable that a variety of activities including habitation, lithic tool manufacture, and irrigated agriculture were undertaken at Waiāhole by the *ca.* AD 1400-1650 period. It seems probable that this irrigated agriculture and associated habitation increased in late pre-contact times to at least the extent documented in *māhele* records (see Figure 3 and Figure 4). It would seem likely that the relatively rich lands of the Waiāhole River delta would have been developed early in this sequence for both habitation and agriculture. The use of the lands of the present project area adjacent to the Waiāhole River for habitation and agriculture appears to have continued unbroken to the present, although with notably less intensity after *ca.* 1910. The lands in the northwest project area may have been generally too low lying and saline for habitation and agriculture.

## IV. IV. SURVEY RESULTS

### A. A. Introduction

The aims of the inventory survey and sub-surface testing were twofold: 1) to locate and document all surface historic properties, and 2) to test for subsurface historic properties in these areas. The inventory survey included a pedestrian inspection of the project area to identify, map, photograph, and attempt to determine the age and function, based on observable characteristics, of all historic properties. Subsurface testing was conducted to identify subsurface deposits. Analysis of exposed stratigraphy and recovered materials contributed to a better understanding of the land use within the project area.

The pedestrian survey, conducted on December 7, 2001 by five CSH archaeologists, entailed 100% coverage of the project area from Waiahole Stream on the south to Waiahole Bridge (not related to Waiahole Stream) at the north and between the shore and Kamehameha Highway. The majority of the project area is landscaped with grass and maintained by the Parks Dept. of Honolulu and is without significant topographical relief. The southeast corner of the project area is vegetated with trees and is currently in use with a small piggery and for habitation. The pedestrian sweeps were generally oriented east/west within the dense vegetation along Waiahole Stream and archaeologists were spaced approximately 5 m. apart dependent on ground cover and visibility. As part of the pedestrian inspection, sites within the project area were assigned permanent SIHP numbers, described, mapped to scale with compass and tape, and photographed. Site locations were plotted on the project area map.

The location of subsurface testing was based primarily on historical research (location of LCA and other map features) and on the findings of the surface survey. This information suggested a strong likelihood of finding buried cultural layers and *lo'i* terrace deposits at the south end of the project area. In all, sixteen trenches were excavated by backhoe with 3 sediment cores for pollen analysis taken from 3 different trenches (Figure 12). The cores were used to gain a better understanding of the sediments below the water table through pollen analysis. Where possible, charcoal samples were collected for C<sup>14</sup> age analysis. Backhoe trenches were excavated to the water table and were generally the width of the backhoe bucket (0.7 m.) and approximately 5 m. in length. The trenches were documented with sediment profiles to scale, photographs, sediment descriptions, and, where useful, sediment samples were collected. Sediment descriptions included Munsell color designations, moisture content, sediment size, texture, inclusions, compactness, and cultural material present.

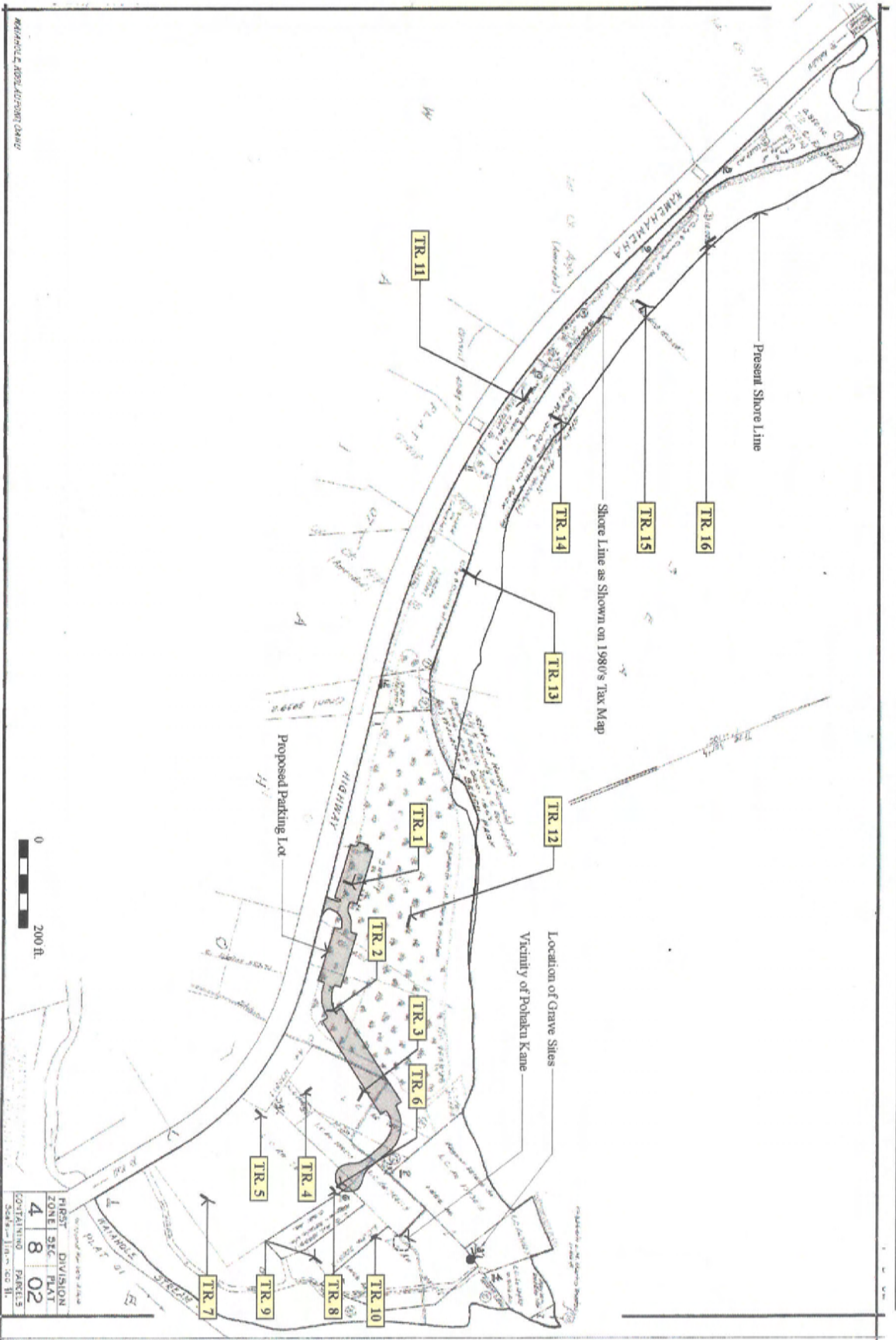


Figure 11 Map showing extent of project area, noting trench locations and other features.

**B. B. Site Descriptions**

The two historic properties identified and recorded within the project area are described below. They are SIHP #50-80-10-1086 - six historic burial plots located in LCA 7661:3 to Kaukaliu, and SIHP # 50-80-10-6396 - a probable *pohaku o Kane* located in LCA 7560:1 (refer to Figure 11).

1. State Site #:	50-80-10-1086
<b>Site Type:</b>	Concentration of rectangular alignments
<b>Function:</b>	Burial plots
<b>Features (#):</b>	6
<b>Dimension:</b>	56 m <sup>2</sup>

**Description:** Site 50-80-10-1086 is a concentration of six rectangular alignments located in the southeast portion of the project area (refer to Figure 11). The site consists of a large, leveled earthen mound with six rectangular alignments (Features A-G) grouped on top (Figure 12). The northwest side of the earthen mound is steeply sloped and drops at an approximate 45-degree angle to the natural land surface, one meter below. In and around the alignments is *ili ili* pebble paving. Based on historical background research and oral interviews it is certain that these features represent an historic graveyard. A modern dog kennel and a pigpen, which may have disturbed and or covered additional burial plots, are adjacent to the site.

Feature A is a partially disturbed rectangular alignment of water worn and sub-angular basalt boulders. The alignment is oriented to the south and contains *ili ili* within the interior. The feature measures 1.2 m. E/W by 0.70 m. N/S and is the southernmost of the group of alignments.

Feature B is a rectangular alignment of water worn and sub-angular basalt boulders approximately 1 m. north of Feature A. The alignment contains an *ili ili* within the interior and has a mature tree growing from the northwest corner of the feature. A modern ceramic horse head had been propped up on a low stump and is facing the alignment. The feature measures 1.6 m. E/W by 1.1 m. N/S.

Feature C is a rectangular alignment of water worn and sub-angular basalt boulders approximately 0.50 m. north of Feature B. This alignment abuts Feature D to the east. Feature C contains an *ili ili* within the interior and has a coral cobble in the southern end of the alignment. The feature measures 1m N/S by 0.80 m. E/W.

Feature D is a rectangular alignment of water worn and sub-angular basalt boulders abutting Feature C to the west, approximately 1 m. north of Feature A. The alignment contains an *ili ili* within the interior and has coral cobble in the southwest corner. The feature measures 1.3 m. E/W by 1.4 m. N/S.

## Archaeological Inventory Survey

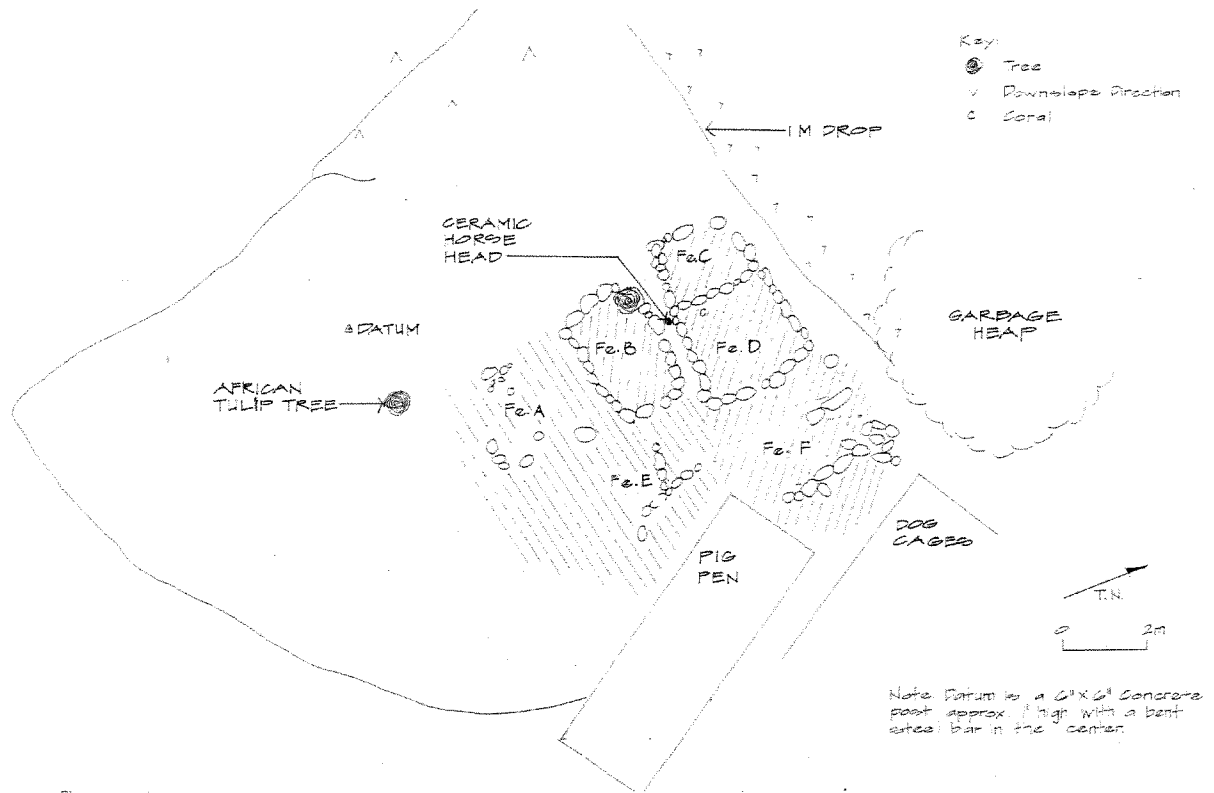


Figure 12 Plan View of the Grave Features Comprising SIHP 50-80-10-1086

Feature E is an alignment of water worn and sub-angular basalt boulders approximately 1 m. east of Feature A (Figure 12). The alignment contains an *`ili `ili* within the interior and appears to have been disturbed, possibly by construction of the pig pen. Cement fragments and modern trash partially covered the alignment prior to clearing. The alignment measures 1.7 m. N/S and has a two-cobble alignment, presumably a former part of a rectangular alignment to the west approximately 0.60 m. in length.

Feature F is a Y-shaped alignment of water worn and sub-angular basalt boulders approximately 0.40 m. east of Feature B (Figure 12). The alignment contains an *`ili `ili* within the interior and appears to have been disturbed by the construction of the pig pen. The alignment measures 1 m. N/S with a 0.60 m. E/W alignment extending from the center of the N/S alignment.

## Archaeological Inventory Survey

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<b>2. State Site #:</b>	50-80-10-6396
<b>Site Type:</b>	Large fine-grain basalt boulder
<b>Function:</b>	God stone, or <i>pohaku o Kane</i>
<b>Features (#):</b>	1
<b>Dimension:</b>	0.9 m. by 0.3 m.

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**Description:** The probable *pohaku o Kane* is lying on the surface of the ground adjacent to two coconut trees with the bounds of LCA 7560:1 (Figure 13). The boulder is elongated and water-rounded. This is commonly described as a roller in geological terms, derived from columnar basalt formation and rounded by intense ocean wave activity.

It is likely that this stone was imported to the Waiahole river delta.



Figure 13 Photograph of the "Roller" Believed to be a *Pohaku O Kane*

### C. C. Modern Feature

A modern *imu* with signs of recent use (Figure 14) is located in the southeastern corner of the project area on the northern bank of Waiahole river adjacent to a footbridge leading across the stream to Mr. Bagio's residence. Squatters have an encampment adjacent (west) of the *imu*. The *imu* consists of a mound of soil and ash including sand, charcoal, ash, glass, plastic, shell and charred cobbles and measures 4.5 m. N/S by 2.7 m. E/W by 0.40 m. high. A small pile of charred vesicular basalt cobbles measuring 1.1m by 0.65m is stacked on a plywood board. Modern trash including sheet metal, a propane tank, a tire rim, *etc.* are scattered on and around the mound.



Figure 14 View to the West Showing Modern Feature of *Imu* Rocks and Earthen Mound

### D. D. Backhoe Trenching Results

Sixteen backhoe trenches were excavated within the project area. Trenches were placed in areas where pre-contact activities likely occurred, where LCA are shown on property maps, predominantly in the south portion of the project area. In addition, trenches were excavated along the back beach area in the central and northern sections of the project area to gain a better understanding of sedimentation along Kamehameha Highway. Two cores were also collected from Trench 8 (in the south section) and Trench 14 (in the north section) for analysis of the sediments below the water table.



## Archaeological Inventory Survey

1. Trench 1		(Figure 15)
Max Length:		5 m
Max Width:		80 cm
Max Depth:		2 m
Oriented:		040 / 220 TN
Stratum I	0-15 cm	Fill; 7.5 YR 3/3 (dry) dark brown, fine to very fine loam, contains 10% gravel; weak granular structure; non-coherent; abrupt and smooth boundary
Stratum II	15-73 cm	Fill; 7.5 YR 3/4 (dry) dark brown, fine to very fine loam, contains 40-50% gravel and cobbles; weak, fine to very fine granular structure; non-coherent; abrupt and smooth boundary
Stratum III	73-149 cm	A horizon; 7.5 YR 3/2 (moist) dark brown, clay loam; moderate to strong, fine to very fine granular structure; slightly sticky, contains plentiful rootlets; abrupt and smooth boundary; natural stratigraphy
Stratum IV	149-168 cm	7.5 YR 2.5/3 (wet) dark brown; clay loam; moderate to strong granular structure; slightly sticky; non plastic; contains very few roots and rootlets; abrupt and smooth boundary
Stratum V	168-220 cm	7.5 YR 2.5/2 (wet) dark brown, clay loam; moderate to strong, fine to very fine granular structure; slightly sticky; non plastic contains very few roots and rootlets, below water table. Water table at 170 cmbs

## Archaeological Inventory Survey

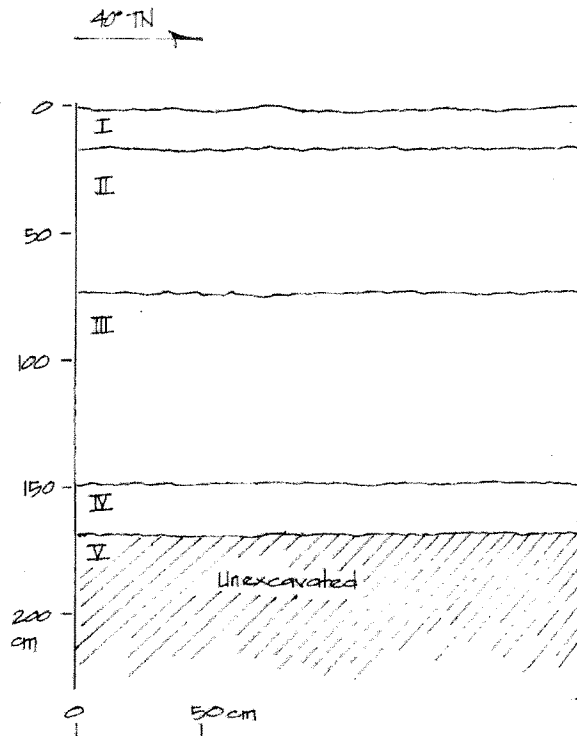


Figure 15 Profile of Trench 1, Northeast Trench Wall Showing Stratigraphy

2. Trench 2	(Figure 16)	
Max Length:	5 m	
Max Width:	65 cm	
Max Depth:	1.75 m	
Oriented:	12 / 192 TN	
Stratum I	0-5 cm	Fill, 7.5 YR 3/4 (dry) dark brown, loam, fine to very fine granular structure; loose; non-coherent; contains 10% gravel and modern trash; abrupt and smooth boundary
Stratum II	5-18 cm	Fill, 7.5 YR 3/4 (dry) dark brown, loam; fine to very fine granular structure; loose; non-coherent; contains 15-20% gravel and modern trash; abrupt and smooth boundary
Stratum III	18-36 cm	Fill, 5 YR 5/6 (dry) yellowish red, clay loam; weak, fine to very fine granular structure; non-coherent; contains modern trash; abrupt and smooth boundary
Stratum IV	36-90 cm	Fill, 7.5 YR 3/1 (dry) dark brown; clay loam; moderate, fine, blocky structure; weakly coherent; contains 5% gravel and modern trash (plastic, wire, glass); abrupt and wavy boundary

## Archaeological Inventory Survey

Stratum V	90-149 cm	Fill, 7.5 YR 3/2 (moist) dark brown; pebbly, cobbly, sandy clay loam; weak, fine granular structure; friable; contains 50% pebbles and cobbles and historic trash; abrupt and broken boundary
Stratum VI	149-165 cm	7.5 YR 3/2 (moist) dark brown; clay loam; moderate to strong, fine to very fine granular structure; slightly sticky; contains plentiful rootlets

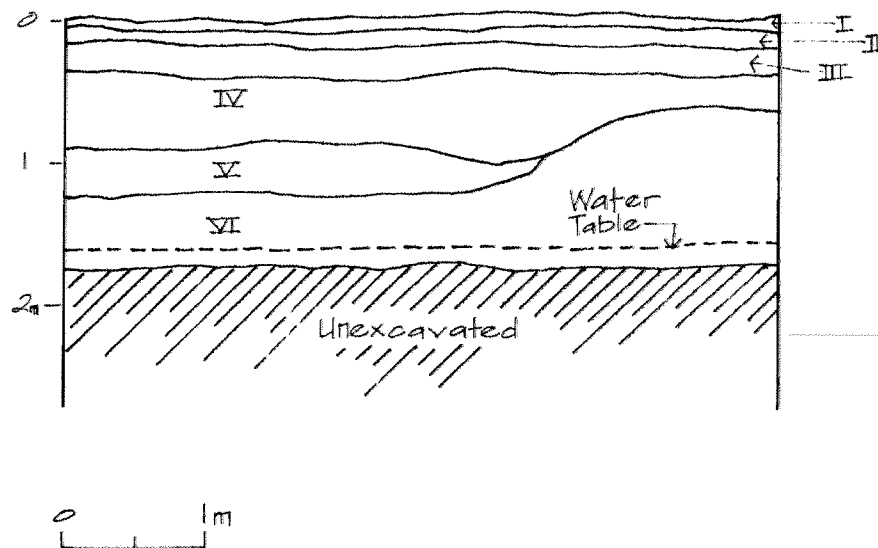


Figure 16 Profile of Trench 2, Northwest Wall of Trench Showing Stratigraphy

3. Trench 3	(Figure 17)
Max Length:	8.5 m
Max Width:	80 cm
Max Depth:	2 m
Oriented:	137 / 317 TN

Stratum I	0-6 cm	Fill, 7.5 YR 3/4 (dry) dark brown, loam; fine to very fine granular structure; loose, non-coherent; contains 10% gravel and modern trash; abrupt and smooth boundary
Stratum II	6-31 cm	Fill, 7.5 YR 3/4 (dry) dark brown, loam; fine to very fine granular structure; loose; non-coherent; contains 15-20% gravel and modern trash; abrupt and smooth boundary

Archaeological Inventory Survey

Stratum III	31-116 cm	Fill, 5 YR 5/6 (dry) yellowish red, clay loam; weak, fine to very fine granular structure; non-coherent; contains modern trash; abrupt and smooth boundary
Stratum IV	116-173 cm	7.5 YR 2.5/3 (wet) dark brown; clay loam; moderate to strong granular structure, slightly sticky, non plastic; contains very few roots and rootlets; abrupt and smooth boundary
Stratum Va	173-186 cm	7.5 YR 3/0 (wet) very dark gray; loamy sand; weak, fine granular structure; non-sticky. Water table at 180 cmbs
Stratum Vb	186-225+cm	Alluvium, 7.5 YR 3/0 (wet) very dark gray; loamy sand; weak, fine granular structure; slightly sticky; contains medium to large water worn cobbles

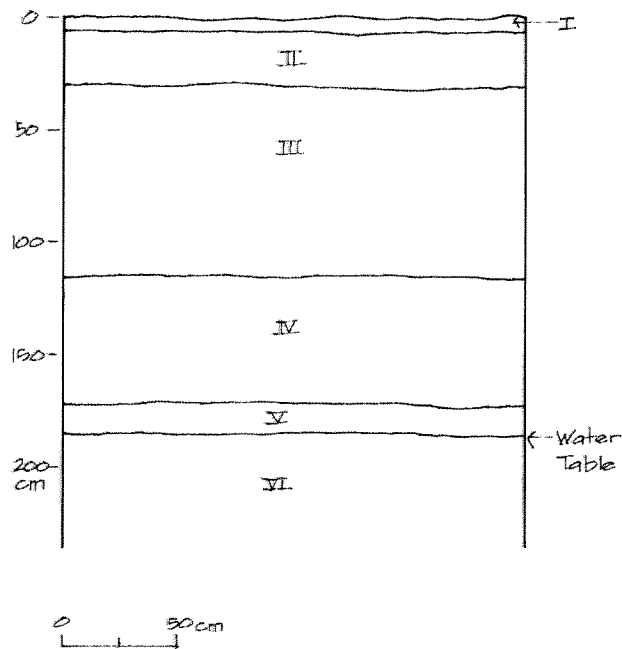


Figure 17 Profile of the Northeast Wall of Trench 3, Showing Stratigraphy

## Archaeological Inventory Survey

4. Trench 4 (Figure 18)  
 Max Length: 6 m  
 Max Width: 70 cm  
 Max Depth: 1.5 m  
 Oriented: 165 / 345 TN

Stratum I	0-1 cm	Fill, 7.5 YR 3/4 (dry) dark brown, loam; fine to very fine granular structure; loose, non-coherent; contains 10% gravel and modern trash; abrupt and smooth boundary
Stratum II	1-30 cm	Fill, 7.5 YR 3/0 (dry) very dark gray; silty, clay loam; moderate, fine blocky structure; weakly coherent; plentiful roots and rootlets, coke bottle, net float and other modern trash, charcoal flecking; abrupt and smooth boundary
Stratum III	30-147 cm	7.5 YR 2.5/3 (wet) dark brown; sandy clay loam; moderate to strong granular structure; slightly sticky; non plastic; contains very few roots and rootlets; boundary below water table

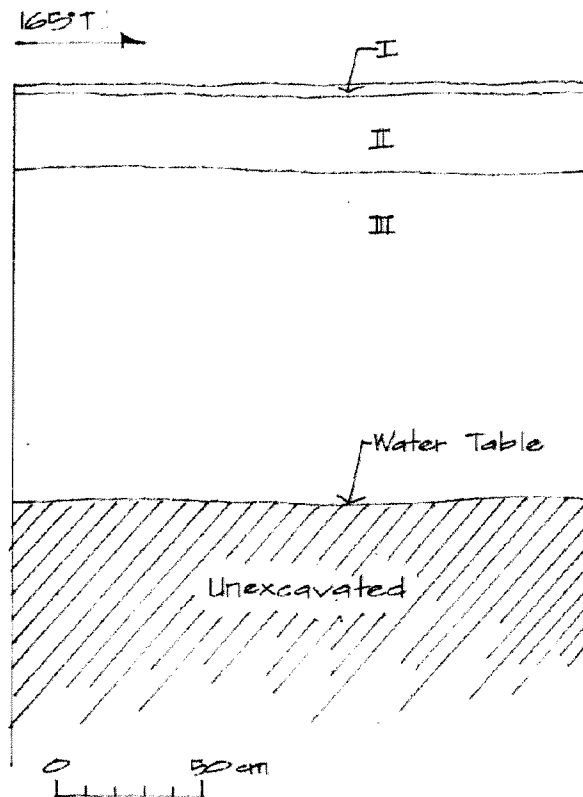


Figure 18 Profile of East Wall of Trench 4, Showing Stratigraphy

## Archaeological Inventory Survey

5. Trench 5		(Figure 19)
Max Length:		6 m
Max Width:		70 cm
Max Depth:		1.5 m
Oriented:		62 / 242 TN
Stratum I	0-35 cm	10 YR 2/2 (very dark brown); hard; clay; moderate granular structure; contains abundant roots and rootlets and oxidized ferrous 2.5 YR 3/4; lower boundary is diffuse and smooth
Stratum II	35-55 cm	10 YR 3/2 (very dark grayish brown); sandy gravelly clay; moderate granular structure; contains oxidized ferrous material though less abundant than Stratum I; lower boundary is abrupt and broken
Stratum III	55-80 cm	2.5 YR 3/2 (dusky red); loose; gravelly sandy loam; structureless; lower boundary is abrupt and broken
Stratum IV	80-150 cm	Pebble sized water rounded gravel within a coarse sand matrix; alluvium

Archaeological Inventory Survey

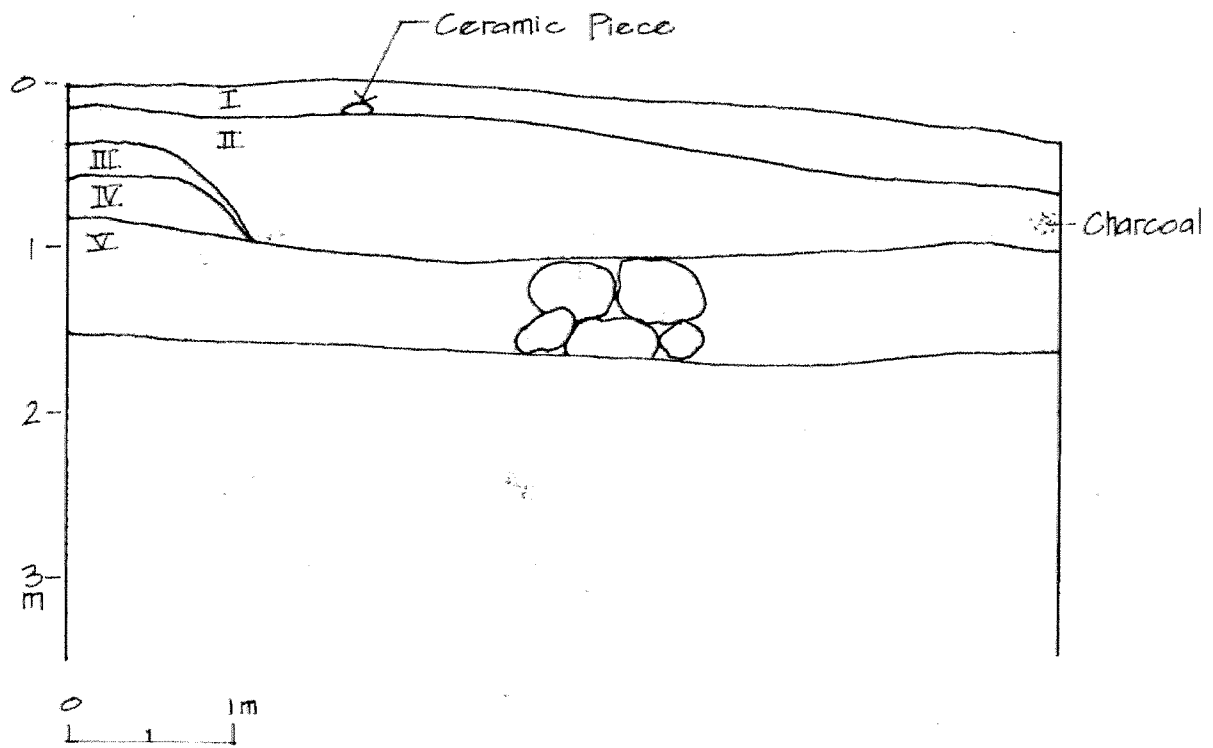


Figure 19 Profile of the Northwest Wall of Trench 5, Showing Stratigraphy

## Archaeological Inventory Survey

6. Trench 6	(Figure 20)
Max Length:	7.5 m
Max Width:	80 cm
Max Depth:	1.5 m
Oriented:	161 / 341 TN
Stratum I	0-40 cm
	Fill; 7.5 YR 3/0 (moist) black; clay loam; weak, fine, structure; friable; contains plentiful roots and rootlets and historic trash; abrupt and smooth boundary
Stratum II	50-130 cm
	7.5 YR 3/2 (moist) dark brown; clay loam; moderate, fine structure; friable; contains few roots and rootlets; abrupt and smooth boundary
Stratum III	130-150 cm
	7.5 YR 3/3 (moist) dark brown; silty, clay loam; weak, fine structure; friable; contains few roots and rootlets; boundary below water table. Water table at 140 cmbs

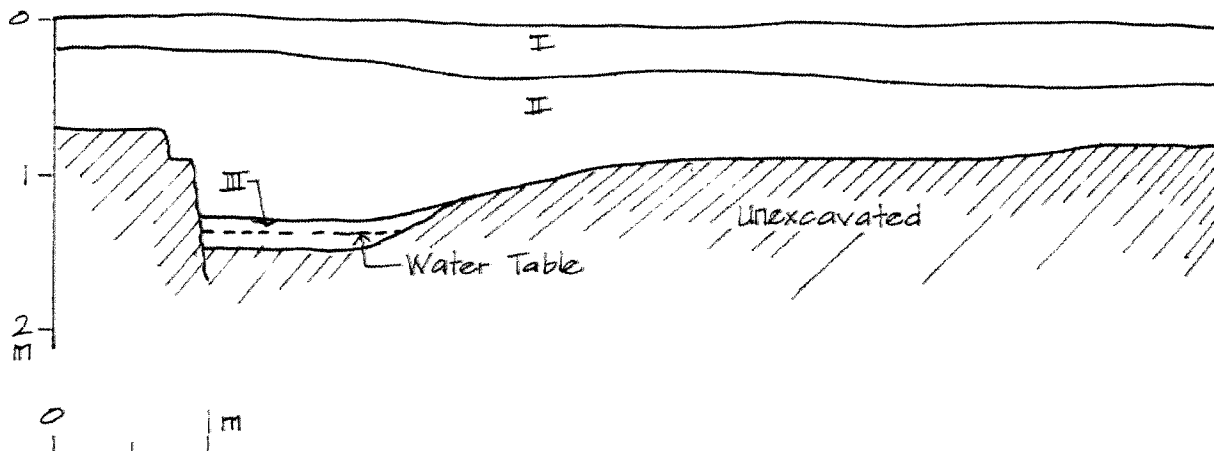


Figure 20 Profile of Northeast Wall of Trench 6, Showing Stratigraphy



## Archaeological Inventory Survey

7. Trench 7 (Figure 21)  
**Max Length:** 6.1 m  
**Max Width:** 70 cm  
**Max Depth:** 1.2 m  
**Oriented:** 052 / 232 TN

Stratum I	0-17 cm	A-horizon; 7.5 YR 3/2 (moist) dark brown; silty clay loam; moderate, medium granular structure; firm; contains plentiful roots and rootlets and 5% pebbles; clear and smooth boundary;
Stratum II	17-60 cm	<i>Lo</i> deposit; mottled 10 YR 3/1 (moist) very dark gray, 2.5 YR 3/6 dark red; silty clay; weak to moderate medium granular structure; firm; contains mottled oxidized ferrous and very few roots and rootlets; clear and smooth boundary;
Stratum III	60-122 cm	Alluvium; 10 YR 3/2 (moist) dark brown; pebbly, sandy silty clay; structureless; very friable; contains 80% waterworn pebbles and small cobbles to base of excavation. Water table at 120 cmbs

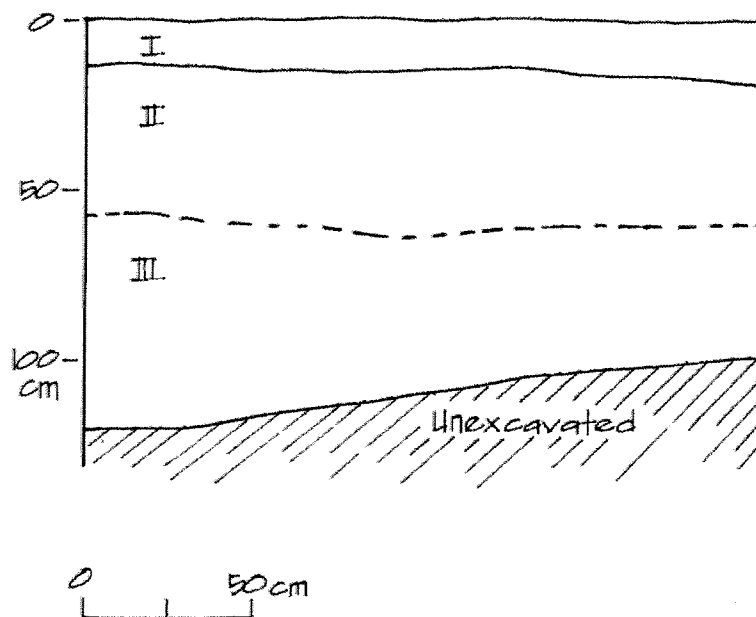


Figure 21 Profile of Northwest Wall of Trench 7, Showing Stratigraphy

Archaeological Inventory Survey

8. Trench 8 (Figure 22)  
 Max Length: 2 m  
 Max Width: 2 m  
 Max Depth: 1.5 m  
 Oriented: 065 / 245 TN

Stratum I	0-35 cm	A-horizon; 7.5 YR 3/2 (moist) dark brown; silty clay loam; moderate, medium granular structure; firm; contains “Primo” bottle, plentiful roots and rootlets and 5% pebbles; clear and smooth boundary;
Stratum II	35-95 cm	<i>Lo</i> ì deposit; mottled 10 YR 3/1 (moist) very dark gray, 2.5 YR 3/6 dark red; silty clay; weak to moderate medium granular structure; firm; contains mottled oxidized ferrous and very few roots and rootlets; clear and smooth boundary;
Stratum III	95-125 cm	Alluvium; 10 YR 3/2 (moist) dark brown; pebbly, sandy silty clay; structureless; very friable; contains 80% waterworn pebbles and small cobbles to base of excavation. Water table at 125 cmbs
	125-178 cm.	Refer to Section E. <b>CORING RESULTS</b> Core #1

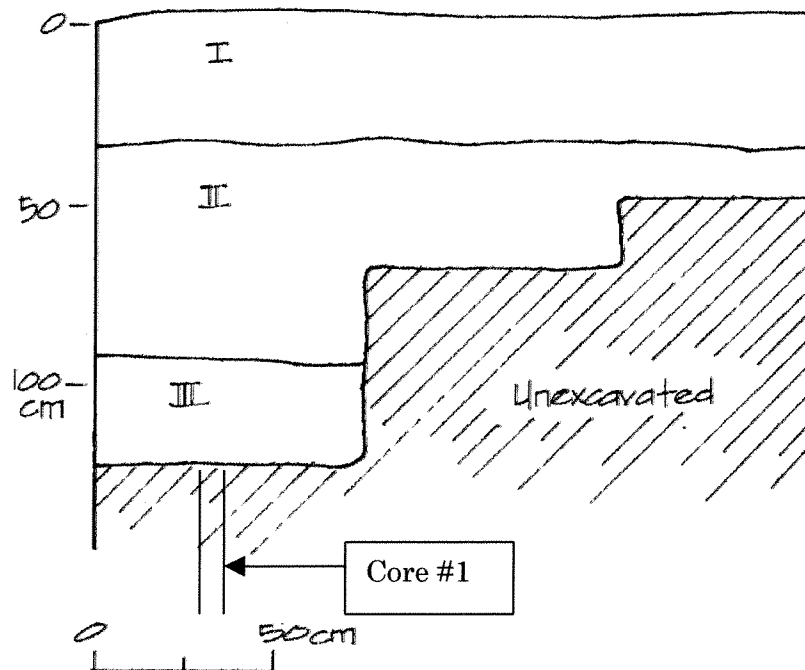


Figure 22 Profile of Northeast Wall of Trench 8, Showing Stratigraphy

## Archaeological Inventory Survey

9. Trench 9	(Figure 23)
Max Length:	2 m
Max Width:	2 m
Max Depth:	1.5 m
Oriented:	065 / 245 TN
Stratum I	0-25 cm
	Fill; 7.5 YR 3/4 (moist) dark brown; sandy clay; structureless; friable; contains few roots and rootlets and modern trash (plastic) and 20% pebbles; abrupt and smooth boundary
Stratum II	25-37cm
	Fill; 10 YR 5/3 (dry) brown; fine sand; structureless; loose, non-coherent; contains plentiful roots and rootlets; abrupt and smooth boundary
Stratum III	37-45 cm
	Fill; 7.5 YR 3/4 (moist) dark brown; sandy clay; structureless; friable; contains few roots and rootlets and 20% pebbles; abrupt and smooth boundary
Stratum IV	45-55 cm
	Fill; 10 YR 5/2 (moist) grayish brown; clay; moderate, sub-angular medium structure; friable; contains 5% pebbles; very abrupt and broken boundary
Stratum V	55-95 cm
	<i>Lo`i</i> deposit; mottled 10 YR 3/1 (moist) very dark gray, 2.5 YR 3/6 dark red; silty clay; weak to moderate medium granular structure; firm; contains mottled oxidized ferrous and very few roots and rootlets; clear and smooth boundary;
Stratum VI	95-123 cm
	Alluvium; 10 YR 3/2 (moist) dark brown; pebbly, sandy silty clay; structureless; very friable; contains 80% waterworn pebbles and small cobbles to base of excavation. Water Table at 120 cmbs

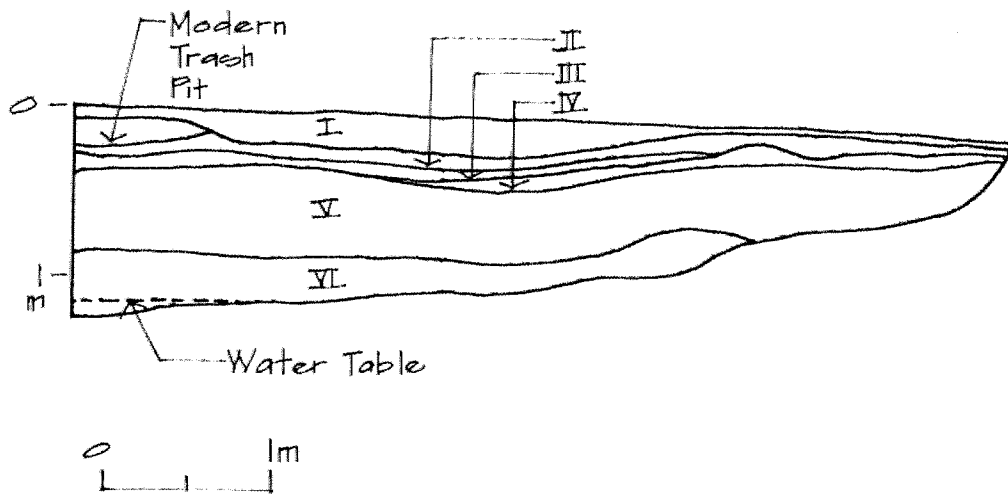


Figure 23 Profile of East Wall of Trench 9, Showing Stratigraphy

## Archaeological Inventory Survey

10. Trench 10 (Figure 24)  
 Max Length: 6 m  
 Max Width: 70 cm  
 Max Depth: 1 m  
 Oriented: 175 / 355 TN

Stratum I	0-5 cm	O-horizon; 10 YR 2/1 (dry) black; partially decomposed organic material
Stratum II	5-80 cm	<i>Lo`i</i> deposit; mottled 10 YR 3/1 (moist) very dark gray, 2.5 YR 3/6 dark red; silty clay; weak to moderate medium granular structure; firm; contains mottled oxidized ferrous and very few roots and rootlets; clear and smooth boundary;
Stratum III	40-100 cm	10 YR 3/2 (moist) dark brown; pebbly, sandy silty clay; structureless; very friable; contains 80% waterworn pebbles and small cobbles to base of excavation. Possible <i>lo`i</i> wall. Water table at 90 cmbs

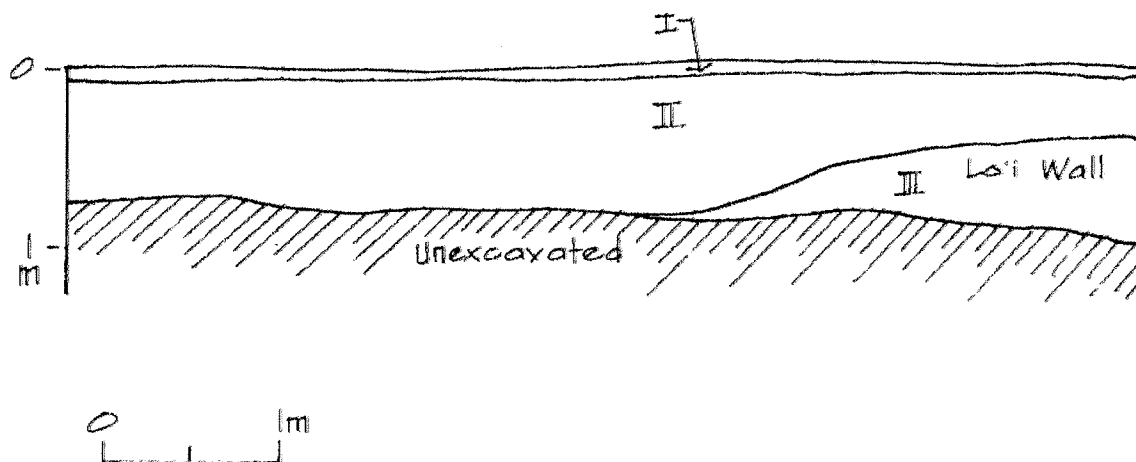


Figure 24 Profile of East Wall of Trench 10, Showing Stratigraphy

## Archaeological Inventory Survey

11. Trench 11 (Figure 25)  
 Max Length: 5 m  
 Max Width: 70 cm  
 Max Depth: 1 m  
 Oriented: 175 / 355° TN

Stratum I	0-32 cm	A-horizon; 10 YR 3/1, very dark gray, with mottle of 10 YR 3/3, dark brown (wet), very fine sandy loam; structureless; slightly sticky; slightly plastic; alternating grading in 10 cm units; very abrupt and smooth boundary
Stratum II	32-38 cm	10 YR 2/1 (wet) black, very fine sandy clay; slightly sticky; plastic; very abrupt and smooth boundary
Stratum III	38-50 cm	10 YR 2/1 (wet) black, clay; structureless; sticky; plastic; clear and smooth boundary
Stratum IV	50-53+ cm	10 YR 2/1 (wet) black, fine gravel and loamy basalt sand gravel. Water table at 90 cmbs

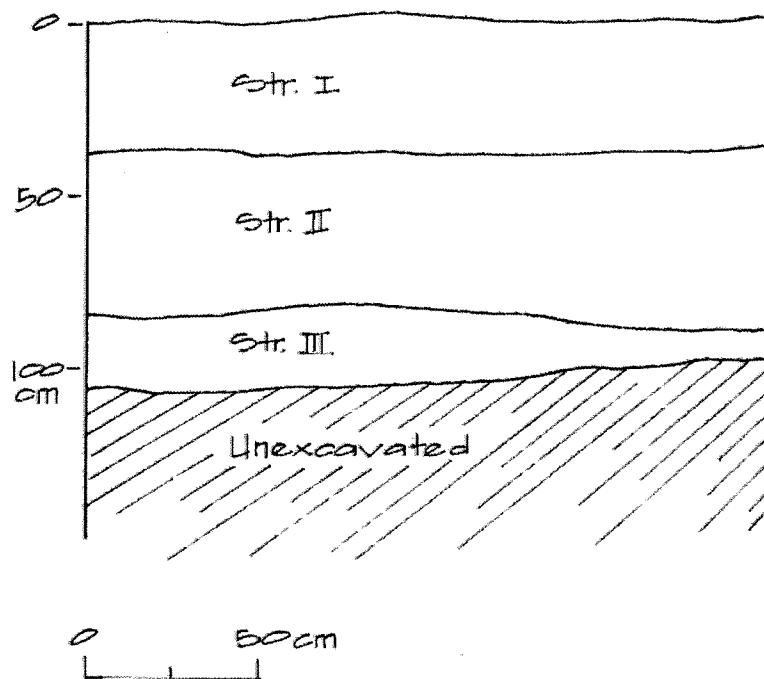


Figure 25 Profile of West Wall of Trench 11, Showing Stratigraphy

Archaeological Inventory Survey

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12. Trench 12		(Figure 26)
Max Length:		6 m
Max Width:		1.5 m
Max Depth:		1.5 m
Oriented:		124 / 204 TN
Stratum I	0-10 cm	Fill; 7.5 YR 3/3 (dry) dark brown, fine to very fine loam, contains 10% gravel, weak granular structure, non-coherent; Abrupt and smooth boundary
Stratum II	10-35 cm	Fill; 7.5 YR 5/3 (dry) brown, cobbly sandy loam; weak, fine granular structure; weakly coherent; contains historic trash and 60% pebbles and cobbles; abrupt and smooth boundary
Stratum III	35-75 cm	Fill; 7.5 YR 3/4 (dry) dark brown, fine to very fine loam, contains 40-50% gravel and cobbles, weak, fine to very fine granular structure, non-coherent; Abrupt and smooth boundary
Stratum IV	75-110 cm	A horizon; 7.5 YR 3/2 (moist) dark brown, clay loam; moderate to strong, fine to very fine granular structure, slightly sticky, contains plentiful rootlets; lower boundary abrupt and smooth; natural stratigraphy

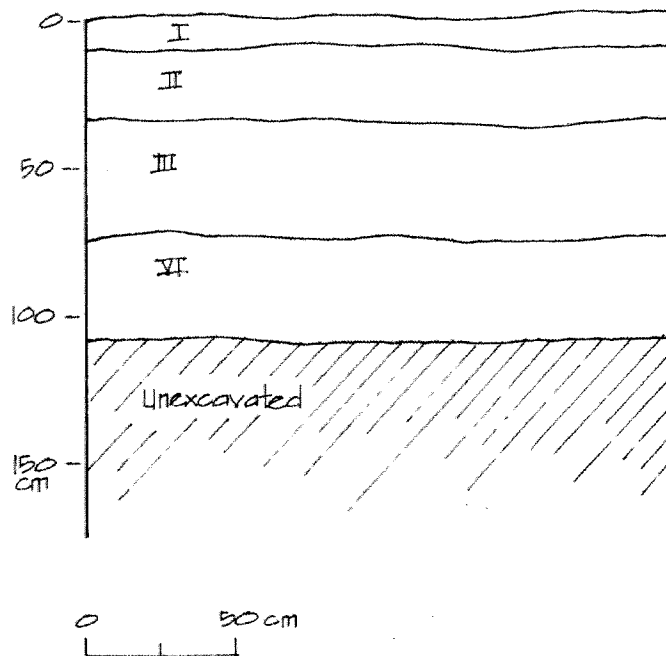


Figure 26 Profile of Southwest Wall of Trench 12, Showing Stratigraphy



## Archaeological Inventory Survey

13. Trench 13	(Figure 27)
Max Length:	5 m
Max Width:	70 cm
Max Depth:	1.2 m
Oriented:	055 / 235 TN
Stratum I	0-5 cm Partially decomposed organic layer; “O” horizon
Stratum IIA	5-60 cm Fill; 10 YR 3/3 (dry) dark brown, pebbly sandy clay; structureless; slightly hard; contains plentiful roots and rootlets and modern trash (plastic); abrupt and wavy boundary
Stratum IIB	30-45 cm Fill; 10 YR 2/1 (moist) black, decaying organic material within Stratum IIA; abrupt and broken boundary
Stratum III	40-65 cm Beach deposition; 10 YR 3/2 (wet) very dark grayish brown, sandy silt; structureless; slightly sticky; contains few roots and rootlets; abrupt and broken boundary
Stratum IV	40-65 cm Beach deposition; 10 YR 3/1 (wet) very dark grayish brown, sandy silt; structureless; slightly sticky; abrupt and broken boundary
Stratum V	50-75 cm Beach deposition; 10 YR 2.5/3 (wet) very dark brown, medium sand; structureless; slightly sticky; abrupt and broken boundary
Stratum VI	50-90 cm Beach deposition; 10 YR 3/1 (wet) very dark grayish brown, medium silty sand; structureless; slightly sticky; abrupt and smooth boundary
Stratum VII	90-110 cm Beach deposition; 10 YR 2.5/3 (wet) very dark brown, medium sand; structureless; slightly sticky, Water table at 110 cmbs

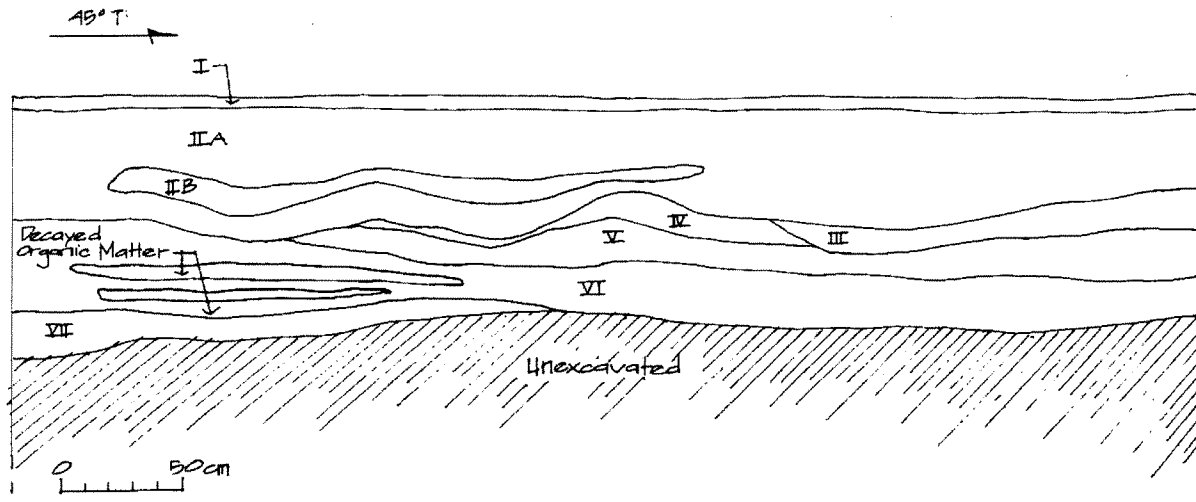


Figure 27 Profile of Northwest Wall of Trench 13, Showing Stratigraphy

## Archaeological Inventory Survey

Trench 14	(Figure 28)
Max Length:	5.3 m
Max Width:	70 cm
Max Depth:	1.1 m
Oriented:	045 / 225 TN
Stratum I	0-30 cm
Stratum II	7-45 cm
Stratum III	45-108 cm

Fill; 7.5 YR 5/6 (dry) strong brown, gravelly, silty sand; weak, medium granular structure; loose, non-coherent; contains abundant roots and rootlets; very abrupt and smooth boundary

Fill; 10 YR 3/1 (moist) very dark gray, sandy, silty loam; weak, fine to medium granular structure; friable; contains abundant roots and rootlets and modern glass; clear and smooth boundary

Beach deposition; 10 YR 3/2 (moist) very dark grayish brown, fine silty sand; weak, fine granular structure; loose, non-coherent; contains few roots and rootlets, 8" X 8" creosote soaked post extending through layer and base of excavation. Water table at 70 cmbs

70-160 cm. Refer to Section E. **CORING RESULTS** Core #2

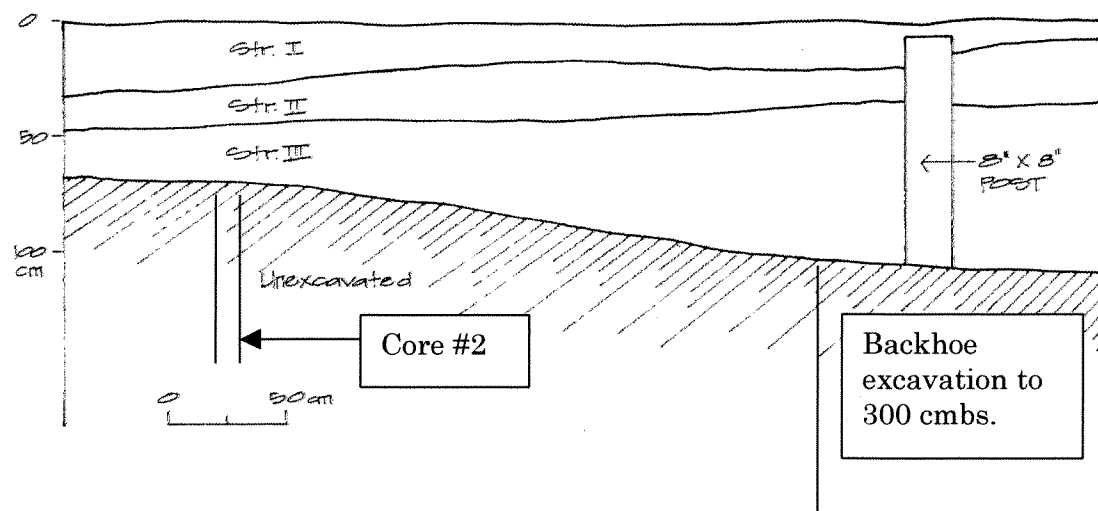


Figure 28 Profile of Southeast Wall of Trench 14, Showing Stratigraphy

## Archaeological Inventory Survey

14. Trench 15 (Figure 29)  
 Max Length: 5 m  
 Max Width: 70 cm  
 Max Depth: 85 cm  
 Oriented: 055 / 235 TN

Water Table at 70 cmbs

Stratum I	0-5 cm	O-horizon; 10 YR 2/1 (moist) black, organic rich sandy loam; structureless; loose, non-coherent; contains abundant roots and rootlets; abrupt and smooth boundary
Stratum II	5-80 cm	Beach deposition; 10 YR 3/2 (moist) very dark grayish brown, fine silty sand; weak, fine granular structure; loose, non-coherent; contains few roots and rootlets

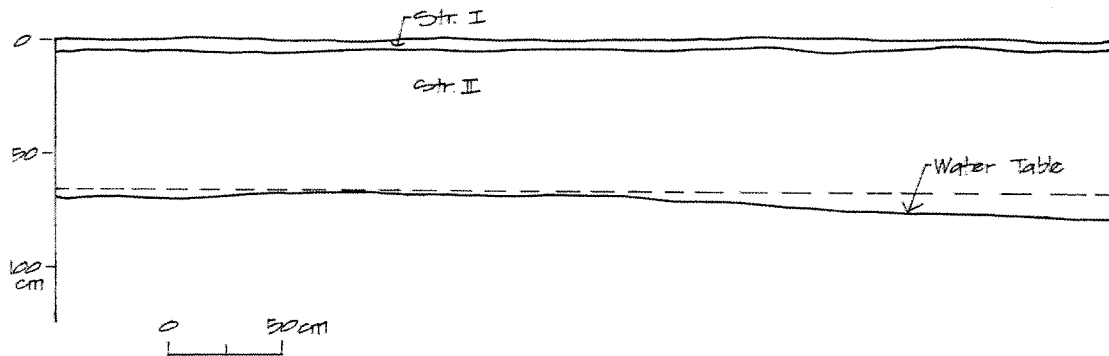


Figure 29 Profile of Southeast Wall of Trench 15, Showing Stratigraphy

## Archaeological Inventory Survey

15. Trench 16 (Figure 30)  
 Max Length: 5.6 m  
 Max Width: 70 cm  
 Max Depth: 60 cm  
 Oriented: 166 / 346 TN

Water Table at 50 cmbs

Stratum I	0-43 cm	Beach deposition; 10 YR 3/3 (wet) dark brown, silty sand; structureless; slightly sticky; contains few roots and rootlets; abrupt and wavy boundary
Stratum II	43-60 cm	Beach deposit; 10 YR 2/1 (wet) black, silty sand; structureless; slightly sticky; contains few roots and rootlets; extends below water table

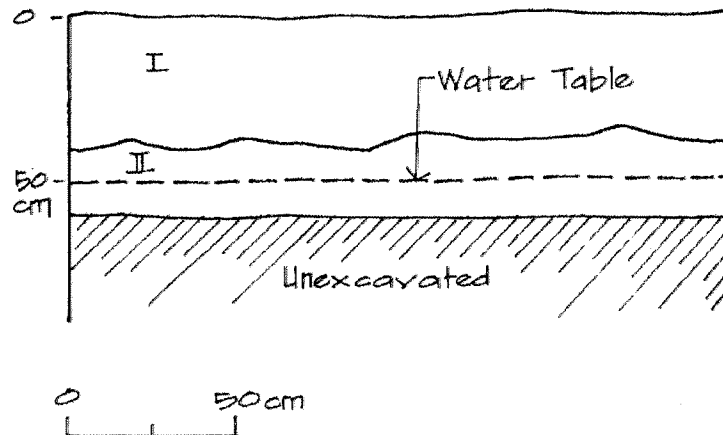


Figure 30 Profile of West Wall of Trench 16, Showing Stratigraphy

**E. E. CORING RESULTS**

1. Core #1

Top of Core at 125 cmbs. in Backhoe Test Trench #8 Figure 31

Stratum V	125-156 cm	10YR3/1 very dark grey A? Horizon, with high organic content in fine beds, and with mottles of 10YR3/3 dark brown (iron staining), loose sandy loam, very fine, single grain, slightly sticky, slightly plastic, structureless, alternating graded bedding in 10 cm. units, smooth very abrupt lower boundary.
Stratum VI	156-163 cm	10YR2/1 Black, Very fine sandy clay, slightly sticky, plastic, smooth very abrupt boundary
Stratum VII	163-175 cm	10YR2/1 black, very fine sandy clay, sticky, plastic, structureless, clear smooth lower boundary
Stratum VIII	175-178 cm.	10YR2/1 black, fine gravel and loamy basalt sand at bottom of Core.

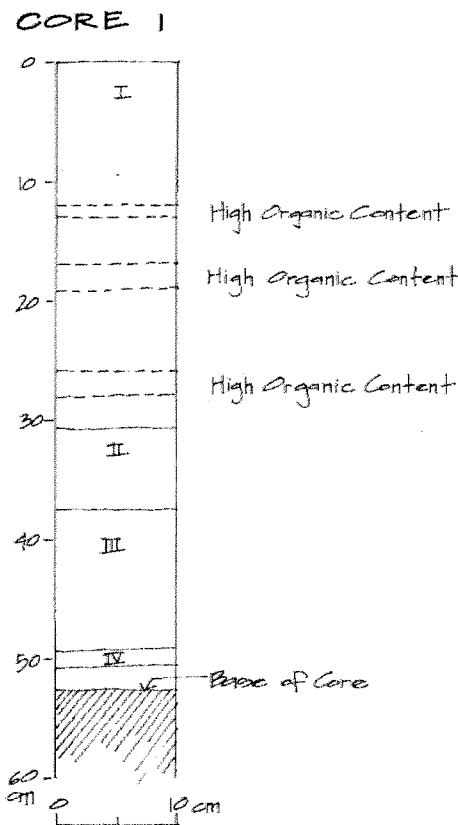


Figure 31 Profile of Core Number 1

## Archaeological Inventory Survey

## 2. Core #2

Top of Core is 70 cmbs. in Backhoe Test Trench #14 Figure 32

Stratum IIIA 70-92 cm	A horizon (?); 10 YR 2/1 (moist) black, fine to very fine sand (basalt) 5% very coarse sand, well rounded grains in lenses less than 2 cm thick, single grain, loose, non-sticky, not plastic, carbonate, portion from 0-10 cm shows oxidation; Clear, smooth boundary
Stratum IIIB 92-108 cm	C horizon (?); 10 YR 2/1 (moist) black, fine to medium, grading downward to coarse with 10 to 20% very coarse in lower 10 cm, very coarse sand is well rounded, texture and all other same as IA; Abrupt, smooth boundary
Stratum IVA 108-110 cm	A horizon; 10 YR 2/1 (moist) black, very fine to fine sand, structureless, loose, non-sticky, non-plastic, carbonate (?), high organic content with presence of charcoal; Abrupt, smooth boundary
Stratum IVB 110-128 cm	C horizon (?); 10 YR 2/1 (moist) black, fine to medium sand grading downward to medium to coarse, structureless, loose, non-plastic, non-sticky, carbonate (?), upper 5 cm shows oxidation of fine sand grains; Clear, smooth boundary
Stratum IVC 128-138 cm	C horizon (?); 10 YR 2/1 (moist) black, medium to coarse sand with 10% very coarse well rounded sand, structureless, loose, non-plastic, non-sticky, carbonate; Abrupt, smooth boundary
Stratum V 138-153 cm	10 YR 2/1 (moist) black, very fine to fine grading downwards to fine to medium sand, increasing percentage of very coarse well rounded sand in small lenses, loose, non-plastic, non-sticky, small fragments of white shell (unidentified), increases in percentage downwards below 75 cm level; Very abrupt, smooth boundary
Stratum VI 153-160 cm	A horizon (?); 10 YR 2/1 (moist) black, very fine to fine sand grading downwards to fine to medium sand, well sorted, uniform, no apparent bedding, contains small mollusc shells (unidentified), high organic matter, diffused, probably extends at a minimum of 50 cm more from bottom of this core.

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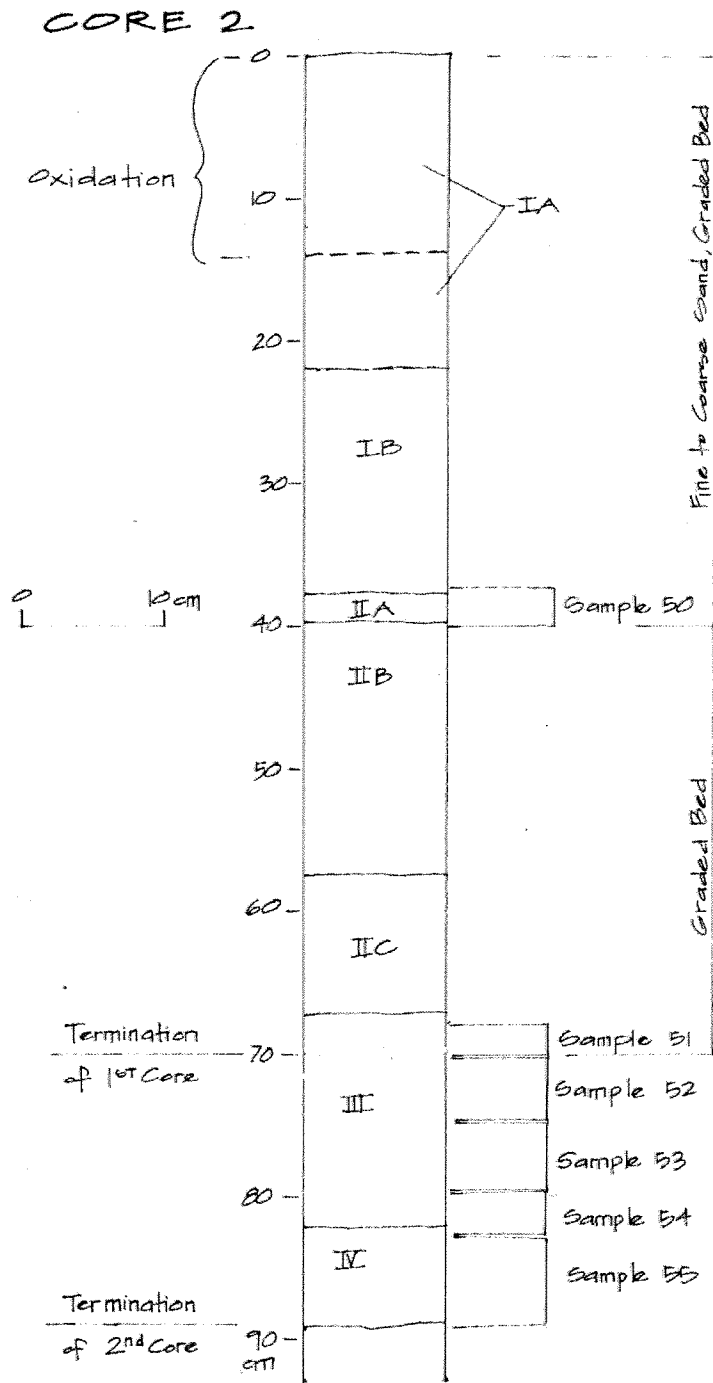


Figure 32 Profile of Core Number 2



## V. V. POLLEN ANALYSIS

The results of the Pollen Analysis are given in their entirety in the Appendix so the reader may draw their own conclusions and only a brief summary is attempted here. Pollen analysis was carried out on nine samples from two soil columns, four samples from a column from Trench 8 and five samples from a column from Trench 14.

### A. Pollen Results from Trench 8

Four stratigraphic samples were submitted for pollen analysis from Trench 8 from the following levels given in centimeters below surface (cmbs): 140-145, 156-163, 163-170, and 175-178. Inasmuch as “The uppermost sample contains too few pollen grains to be able to derive meaningful conclusions” this sample is omitted from further discussion.

The basal sample (175-178 cmbs) from Trench 8 yielded pollen from coconut (*niu*) and ti (*kī*) which are both understood as Polynesian introductions. The basal sample also yielded charcoal particles at very low concentrations indicative of minimal burning within the watershed. Together the presence of evidence of Polynesian cultigens and burning strongly suggests that the entire pollen record postdates initial Polynesian occupation and that no pristine pre-human colonization pollen record is present. Charcoal particle concentrations remain low possibly indicative of relatively little burning in this relatively wet area (rainfall averages 60 - 80 in. per year at the coast rising markedly inland).

Other pollen studies on O`ahu have indicated sharp drop-offs in the pollen of certain endemic low-land species (particularly the *Loulu* palm, *Pritchardia* sp. and *Kanaloa kahoolawensis*) following human colonization but no such drop-off is observable in this case. *Pritchardia* pollen still accounts for a robust 26.2% of all pollen in the upper 31-38 cmbs level. As Ward notes, “The remaining three samples share a uniformity of types and abundance in the pollen and spore spectra.” The samples homogeneously reflect a pollen rain dominated by *Acacia koa* (*Koa*), *Pritchardia* sp. (*Loulu*), *Antidesma* sp. (*Hame*) Myrtaceae (*Ōhi`a* and others), *Freycinetia arborea* (*Ie`ie*), *Cheirodendron* (*Ōlapa* and others), *Ilex anomala* (*Kāwa`u*) *Elaeocarpus bifidus* (*Kalia*), and *Cibotium* sp. (*Hapu`u*). While the presence of sedges (Cyperaceae) and grasses (Poaceae) throughout the sequence indicates the proximity of a nearby marsh or wetland habitat, there is no evidence of a marked increase in sedges or grasses as would be expected in response to substantial clearing activity. Ward notes that the relatively high numbers of Pseudoschizaea algal spores “which are common in freshwater tropical deposits, give further evidence of a wetland at this site.”

Ward opines that the presence of pollen types and charcoal particles indicates that the lower three stratigraphic samples all reflect a time of early Polynesian occupation.

## **B. Pollen Results from Trench 14**

Five stratigraphic samples were submitted for pollen analysis from Trench 14 from the following levels given in centimeters below surface (cmbs): 108-110, 138-140, 145-150, 153-160, and 200-300 (backhoe sample). This record is the more interesting of the two recovered inasmuch as there were five good stratigraphic samples of pollen (compared to the three in Trench 8) and that a much longer column was sampled. Despite the presence of “minimal” charcoal particle concentration and the presence of two grains of *Hibiscus tiliaceus* (*Hau* - understood as a Polynesian introduction) pollen in the basal level the pollen types are “indicative of a pristine lowland forest.” A time of early Polynesian occupation is suggested for the basal sample on the basis of the *Hau* pollen and the charcoal particles, however, a date from the stratum from which the basal sample was taken came back at BC 3340 to 2890 (BP 5290 to 4840) long before Polynesian arrival. It seems most probable the few *Hau* pollen grains and charcoal particles filtered down from above or entered the sample through contamination.

Throughout the column much the same list of native species as is indicated for Trench 8 enumerated above.

There is evidence, however, of substantial environmental degradation between the basal sample and the overlying samples. In the basal sample *Pritchardia* sp. (*Loulu*) pollen accounts for 38.5% of all pollen while the percentage of *Pritchardia* sp. pollen in the four overlying samples ranges between 10.6% and 3.2% (mean value 5.4%). This environmental change is also reflected in the concentrations of the pollen of sedges (Cyperaceae) and grasses (Poaceae). Collectively Cyperaceae and Poaceae accounted for only 8.9% of all pollen in the basal sample. The values for sedge and grass pollen as a percentage of total pollen in the overlying, more recent, four samples ranged from 60.9% to 91.9%. Clearly the collective dominance of sedges and grasses exploded in the same interval the percentage of *Pritchardia* sp. pollen dropped markedly a pattern that then persisted. In this same interval of the two deepest samples the concentration of charcoal particles jumps from 1.2 mm<sup>2</sup>/cc to 8.2 mm<sup>2</sup>/cc an almost seven-fold increase (although the concentration remains at a relatively low level probably reflecting the relatively wet environment).

The pattern of the marked decline of *Pritchardia* sp. pollen, the spectacular rise of sedge and grass pollen and the rise of charcoal particle concentration is not shown to be a gradual trend in the series of samples but rather occurs markedly and irreversibly in the interval between the two deepest samples. We do not really have any idea how rapid this was, however, as the carbon date from the basal sample suggests an interval of at least three thousand years separating the oldest sample from the next oldest which appears to be post Polynesian settlement (on the basis of the abundance of charcoal particles).

These results support what has become the anticipated pattern of what Ward characterizes as an “abrupt decline in lowland forest elements, expansion of weedy elements, and higher charcoal particle concentrations” attending human colonization of Hawai‘i. In the present case

there is no data on when this occurred.

Five Polynesian introductions appear in the pollen record including *Kukui* (Candle-nut, *Aleurites moluccana*), *Niu* (Coconut, *Cocos nucifera*), *Hau* (*Hibiscus tiliaceus*) and *Noni* (*Morinda citrifolia*) but none are indicated as particularly abundant.

## VI. VI. ARTIFACT ANALYSIS

The artifacts encountered in Waiahole beach Park during the archaeological inventory survey are comprised of only post-1950 trash.

## VII. VII. SUMMARY

The predictive model for the types of sites expected within the project area was based on the results of background historical, cultural, and previous archaeological research. Comparison of the predicted and the actual results of the inventory survey field work places the field observations within the context of the background research. It provides a general summary of the project findings.

As predicted, the northern portion of the project area contained no surficial archaeological sites. In general, fill layers predominate the uppermost strata with modern trash within the fill. Marshy conditions existed prior to the recent filling as evidenced in the core sampling of the deeper waterlogged sediments. The marshy conditions would have precluded building of permanent structures in the area. Natural soils in the northern portion of the project area consisted of structureless sands and silty sands that represent alternating beach and alluvial or standing water deposition episodes.

The southern portion of the project area consisted of alluvial deposits capped by modern fill layer(s). The alluvium supported flooded agricultural fields (*lo'i*) indicated by mottled silty clays and clay loams with zones of iron staining from oxidizing ferrous minerals encountered in trenches 1 through 12. Trench 10 contained a possible *lo'i* wall which consisted of very gravelly silty clay which was consistent with the stratum underlying the *lo'i* sediments. Alluvial gravelly silty clay was predominating in the bases of the trenches with abundant waterworn pebbles to small cobbles, which accounted for up to 80% of the sediments.

One site as well as a possible upright and a modern *imu* were also encountered in the southern portion of the project area. The *imu* with modern debris was encountered along Waiahole Stream and may represent a continuously used *imu* from early historic times. Modern trash and charred cobbles were strewn in and around the earthen mound and a pile of *imu* cobbles were recorded on top of the earthen portion of the mound.

State Site #50-80-10-1086, a concentration of historic graves situated on a large leveled mound was encountered in the southeastern portion of the project area adjacent to a modern pig pen and dog kennel. This concentration of 6 rectangular aligned grave plots (though others may have been disturbed beneath the pig pen) appear to be associated with a church which was once situated at this location within LCA 7661:3 (Kaukaluu) and is plotted on Dove's 1897 map of Waiahole. In an informal interview with the current tenants of the land it was stated that approximately 10 years ago a group of Hawaiians from the Big Island visited the grave site to express their aloha to their ancestors. A kukui lei was left at the site by the group and was found during the current project. Though no subsurface testing was performed to positively identify these as human burials, based on the presence of a church at this location and oral interviews with the current residents of the parcel it is probably that this site dates to the mid-late 19<sup>th</sup> century.

## VIII. SIGNIFICANCE AND RECOMMENDATIONS

The inventory survey and sub-surface testing of the approximately 21 ac. documented the remains of land use that appears to extend from prehistoric times, through over one hundred years of historic commercial agriculture into the modern period where a portion of the subject parcel continues to be used by local pig farmers. Two historic properties were identified and are recommended for preservation in place.

### A. Significance

Historic property #50-80-10-1086, the historic grave plots in the southeastern portion of the project area, are significant under of the State Historic Preservation Division significance criterion D – for information content, and criterion E – for cultural importance. The location of the burial plot coincides with the location of a cross symbol on Dove’s 1897 map of Waiāhole in Land Commission Award 7661 `Āpana 3. The “church” symbol (the cross) may simply stand for this graveyard or there may indeed have been a small church here serving the Waiāhole community for which there is no other known church site.

Historic property #50-80-10-6396, the probable Pōhaku O Kāne, is significant for its potential to provide information on Hawai`i’s past (significance criteria D) and its cultural importance (significance criteria E). Kamakau (1961:32) describes the *Pōhaku o Kāne* as a place of refuge, a *pu`u honua*, for each family from generation to generation. It was not a *heiau*; it was a single stone monument (*he wahi `eo`eo pōhaku ho`okahi*), and a *kuahu* altar with ti and other greenery planted about".

### B. Recommendations

The recommendation for historic property 50-80-10-1086 is to preserve it in place, mark it clearly and conduct regular landscape maintenance around it to preserve the integrity of the site and make it accessible. No development or other land modification should take place within this preserve area. The encroaching pig pen and dog yard should be carefully removed. It should be possible to remove these without significant subsurface impact. It is important that the preserve area be included on all future development plan maps so that the preservation of this area will be incorporated into all future development plans for Waiāhole Beach Park.

State Site #50-80-10-6396, the probable Pōhaku O Kāne, is also recommended for preservation in place, with clear markings and regular landscape maintenance around it to preserve the integrity of the stone. No development or other land modification should take place within a reasonable distance of the stone. It is important that the location of the stone be included on all future development plan maps so that the preservation of this area will be incorporated into all future development plans for Waiāhole Beach Park.

Archaeological on-site monitoring is recommended for all grading and grubbing activities on the peninsula on the north bank of the Waiahole river where the Land Commission Awards

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are congregated. This is recommended for the area of 50-80-10-1086 and 50-80-10-6396 as well as potential inadvertent human burial finds on the peninsula. The possibility of such finds is suggested in interviews with long-term residents of the area (Bushnell et al. 2001).

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## X. DR. JEROME WARD POLLEN ANALYSIS (COMPLETE)

### Pollen analysis of Waiahole, O'ahu

Samples were analyzed from two test trenches for pollen analysis from the Waiahole area on O'ahu. The goal was to detect evidence of landscape change in the environment and presence of ethnographic plant taxa, or plants use by Polynesians.

The samples were initially treated with HCL to dissolve carbonates, followed by KOH to solubilize organics, and HF to dissolve the silica fraction (Moore et al., 1991). Acetolysis solution, advocated by Herengreen (n.d.), was used to break down the abundant cellulose, and dilute HNO<sub>3</sub> was used to oxidize the remaining microscopic plant debris, including lignin. After final rinsing the pollen residue was mounted in glycerine jelly following Erdtman's (1960) technique.

Palynomorphs, which include pollen, pteridophyte spores, and other organic-walled microfossils are usually less than the 200 μm size fraction (Tschudy and Scott 1969). These were identified using published pollen floras that include Pacific types, chiefly Selling (1946, 1947) for Hawai'i and Cranwell (1953) for New Zealand. A personal reference collection of pollen and spores from the Pacific was also used and includes about 500 specimens. An attempt was made to count at least 200 dryland pollen grains from each sample.

Usually, a sum of at least 200 pollen grains is preferred for Hawaiian work in order to adequately record shifts in forest types. A high pollen sum is also needed to detect the presence of ethnobotanically important species, which are often shy pollen producers. At Waiahole the pollen recovery was inconsistent due to variations in overall palynomorph concentration. The lowest pollen count occurred in the 15-20 cm sample of Trench 8 where only 39 pollen grains were counted. About half of the remaining samples fell short of the 200 grain target number.

Charcoal particles were analyzed using a quantitative counting method. The particles were counted using an eyepiece graticle, with a 10 x 10 grid square pattern (Patterson et al., 1987), and exotic marker Lycopodium spores counted along with them provided the necessary control for calculating the concentration. Charcoal was counted in grid square size classes and the total area in mm<sup>2</sup> was determined. The charcoal

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values were converted into concentration values using the formula from Birks and Bergen (1992):

$$\text{Charcoal concentration} = \text{initial } \underline{\text{Lycopodium}} \text{ concentration (\#/cc)} \times \text{total charcoal area (mm}^2\text{/cc)} / \underline{\text{Lycopodium}} \text{ spores counted (\#)}$$

The pollen concentration was calculated in a similar fashion to the charcoal particle concentration:

$$\text{Pollen concentration} = \text{initial } \underline{\text{Lycopodium}} \text{ concentration (\#/cc)} \times \text{total number of palynomorphs (\#)} / \underline{\text{Lycopodium}} \text{ spores counted (\#)}$$

The count data are presented in Table 1. The pollen is separated into ecological groups: Dry-Mesic Forest, Mesic-Wet Forest, and Herbs, while the Pteridophytes are divided on the basis of morphology, whether monolete or trilete. The palynomorphs were plotted in pollen diagrams, which are shown in Figures 1 and 2.

### **Paleoecology**

#### **Trench 8**

The pollen concentration ranges from a high of 27,000 grains/cc in the basal sample to just over 100 grains/cc in the 15-20 cm sample. The middle samples from 31-45 cm, while still relatively low are close to 4,000 grains/cc. The uppermost sample contains too few pollen grains to be able to derive meaningful conclusions. The remaining three samples share a uniformity of types and abundances in the pollen and spore spectra.

The lower three samples are dominated by *Acacia koa*, *Pritchardia*, *Antidesma*, *Myrtaceae*, with minor contributions from *Elaeocarpus bifidus*-type, *Kanaloa kahoolawensis*, *Pisonia sandwicensis*, and *Pouteria*. The Mesic – Wet Forest group is represented by a shared dominance of *Araliaceae*, *Cheirodendron*, *Freycinetia arborea*, and *Ilex anomala*, which indicate the presence of a wetter forest at higher elevations within the basin. Sedge and grass pollen were present in almost every sample from Trench 8 suggestive of a nearby marsh or wetland habitat. In addition, the relatively high numbers of *Pseudoschizaea* spores, which are common in freshwater tropical deposits, give further evidence of a wetland at this site.

The Pteridophyte record from Trench 8 is heavily dominated by monolete/psilate followed by *Marattia douglasii* and *Polypodium pellucidum*-type spores. Among the Trilete spores, *Cibotium* is dominant while *Lindsaea* registers at slightly lower levels.

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Archaeological Inventory Survey

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The trilete/echinate type is significant only in the 31-38 cm level but drops to much lower levels in the two basal samples.

Charcoal concentrations are very low in this core with the basal two samples at 2.8 mm<sup>2</sup>/cc and 2.0 mm<sup>2</sup>/cc while the upper two samples are 0.6 mm<sup>2</sup>/cc and 0.2 mm<sup>2</sup>/cc at 31-38 cm and 15-20 cm, respectively. These amounts would suggest minimal burning within the watershed.

The record of canoe plants, or plants introduced by early Hawaiians as evidenced from the recovered pollen, includes *Aleurites moluccana* (kukui) at 31-38 cm, *Cocos nucifera* (nui) at 38-45 cm and 50-53 cm, and *Cordyline fruticosa* (ti) at 31-38 cm, 38-40 cm, and 50-53 cm. The presence of these pollen types along with microscopic quantities of charcoal provide evidence that this profile dates to a period sometime after Hawaiian arrival on O'ahu. The relatively high numbers of *Pritchardia* pollen with low charcoal concentrations suggest an earlier period. In later horizons *Pritchardia* and other native lowland forest species decline abruptly while *Kanaloa* disappears entirely.

#### **Trench 14**

The basal sample from Trench 14 is different in character from the other samples of this profile in that *Pritchardia* is dominant followed by *Acacia*, *Elaeocarpus*, and *Myrtaceae*. The Mesic – Wet Forest group is represented only by *Araliaceae*, *Freycinetia*, and *Ilex* pollen. Very little sedge and grass pollen grains were recovered in the basal sample. The Pteridophytes are once again dominated by monolete/psilate spores. This dominance is shared to a lesser degree by spores from the Trilete fern group including *Cibotium*, *Gleichenia*, and *Lindsaea*.

The charcoal concentration was estimated at around 1.2 mm<sup>2</sup>/cc, which is considered minimal but would indicate some burning activity in the watershed.

The next three samples in the profile – 83-90 cm, 75-80 cm, and 68-70 cm – spanning about 20 cm of the core display similar pollen and spore spectra. The profile is dominated by pollen of *Pritchardia*, *Pandanus*, and *Myrtaceae*, followed by grass from the Herb group. Locally-produced sedge pollen is strongly represented and is indicative of a lowland marsh or wetland at the site. The Mesic – Wet Forest group is poorly represented with only trace amounts of *Freycinetia* and *Ilex* pollen.

The charcoal particle concentrations in these samples are similar and range from 8.2 in 83-90 cm, 9.5 in 75-80 cm, and 15.5 in the 68-70 cm interval. These numbers suggest continued burning within the watershed but at relatively low levels.



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The middle samples contained pollen of plants introduced by early Hawaiians including single grains of *Aleurites* from 75-80 cm and 68-70 cm, and single grains each of *Aleurites* and *Hibiscus tiliaceus* from 68-70 cm.

The uppermost sample at 38-40 cm is dominated by grass and sedge pollen. Only a few arboreal pollen types were recovered from this sample with a few grains of *Acacia*, *Dodonaea*, and *Pritchardia*. The Pteridophyte group was dominated by monoete/psilate spores.

The charcoal particle concentrations are 9.1 mm<sup>2</sup>/cc suggesting continued burning in the watershed. No pollen types of Hawaiian-introduced species were recovered from this sample.

This profile begins with pollen types indicative of a pristine lowland forest. The recovery of *Hibiscus tiliaceus* (hau) and low levels of charcoal particles from this layer suggests early Hawaiian activity in the area during this time. The remainder of the samples in this profile contain higher levels of charcoal particles and additional types of Hawaiian – introduced species. This evidence suggests expanding agroforestry, agriculture, and forest disturbance. While no pollen of naturalized or historic species was seen in the uppermost sample it is similar in composition to other samples of this age seen from lowland O'ahu.

### Conclusions

The Waiahole test trench profiles offer a glimpse into early Hawaiian history. Both profiles appear to date to sometime after arrival of early Hawaiians because the collapse of the lowland *Pritchardia* forest with co-dominants *Kanaloa*, *Dodonaea*, and cheno-am type had not yet occurred. Instead the record shows relatively high numbers of *Pritchardia* pollen, pollen representing five species of Hawaiian-introduced species, and low levels of microscopic charcoal particles. Later periods in Hawaiian pre-history, as documented by pollen evidence, record abrupt decline in lowland forest elements, expansion of weedy elements, and higher charcoal particle concentrations.

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**XI. SHPD ACCEPTANCE LETTER**

LINDA LINGLE  
GOVERNOR OF HAWAII



STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

HISTORIC PRESERVATION DIVISION  
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CONSERVATION AND RESOURCES  
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CONVEYANCES  
ENGINEERING  
FORESTRY AND WILDLIFE  
HISTORIC PRESERVATION  
LAND  
STATE PARKS

February 6, 2003

David W. Shideler  
Office Manager  
Cultural Surveys Hawaii, Inc.  
733 N. Kalāheo Avenue  
Kailua, Hawai`i 96734

LOG NO: 31649  
DOC NO: 0302EJ01

Dear Mr. Shideler:

SUBJECT Chapter 6E-8 Historic Preservation Review - Revisions to Report  
*Archaeological Inventory Survey of an Approximately 21-Acre Parcel  
at Coastal Waiāhole Ahupua`a, Ko`olaupoko District, O`ahu*  
Waiāhole, Ko`olaupoko, O`ahu  
TMK: (1) 4-8-002:001, 002, 004-012

Thank you for the submission of the revised pages to the report documenting the results of an archaeological inventory survey for the City and County of Honolulu Department of Parks and Recreation for a proposed park in coastal Waiāhole.

The revisions made in response to our review of the draft report (SHPD Log 31508/Doc. 0301EJ08) are acceptable and we now consider the report final.

Should you have any questions, please feel free to call Sara Collins at 692-8026 or Elaine Jourdane at 692-8027.

Aloha,

*P. Holly McEldowney*  
P. Holly McEldowney, Acting Administrator  
State Historic Preservation Division

EJ:jk

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**Archaeological Inventory Survey  
of an Approximately 9-Acre Parcel in Coastal  
Waiāhole Ahupua‘a, Ko‘olaupoko District, Island of O‘ahu**

TMK: 4-8-01

by

Owen L. O’Leary, MA

Matt McDermott, MA

Todd Tulchin, BS

and

Hallett H. Hammatt, Ph.D.

Prepared for  
The City and County  
of Honolulu

Cultural Surveys Hawai‘i, Inc.

(Job Code: WAIA 41)

May 2005

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**MANAGEMENT SUMMARY**

<b>Title</b>	Archaeological Inventory Survey of an Approximately 9-Acre Parcel in Coastal Waiāhole Ahupua‘a, Ko‘olaupoko District, Island of O‘ahu
<b>Date</b>	May 2005
<b>Project Number</b>	Cultural Surveys Hawai‘i Inc. (CSH) Job Code: WAIA 41
<b>Agencies</b>	City and County of Honolulu (City) State Historic Preservation Division (SHPD) State Department of Land and Natural Resources (DLNR) State Department of Health (DOH) U. S. Army Corps of Engineers (USACE)
<b>Permit Number</b>	CSH completed the fieldwork for this cultural resource investigation under state archaeological fieldwork permit No. 0404 issued by SHPD, per Hawai‘i Administrative Rules (HAR) Chapter 13-13-282.
<b>Undertaking Location</b>	South of Waiāhole Stream and east of Kamehameha Highway, Waiāhole Ahupua‘a, Ko‘olaupoko District, O‘ahu Island, (TMK 4-8-01). This area is depicted on the 1998 Kanē‘ohe USGS 7.5-minute topographic quadrangle.
<b>Project Land Jurisdiction and Funding</b>	City and County of Honolulu
<b>Acreege</b>	Approximately 9 acres
<b>Undertaking Description</b>	The City proposes the creation/restoration of wetlands and <i>lo‘i</i> (pond field) within the southern portion of the subject parcel. The proposed project is described in a “ <i>Concept Plan: Waiāhole Stream Wetlands Creation and Enhancement</i> ” prepared by Eric Guinther of AECOS, Inc (2004). AECOS’s Inc. concept plan divides the project area into roughly equal thirds. The densely <i>hau</i> -forested northern-most area would be largely preserved “as is.” If there were modifications to this northern area, they would include excavation of one or more new channels for Waiāhole Stream to provide multiple exits for the stream on the eastern portion of Waiāhole peninsula. The middle portion of the subject parcel would be restored/created as a wetland area. This will involve the excavation of basins to create areas of standing water. In the portion of the subject parcel closest to Kamehameha Highway AECOS’s concept plan proposes to recreate <i>lo‘i</i> that were once extent in this area. The different uses of the three portions of the subject parcel reflect previous land use based on historical documentation and aerial photographs.

<b>Historic Preservation Regulatory Context</b>	Because of the project's need for a Nationwide Permit (NWP) 27 from the USACE, the project is a federal undertaking requiring compliance with Section 106 of the National Historic Preservation Act. Additionally, the project may include partial federal funding from various federal agencies, including the Environmental Protection Agency, U. S. Fish and Wildlife, National Oceanographic and Atmospheric Administration, and the National Resource Conservation Service. At the state level, the proposed restoration/creation will require a state 401 Water Quality Certification Permit from the State Department of Health and a Special Management Area minor permit from DLNR and other agencies. Accordingly, the project will need to comply with Hawai'i state historic preservation review legislation [Hawai'i Revised Statutes (HRS) Chapter 6E-8 and (HAR) Chapter 13-275].
<b>Document Purpose</b>	At the request of the City, CSH completed an archaeological inventory survey investigation. It fulfills the requirements of the Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation and was conducted to identify, document, and make National Register of Historic Places (National Register) and Hawai'i Register of Historic Places (Hawai'i Register) eligibility recommendations for the subject parcel's cultural resources. The investigation also fulfills Hawai'i State archaeological inventory survey requirements (per HAR Chapter 13-276). The investigation includes an undertaking-specific effect recommendation and treatment/mitigation recommendations for the cultural resources recommended National/Hawai'i Register eligible. This document is intended to support project-related historic preservation consultation with stakeholding federal, state, and county agencies and interested Native Hawaiian and community groups.
<b>Area of Potential Effect (APE) and Survey Acreage</b>	The proposed wetland and <i>lo'i</i> restoration will not impose adverse visual, auditory or other atmospheric impact to the subject parcel's immediately vicinity and any surrounding cultural resources, including standing architecture. Accordingly, the proposed undertaking's APE extends no further than the footprint of the approximately 9-acre area proposed for the wetland and <i>lo'i</i> restoration. The survey area for the current investigation included the entire approximately 9-acre APE.
<b>Fieldwork Effort</b>	Owen L. O'Leary, MA, Matt McDermott, MA, Steve Rohrer, BS, Karl Van Ryzin, BA, Kulani Jones, BA, and Hallett H. Hammatt, PhD completed the fieldwork intermittently between November 10 and December 16, 2004. The field effort, including pedestrian inspection and subsurface testing with a backhoe, required 16 person-days to complete.
<b>Number of properties identified</b>	Three

**Properties Recommended Eligible to the National/Hawai'i Register**

- State Inventory of Historic Properties (SIHP) # 50-80-10-6756, subsurface structural remnant, recommended eligible under criterion D
- SIHP # 50-80-10-6757, historic road segment, recommended eligible under criteria C and D
- SIHP # 50-80-10-6758, prehistoric/historic agricultural infrastructure including remnants of pond fields, a berm, and an *'auwai*, recommended eligible under criterion D

**Properties Recommended Ineligible for the National/Hawai'i Register**

None

**Effect Recommendation**

Excavation of large areas for the construction of modern pond fields will likely destroy portions of SIHP # 50-80-10-6758 (prehistoric/historic agricultural infrastructure). The excavation of large areas in other portions of the project area to create areas of standing water for wetland rehabilitation will potentially destroy SIHP #s 50-80-10-6756 (structural remnant) and 50-80-10-6757 (historic road alignment), depending upon where those excavations are located. Accordingly, an undertaking-specific effect determination of “adverse effect” is warranted for the proposed *lo'i* and wetland restorations at the City’s Waiāhole Beach Park. In compliance with Section 106 of the National Historic Preservation Act, a determination of “adverse effect” requires the development of a Memorandum of Agreement (MOA) for the proposed undertaking. This MOA should be developed in consultation among the City, SHPD, USACE as the undertaking’s lead agency, any other stake-holding federal agencies, and concerned consulting parties. Under Hawai'i State historic preservation review legislation (HAR 13-275) a project effect recommendation of “effect with proposed mitigation commitments” is warranted.

**Mitigation Recommendation**

In order to alleviate the proposed undertaking’s adverse effect on properties recommended eligible to the National and Hawai'i Registers, CSH offers the following mitigation recommendations. The proposed *lo'i* and wetland restoration should be designed to avoid and preserve SIHP # 50-80-10-6756 (structural remnant) and SIHP # 50-80-10-6757 (historic road alignment). These sites are located along the boundaries of the proposed *lo'i* and wetland restoration and their avoidance should not unduly complicate the proposed restoration’s design and layout. SIHP # 50-80-10-6758 (prehistoric/historic agricultural infrastructure) is part of a large prehistoric and historic agricultural district that was once extant throughout much of Waiāhole. Portions of this district are still farmed today. Within the current project area, the agricultural infrastructure has lost its integrity through disuse and extensive ground disturbance and cannot convey its historical significance as part of this larger district. The archaeological remnants of this agricultural infrastructure still contain important information, however. Accordingly, in order to mitigate the destruction of portions SIHP # 50-80-10-6758 during the proposed *lo'i* and wetland restoration, a program of archaeological data recovery, in the form of an archaeological monitoring program (per the language of HAR Chapter 13-275-8), is recommended. This monitoring program should comply with HAR Chapter 13-279 and focus on the remnants of the old agricultural field system within the project area.

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## I. INTRODUCTION

### A. Investigation Background

At the request of the City and County of Honolulu (City), Cultural Surveys Hawaii, Inc. (CSH) has conducted an archaeological inventory survey with subsurface testing of an approximately 9-acre parcel. South of Waiāhole Stream and east of Kamehameha Highway, Waiāhole Ahupua‘a, Ko‘olaupoko District, O‘ahu Island, (TMK 4-8-01). This area is depicted on the 1998 Kanē‘ohe USGS 7.5-minute topographic quadrangle.

In 1996, the City purchased, and is the current landowner of, the southern portion of Waiāhole peninsula (the subject parcel) with Federal Department of Transportation (DOT) Intermodal Surface Transportation Efficiency Act (ISTEA) funds. The City proposes the creation/restoration of wetlands and *lo‘i* within the southern portion of the subject parcel. The proposed project is described in a “*Concept Plan: Waiāhole Stream Wetlands Creation and Enhancement*” prepared by Eric Guinther (2004) of AECOS, Inc. For the proposed restoration/creation the City will be utilizing municipal funding.

Because of the project’s need for a Nationwide permit (NWP) 27 from the USACE, the project is a federal undertaking requiring compliance with Section 106 of the National Historic Preservation Act. Additionally, the project may include partial federal funding from various federal agencies, including the Environmental Protection Agency, U. S. Fish and Wildlife, National Oceanographic and Atmospheric Administration, and the National Resource Conservation Service. At the state level, the proposed restoration/creation will require a state 401 Water Quality Certification Permit from the State Department of Health and a Special Management Area minor permit from DLNR and other agencies. Accordingly, the project will need to comply with Hawai‘i state historic preservation review legislation [Hawai‘i Revised Statutes (HRS) Chapter 6E-8 and Hawai‘i Administrative Rules (HAR) Chapter 13-275].

This inventory survey has been undertaken to fulfill the requirements of the Secretary of the Interior’s Standards and Guidelines for Archaeology and Historic Preservation and was conducted to identify, document, and make National Register of Historic Places (National Register) and Hawai‘i Register of Historic Places (Hawai‘i Register) eligibility recommendations for the subject parcel’s cultural resources. The investigation also fulfills Hawai‘i State archaeological inventory survey requirements (per HAR Chapter 13-276). The investigation includes an undertaking-specific effect recommendation and treatment/mitigation recommendations for the cultural resources recommended National/Hawai‘i Register eligible. This document is intended to support project-related historic preservation consultation with stake-holding federal, state, and county agencies and interested Native Hawaiian and community groups.

### B. Project Description

The City proposes the creation/restoration of wetlands and *lo‘i* within the southern portion of the subject parcel. AECOS’s Inc. concept plan (Guinther 2004) (Figure 3) divides the project area into roughly equal thirds (Figure 4). The densely *hau*-forested northern-most area (depicted in yellow in Figure 4) would be largely preserved “as is.” If there were modifications to this northern area, they would include excavation of one or more new channels for Waiāhole Stream to provide multiple exits for the stream on the eastern portion of Waiāhole peninsula.

①

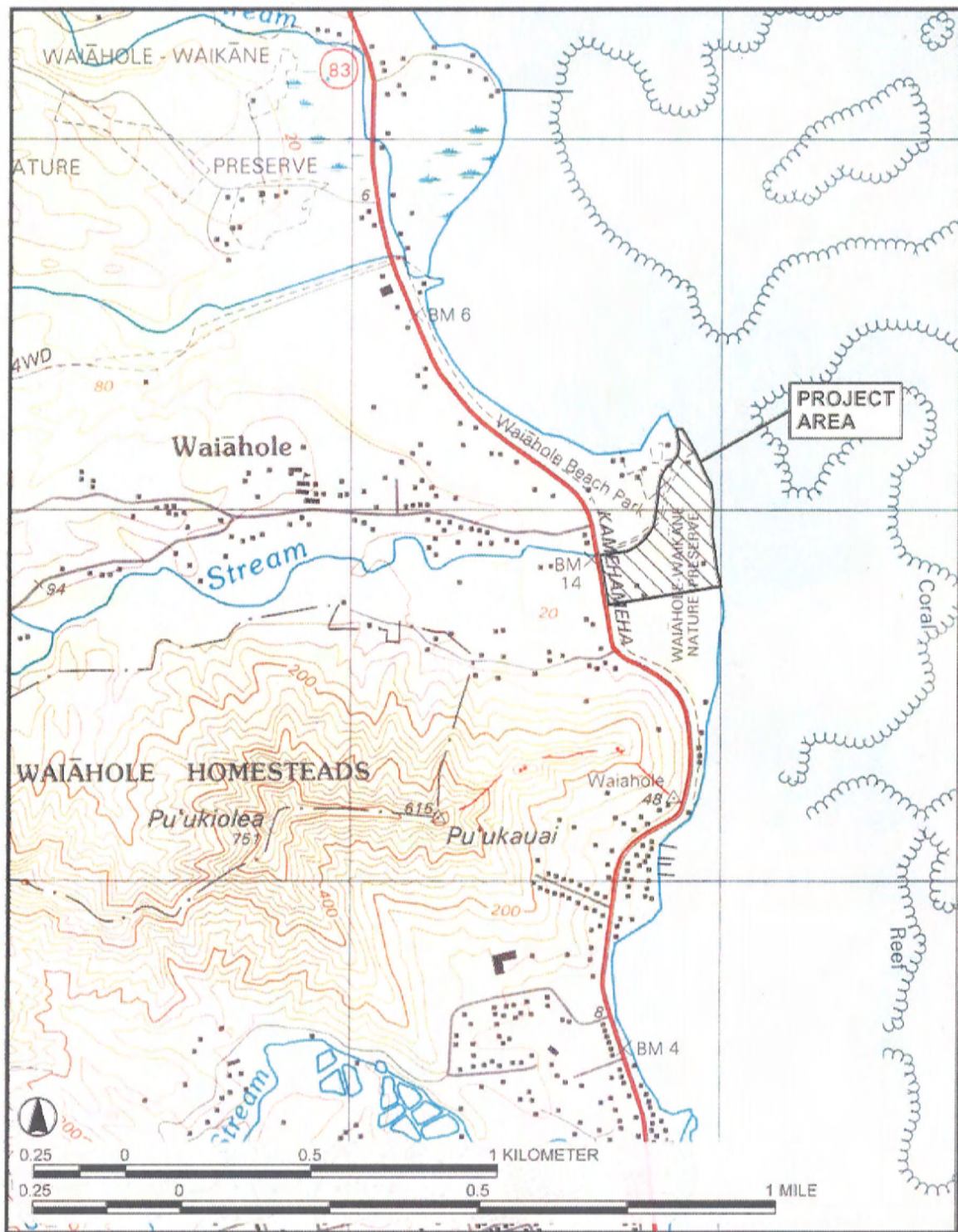


Figure 1. Portion of 1998 USGS 1:24,000 Kanē'ōhe 7.5-minute series topographic quadrangle showing the project area.

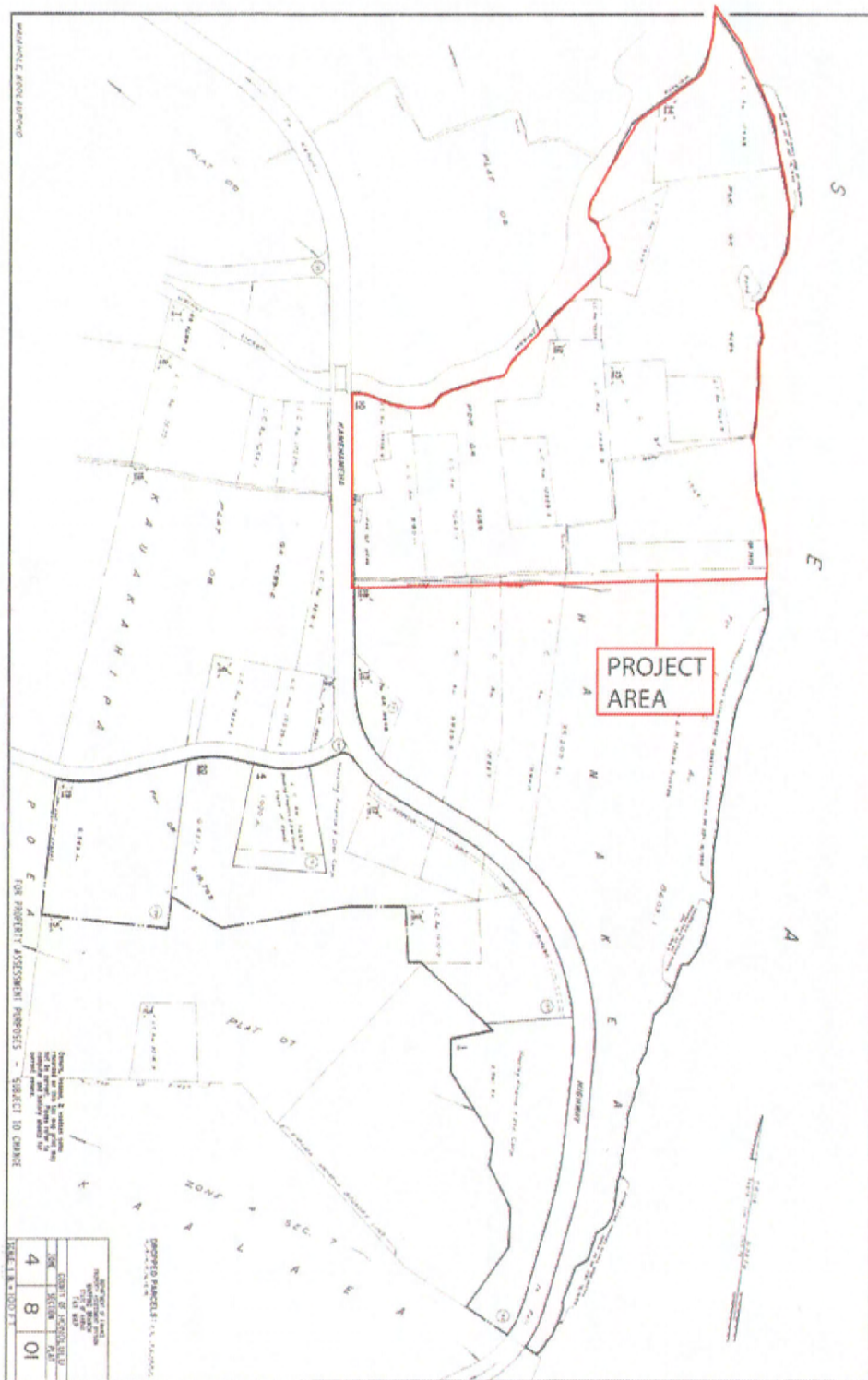


Figure 2. TMK plat map 4-8-01 showing LCA awards and the project area location.





Figure 3. Waiāhole Beach Park Master Plan schematic as provided by the City and County of Honolulu Department of Design and Construction with the current project area overlain in red.



Figure 4. An aerial photograph taken in 2000 showing the project area, the three proposed improvement sections, and the old construction base-yard.



Figure 5. Aerial photograph from 1949 showing the project area conditions. The overlay shows proposed drainage, wetland, and *lo'i* creation/restoration within the project area.

The middle portion of the subject parcel (depicted in green in Figure 4) would be restored/created as a wetland area. This will involve the excavation of basins to create areas of standing water. In the portion of the subject parcel closest to Kamehameha Highway (depicted in red in Figure 4), AECOS's concept plan proposes to recreate *lo'i* that were once extent in this area. The different uses of the three portions of the subject parcel reflect previous land use based on historical documentation and aerial photographs.

The proposed wetland and *lo'i* (pond field) restoration will not impose adverse visual, auditory or other atmospheric impact to the subject parcel's immediately vicinity and any surrounding cultural resources, including standing architecture. Accordingly, the proposed undertaking's APE extends no further than the footprint of the approximately 9-acre area proposed for the wetland and *lo'i* restoration. The survey area for the current investigation included the entire approximately 9-acre APE.

### C. Scope of Work

The inventory survey and its accompanying report document all historic properties<sup>1</sup> within the subject parcel. The following scope of work was followed:

- 1) A complete ground survey of the project area, limited only by the project area's dense vegetation. All sites located were described and mapped with evaluation of function, interrelationships, and significance. Documentation includes photographs and scale drawings. All sites have been assigned State Inventory of Historic Properties numbers (SIHP #).
- 2) Limited subsurface testing to determine if subsurface deposits were located in the project area and to evaluate their function and significance. Appropriate samples from these excavations have been analyzed for chronological and past environmental information.
- 3) Research on historic and archaeological background, including search of historic maps, written records, and Land Commission Award documents. This research focuses on the specific area with general background on the *ahupua'a* and district and emphasizes settlement patterns.
- 4) Preparation of this survey report, which includes the following:
  - a. A project description;
  - b. A topographic map of the survey area showing all recorded historic properties;
  - c. Descriptions of all historic properties, including selected photographs, scale drawings, and discussions of age, function, and significance, per the requirements

---

<sup>1</sup> Historic properties, as defined under federal historic preservation legislation, are cultural resources that are at least 50 years old and have been determined eligible for inclusion in the National Register of Historic Places based on established significance criteria; under federal legislation, a project's (undertaking's) potential effect on historic properties must be evaluated and potentially mitigated. Under Hawai'i State historic preservation legislation, historic properties are defined as any cultural resources that are 50 years old, regardless of their significance; under state law, a project's effect and potential mitigation measures are evaluated based on the project's potential impact to "significant" historic properties (those historic properties determined eligible, based on established significance criteria, for the Hawai'i Register of Historic Places).

- of HAR Title 13, Subtitle 13, Chapter 276 “Rules Governing Standards for Archaeological Inventory Surveys and Reports”;
- d. Historical and archaeological background sections summarizing prehistoric and historic land use of the project area and its vicinity;
  - e. A section concerning cultural consultations (per the requirements of HAR 13-13-276).
  - f. A summary of site categories and site significance based upon the National and Hawai‘i Registers criteria;
  - g. A project effect determination
  - h. Treatment recommendations to mitigate the project’s adverse effect on any significant historic properties (properties recommended eligible to the Hawai‘i Register) identified in the project area.
  - i. This scope of work also includes full coordination with the State Historic Preservation Division (SHPD) relating to archaeological matters.

#### **D. Methods**

##### **1. Background Research**

A variety of sources were consulted during the background research for this inventory survey including texts on native Hawaiian oral history of the region, texts on the history of the area, old maps and photographs, Waihona ‘Āina, the SHPD library, reports of previous archaeological work in the *ahupua‘a*, and texts on the natural history and geography of the area. The books, archaeological reports, and older maps consulted for this inventory survey report are housed at CSH’s library. In addition, aerial photographs from the National Oceanic and Atmospheric Administration (NOAA) have been utilized in conjunction with older aerial photographs to document how the use of the project area has changed over time.

##### **2. Consultation Effort**

In accordance with Hawai‘i State legislation governing archaeological inventory surveys [HAR 13-276-5(g)], CSH personnel conducted consultation with the local Waiāhole community. Local Waiāhole Valley residents were contacted, including The Waiāhole/Waikāne Community Association, local business owners, and project area residents.

##### **3. Fieldwork**

Owen L. O’Leary, MA, Matt McDermott, MA, Steve Rohrer, BS, Karl Van Ryzin, BA, Kulani Jones, BA, and Hallett H. Hammatt, Ph.D. completed the fieldwork intermittently between November 10 and December 16, 2004. Fieldwork was conducted under state archaeological fieldwork permit No. 0404 issued by SHPD, per Hawai‘i Administrative Rules (HAR) Chapter 13-13-282. The field effort, including pedestrian inspection and subsurface testing with a backhoe, required 16 person-days to complete.

An initial field inspection by Matt McDermott and Owen O’Leary on November 10 determined that the project area is extremely overgrown with vegetation (Figure 6), which would prevent CSH personnel from conducting a total coverage pedestrian survey. Principally, the 12-

15 foot high California grass was very dense. *Hau* (*Hibiscus tiliaceus*) also covers large portions of the project area. It was possible to climb amongst the *hau* branches to examine the ground surface. The real difficulty was the California Grass, which could be fought through, but which completely obscured the land surface.

As per consultation with SHPD, Matt McDermott and Owen O'Leary conducted a pedestrian survey of the project area on December 8, 2004 and surveyed as much of the project area as possible. Survey coverage was complete (100%) for all portions of the project area not covered by California Grass. The interval between survey transects for these non-California Grass areas was 15-20 meters. For the southwestern portions of the project area covered by California Grass (which amount to approximately 20% of the project area; Figure 7) sample transects through the grass were used to confirm that the ground surface in these areas was completely obscured. The project area was divided into small discreet sections using aerial photography. Those areas covered by *hau* were carefully inspected along with the small sections of the project area where other types of trees prevent the California grass from growing and obscuring the ground surface. Those sections that were covered in California grass were also inspected to insure that there were no hidden pockets of open space. A hand-held Garmin e-trex was used to track the survey progress to insure that all portions of the project area were covered.



Figure 6. Photograph showing the extremely dense vegetation with the project area.

A backhoe was used to create paths through the vegetation and debris to clear areas for subsurface testing. Backhoe work was conducted on December 8, 9, and from December 14-17, 2004. Owen O'Leary, Matt McDermott, Steve Rohrer, Karl Van Ryzin, and Kulani Jones and Hallett H. Hammatt participated in the fieldwork. Trenching locations were determined by

overlaying the 1949 aerial photograph (Figure 5) on top of the 2000 aerial photograph (Figure 4). The goal was to excavate a cross-section of *lo'i* walls in addition to obtaining an accurate representation of the subsurface environment. A total of 17 trenches were excavated. A standard bucket was used for all trenches resulting in a uniform trench width of approximately 0.7 meters.

As subsurface features were discovered, additional trenches were excavated in the immediate vicinity to provide additional vertical exposures. To further document cultural features/layers, stripping areas were started. Stripping areas were excavations undertaken to provide horizontal exposures of stratigraphic layers and features exposed in profile in the backhoe trenches. These were not controlled excavations. Generally, the backhoe bucket and shovels were used to scrape away overburden. Removed sediments were not screened. The areal extent of each stripping area was variable, depending upon conditions. Observed artifacts were collected during stripping area excavation.

The locations of the trenches, stripping areas, stone alignments, and backhoe cleared areas are depicted in Figure 7. As shown on Figure 7, backhoe access was only possible along the project area's southern boundary. This was the only area where subsurface testing took place.

The locations of all items indicated on Figure 7 were recorded using a Trimble Pro XR backpack GPS unit with a TSCI Datalogger with active differential correction providing horizontal accuracy to within 0.5 meters. Data collected using both GPS units (the Garmin and the Trimble) were processed using ESRI's Arc Surveyor 5.0 and ArcGIS 8.3.

Stratigraphy was drawn and photographed and sediments were described for each of the 17 trenches excavated. Sediment descriptions include, Munsell color, texture, consistence, structure, plasticity, cementation, origin of sediments, descriptions of any inclusions such as cultural material and/or roots and rootlets, lower boundary distinctiveness and topography, and other general observations.

#### 4. Laboratory Analytic Methods

Bulk sediment samples were collected and wet sieved through 1/8-inch mesh screens at the CSH laboratory. This involved placing a large screen across two sawhorses and using a garden hose to breakup and push through the clay particles so that only objects larger than 1/8-inch remained. The materials in the screens were allowed to dry. Subsequently, all cultural remains were collected, identified, examined, and catalogued.

A sediment sample and a *kukui* nut were submitted to Beta Analytic, Inc. for AMS radiocarbon dating. Two sediment samples were also submitted to Bruce Phillips with EcoPlan Associates, Inc. for pollen analysis and micro-particle charcoal quantification.

### E. Environmental Summary

#### 1. Natural Environment

Waiāhole is one of the many windward valleys on the island of O'ahu. It is located in the Ko'olaupoko District and is bounded by Waikāne Ahupua'a on the north and Ka'alaea Ahupua'a on the south. Like all of the windward valleys, Waiāhole is affected by the prevailing winds in the island, which are the northeast trades that blow against the Ko'olau Mountains (Juvik and Juvik 1998: 55).

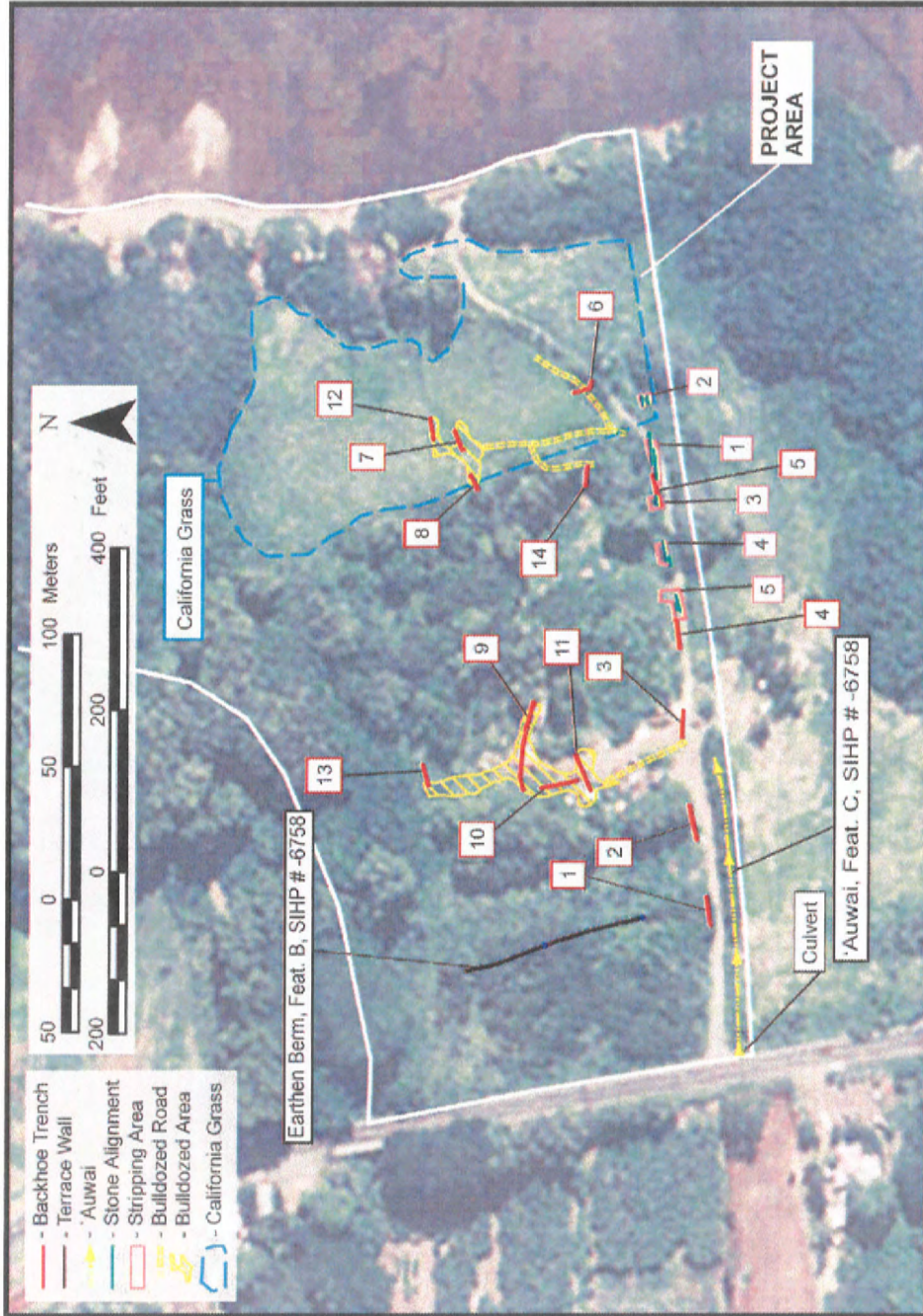


Figure 7. Aerial photograph (2000) taken from the National Oceanic and Atmospheric Administration (NOAA) web site showing the locations of the trenches, stripping areas, stone alignments, and backhoe cleared areas. The portion of the project area covered by California Grass is also depicted.



The mountains create an orographic effect that results in an annual rainfall of up to 160 inches per year in the *mauka* sections of the valley. The project area receives approximately 60-80 inches of rain per year (Juvik and Juvik 1998: 56).

All of this rainfall produces strong flowing perennial streams, one of which, Waiāhole Stream, makes up the northern boundary of the project area. This stream would have provided plentiful waters for both domestic and agricultural needs.

Foote *et al.* (1972) assigns the soils within the project area to the Pearl Harbor series. The Pearl Harbor series includes very poorly drained sediments on nearly level coastal plains on the island of Oahu. Soils in this series are generally low and level with elevations ranging from at sea level to five feet. The majority of the current project area is made up of Pearl Harbor clay (Ph). A smaller amount of the project area is characterized by Foote *et al.* (1972) as:

Marsh (MZ) consists of wet, periodically flooded areas covered dominantly with grasses and bulrushes or other herbaceous plants. It occurs as small, low-lying areas along the coastal plains. Water stands on the surface, but marsh vegetation thrives. The water is fresh or brackish, depending on proximity to the ocean. Included in mapping were small areas of mangrove swamp and small areas of open water.

As sediments have eroded from the *mauka* portions of Waiāhole Valley and been carried by Waiāhole stream they have been deposited in the coastal regions. Recurrent flooding events have created a delta deposit. Over time, the mouth of Waiāhole Stream has moved laterally across the delta, resulting in multiple outlets into the ocean. This would have resulted in the reoccurring removal and replacement of sediment throughout much of the project area. This meandering stream mouth has also left localized stratigraphic layers containing high percentages of water-rounded gravels and cobbles.

At present the project area is covered in extremely dense vegetation, most of which is invasive. There are large sections of California grass that have choked out all other plants. The other major sections of vegetation within the project area are made of *hau*, which has also prevented any other plants from growing beneath its dense broad canopy of leaves.

## 2. Built Environment

The project area itself is currently undeveloped. Within the project area there are numerous abandoned cars, boats and appliances such as washing machines, dryers and refrigerators. Construction refuse is common throughout the project area and is piled into large mounds in several locations. Kamehameha Highway bounds the project area on the west. Figure 4 shows that there is relatively little development surrounding the project area other than the highway and The *Poi* Factory at the corner of Kamehameha Highway and Waiāhole Valley Road.

About 10-20% of the project area has been affected by a construction base-yard (depicted in blue in Figure 4) that was used in the late 1980s. This has resulted in the abandonment of many of the larger vehicles within the project area as well as the removal of the top layer of sediment in some places and its replacement with asphalt and other modern construction debris.

At present there are two squatters camps located with the project area. One is at the northern most tip of the project area where Waiāhole Stream reaches the ocean and the second is located in the southeastern corner of the project area.

## II. HISTORICAL BACKGROUND

There have been numerous studies done on the Ko'olaupoko District of O'ahu and a great deal of primary research has been carried out on the *ahupua'a* which border Kāne'ōhe Bay, including Waiāhole. The following background summary builds upon five of these studies in particular: *Land Use at Waiāhole Valley O'ahu* by Michihiro Miyagi (1963), *Sites of O'ahu* by Sterling, and Summers (1978), *Kāne'ōhe: A history of Change* by Dennis M. Devaney et al. (1982), *An Archaeological Inventory Survey of Approximately 21 Acre Parcel at Coastal Waiāhole Ahupua'a, Ko'olaupoko District, O'ahu (TMK 4-8-02:1, 2, 4-12)*, by Hammatt et al. (2002), and *A Cultural Impact Assessment for the Waiāhole Bridge Replacement Project, Waiāhole Ahupua'a, Ko'olaupoko District, Island of O'ahu (TMK 4-8-01)*, by Hammatt et al. (2003).

### A. Mythological and Traditional Accounts

Waiāhole's traditions and legends have been recorded by historians and Native Hawaiian cultural specialists. These traditions and legends suggest that Waiāhole Ahupua'a was well-established and well-known in the consciousness of the Hawaiian people in pre-contact times. The *āhupua'a*'s taro cultivation is especially highlighted in the legends and traditions.

Mary Kawena Pukui (1983:180) relates a poetical saying referring to the demi-god Maui at Waiāhole, probably drawing upon Samuel M. Kamakau's 1869 account also presented below:

*Ke ala kike'eke'e a Maui.*

The winding trails of Maui.

She explains:

Trails made by Maui when he was pursued by those who wished to destroy him. One trail was at Waiāhole, O'ahu, one at Keka'a between Lahaina and Kā'anapali, and the third at Kealakahakaha, Kahakuloa, Maui.

Samuel M. Kamakau relates that:

*Ua 'ōlelo ia o Maui a Kalana kekāhi ali'i kahiko loa i hana i nā alanui i ka wā he iwakalua a keu keneturia mamua, akā, ma kona ano mo'olelo, ua hanaia nā alanui a pololei loa. Ua ma'a nā kānaka i ka hele ma ka pololei o ke alanui, akā i ke alualu ana o kekāhi po'e e pepehi ia Maui, ua hele kike'eke'e 'oia i ke alanui, a ua kapaia o "ke alanui kike'eke'e a Maui," aia ma Waikāne me Waiāhole ma Ko'olaupoko i O'ahu... (Ke Au 'Okō'a October 14, 1869).*

Maui, son of Kalana, was one of the ancient chiefs of Maui who made roads twenty centuries ago. The roads in his day were straight, and the people were accustomed to running along straight roads; so when certain persons ran after Maui to kill him he made the road go zigzag and it was called "the zigzag road of Maui." (ka alanui kike'eke'e a Maui). One is at Waikāne and Waiāhole in Ko'olaupoko on O'ahu...

This myth may account for some of the winding roads in Waiāhole. It might be the explanation as to why the path is in a certain location or has a certain configuration such as

switch-backs. Alternatively this may be a traditional explanation associated with the stream named Wai-ke'eke'e (lit. "crooked water") in the adjacent *ahupua`a* of Waikāne.

Another poetical saying (Pukui 1983:186) was:

*Ke kalo pa`a o Waiāhole.*

The hard taro of Waiāhole.

She explains, probably drawing upon the 1865 account of Kaehuaea given below:

A reminder not to treat others badly. One day, a man went to Waiāhole, O`ahu, to visit his sister, whom he had not seen for many years. She was absent, and her husband neither asked the stranger in nor offered him any food. When hunger possessed the visitor he asked if he might have some taro to eat. His brother-in-law directed him to his taro patches and told him to get some from there. The man went to the patches and then continued on his way. When the woman returned she was told of the visitor, and by her husband's description she knew that it was her brother. She rebuked him for his lack of hospitality. When they went to their taro patches they found all the taro pulled up and hacked to pieces.

Kaehuaea (1865) relates the following account in his "Na mea Kaulana o Waiāhole" (The famous things of Waiāhole):

*Ma ka`u mea i lohe ai, i na kama`āina o keia `āina no na mea kaulana i hanaia i ka wā kahiko.*

*Ka mua o kahi i hānau ai o Kualī`i; ka hope o ki`i kalu-pa`a i Waiāhole*

*Ua haiia ma ka Papa Kuhikuhi makahiki o nā mea kaulana o Hawai`i nei. "Helu 1., ma Kalapawai i Kailua kona wahi i hānau ai." `A`ole pela ka pololei, eia noia. O kona wahi i hānau ai, ma Waimuku i Waiāhole; a o kahi i hanai ia`a o Mokoli`i; a o kahi i noho ai i ke kapu ali`i & ke kapu Heiau, `oia o Kalapawai i Kailua; o kahi i ao ai i ke kukini ma Alele, he kula loa, a laula no hoi no ka mea, `a`ole i ike pono ia kahi i hānau ai keia ali`i. Mamuli o ke mele i ho`omaopopoia`i, no ka mea, i nā ali`i a pau a `ākoakoa ana ma Kalapawai i Kailua, maloko hoi o kekahi hale nui; a o Kūali`i pu kekahi e noho ana. Ho`oho like ae la ka leo o nā`li`i, penei: "I hea kou wahi i hānau ai, nau-ā?" `Elua a `ekolu ho`oho ana pela, ekemu mai la o Kūali`i ma ka leo mele penei: "I Waiomuku `āina kahakai, nau-ā." A lohe nā`li`i i ka leo o ke Ali`i, pilihua iho la lākou, me ka no`ono`o nui, me ka nīnau ana iho, "Aia la i hea ia wahi?" Eia ka i Waiāhole nei. Nolaila ina paewaewa ka`u, e pane ma no mai ohumu. E hoi ae au e kama`ilio ia ki`i kalu-pa`a i Waiāhole.*

*Ua kaulana o ki`i kalu-pa`a i Waiāhole me ka mana`o paha o ka lehulehu, he paakiki maoli io no ke kalo. `A`ole pēlā eia wale no, ua kaulana o ki`i kalu-pa`a i Waiāhole mamauli o ka hana kupanaha a kekahi kanaka, `oia o Kuapunohu, he kanaka kōaia, e hele huli hoa paio ana ia nona ma Ko`olaupoko; aia hoi e noho ana kona kaikuahine ilaila me kana kāne o Imaole. Ua hele nae kona kaikuahine i ka lawaia, a o ke kaikoeke wale no ko ka hale. Pane aku la ka malihini i ke kama`āina, "`A`ohe nae paha a oulua ai?" Kama`āina "He ai no, aia la iwaena*

*(kaika). No`ono`o iho la ka malihini, e pilikia ana ia no ka pololei, ninau hou aku la ka malihini i ke kama`āina "Auhea i kou`olua waena?" Kuhikuhi pololei aku la ke kama`āina, o ko ianei hele no ia a hiki ma kuauna o ka loi, o ko ianei uhaki ae la no ia i ka welau o ka ihe aia nei, a ho`olilo iho la ia mea i hea-a, lalau aku la ia elua kalo kolikoli a li`ili`i, ho`ouka maluna o ke ahi. Pēlā kana hana ana a lilo i mea nui, a pau loa ka loi okoa & ka (Eka okoa) a pupuhi aku la kela i ke kai o Ukoa, akola, wahi a Kuapunohu, ke heo la kela.*

*`Oia iho la nā wahi mea kaulana ma Waiāhole ma ka`u ike & ko`u lohe. Pau aku la ka`u o ka`oukou koe. Owau no me ka mahalo. B. Kaehuaea, Waiāhole.*

The solid taro of Waiāhole, according to the opinion of the public, was a very hard taro. It was not so, it became famous because of the strange deeds of a man, Kuapunohu, a warrior. He went about Ko`olaupoko to find some one to challenge. His sister was living there with her husband Imaole. She went fishing while he remained at home. The stranger said to the native son, "Have you two any food?" The native son answered, "We have food but standing in the patch." The stranger thought that he was going to have to suffer with hunger so he asked the native, "Where is your patch?" The native gave him specific directions and he went 'til he came to the border of the taro patch. Here he broke off the tip of his spear and used it as a prod. He reached out for two taros, cut them into small pieces and laid them on the fire. He continued doing this until he made a big work, clearing up the whole patch of four acres and burning it up like the blowing away of the sea of `Uko`a. "Serves him right." said Kuapunohu as he went off. (Na Mea Kaulana o Waiāhole, Ku`oko`a Sept. 16, 1865)

This myth describes land usage, and the attitude and values of the people previously living in the Waiāhole region. Waiāhole has fertile soil, and was renowned for the cultivation of taro. The saying would appear to be a rebuke to the attitudes of the residents once living there who may have had a reputation as not being very accommodating and hospitable towards strangers. When a resident fails to offer food and accommodations to a stranger on his land (his brother-in-law), his wife later finds out and rebukes him for his lack of hospitality towards his brother-in-law. When the man allows the stranger to help himself to some taro, and doesn't bother to help the stranger, he eventually pays for his laziness and unaccommodating attitude. He learned his lesson later when he saw that all his taro was pulled up and wasted by his brother-in-law.

In the legend of Halemano (Fornander, 1919 Vol. V, Part II), Halemano [the romantic anti-hero of O`ahu] met up with the heroine of this tale, Kamalālāwalu (a Fickle Puna, Hawai`i Island princess) in Wailua, O`ahu. There, they resumed living together but their living situation wasn't as harmonious as it was before. With her sad and unfulfilled heart, Kamalālāwalu set out and journeyed:

*Holo mai la o Kamalālāwalu... a Kualoa. Loa`a o Waiāhole, he`li`i no laila e noho ana, a`ohe ana wahine; lawe a`e la ia ia Kamalālāwalu i wahine nana, a noho iho la lāua ma laila.*

She journeyed to ... Kualoa where she met Waiāhole, a chief of that place who was a single man. He took Kamalālāwalu as his wife and they resided there [near Kualoa] together.

When Hua‘a the King of Puna received word that Kamalālāwalu was residing on O‘ahu with another chief he said:

*Ae, ua lilo ka kaula waiwai ia ia no kona kino, aka, aole i loa ia kaula kona kino, nolaila, e holo kaula e kaula i kona wahi i noho ai.*

Yes, we have given her our properties with the idea of getting her to be our wife, but we did not succeed. Let us therefore go and make war on those with whom she is now living.

King Hua‘a did just that. He sent a massive fleet of men in about eight thousand canoes (he mau man wa‘a) to make war with chief Waiāhole’s people. King Hua‘a’s men landed at Makapu‘u.

*...a makaukau lākou, hele mai la lākou mauka a hiki i Kāne‘ohe. Ho‘omaka ke kaula, ma ia kaula ana, ua he‘e honua o O‘ahu nei, a ua luku ia o Waiāhole.*

...they advanced overland, going by way of Kāne‘ohe. At Kāne‘ohe proper they met the enemy and the fighting began. Early in the battle O‘ahu was routed and a great slaughter took place at Waiāhole.

After the battle, Kamalālāwalu was found alive and taken by the Kings of Hawai‘i, Hua‘a and Kulukulua, back to Hawai‘i Island.

This tale presents the idea of a massive slaughtering of Hawaiians in the Waiāhole area (or of the forces of the chief of Waiāhole) during a battle over possession of a princess, but the historical accuracy of this tale remains uncertain. If there was such a great slaughter of the forces of Waiāhole it could have been elsewhere at Luluku (Lit. “Destruction”) in upland Kāne‘ohe for example.

Fornander (1919, Vol. V, Number I, pp. 214-225) relates the legend of Kapunohu which has many motifs similar to both Kaehuaea’s account of Kuapunohu (magic spear, strife with brother-in-law as a result of a perceived slight over food) and the legend of Halemano (a big island chief comes to visit an O‘ahu woman, lands at Makapu‘u, and slays the forces of O‘ahu) and explains the proverb of the hard taro of Waiāhole. In this legend the strife with a brother-in-law as a result of a perceived insult over food is clearly set in Kohala, Hawai‘i Island. After many adventures, Kuapunohu visits his sister named Konahuanui in Ko‘olaupoko, O‘ahu and harvests fabulous quantities of taro to eat. For reasons unexplained:

*...a mai la ke ahi, pela no kana hana mau ana, a lilo iho la ke kalo i wahie no ke ahi. Nolaila, ma kēia hana ana a Kapunohu, ua kapaia “kalo pa‘a o Waiāhole,” he ‘ōlelo kaulana loa ia mai Hawai‘i a Ni‘ihau.*

When the fire lit, he took some of the taro and cut it up and threw the pieces into the fire and in this way used the taro for firewood. Because of this action of Kapunohu, the saying “the hard taro of Waiāhole” is known from Hawai‘i to Ni‘ihau.

In the legend of Kapunohu the hero’s fabulous strength in pulling taro (presumably from Waiāhole) recommends him to his brother-in-law Olopana. Olopana makes Kapunohu his commander in battle (*alihikaua*); Kapunohu goes on to kill the ruling chief of O‘ahu, Kākuhihewa; and Olopana rules all of O‘ahu.

Raphaelson (1929:24) reported Waiāhole's fame as the place "where hard taro grows, taro so hard that *'hoi kalopa`a i Waiāhole`* is a catchword that means an obstinate man."

Raphaelson (1929:24) goes on to relate: "There is a beautiful tale about Waiāhole and Waikāne, a place beyond. These two were man and wife, it is said. They loved each other for many years, and even today their mists embrace in the upper clouds."

Waiāhole was clearly considered a desirable and well-watered land. Samuel Kamakau relates that:

*I ka lilo ana o ke aupuni i ke au o ke aupuni ia Kamapua`a o O`ahu, ua lilo ka nui o na `āina inoa wai i ke kahuna ia Lonoawohi, aka nae, mahope iho, ua ho`oponopono ia ka `āina e Kahikiula a me na kaikua`ana o Kamapua`a, no ka pau loa o na `āina inoa wai i ke kahuna, a no ka mana`o ia no hoi o pili pa`a loa ka `āina pelā i ka papa kahuna, nolaila, ua ha`awi pa`a ia na `āina o ka papa kahuna, oia o Waimea, Pūpūkea, Waiāhole a me Hakipu`u, a ua pili pa`a ia mau `āina i ka papa kahuna mai kahiko loa mai a hiki i ke au o Kahahana. I ke ao hoi o Kehekili a me Kalanikūpule, ua ha`awi no i ka laua mau kahuna, a pelā no i ke au o Kamehameha I. - Ua lilo o Waimea i ka papa kahuna a Pa`ao, a o Pūpūkea, no ka papa kahuna a Kauali`i, a o Waiāhole, no ka papa kahuna a Lonoamaui...*

When O`ahu came under the rule of Kama-pua`a, he gave the land containing the word wai to the kahuna Lono-a-wohi to distribute. Later the land was redistributed by Kahiki-`ula and the older brothers of Kama-pua`a because the kahunas had a monopoly of the well-watered lands, and the kahuna class were given the lands of Waimea, Pūpūkea, Waiāhole, and Hakipu`u in perpetuity, and these were held by them until the days of Kahahana. Kahekili and Kalanikūpule confirmed this gift to the kahunas, and so did Kamehameha...Waiāhole belonged to the priests of Lono-mauki. ("Ka Nupepa Ku`oko`a" November 16, 1867)

## B. Traditional Land Use

The district of Ko`olaupoko was rich in many of the resources utilized by traditional Hawaiians. The exploitation of marine resources is evidenced by the many fishponds around the coastal fringe of Kāne`ohe Bay and by the presence of numerous fishing shrines. It has also been recognized that traditional land divisions within the district (*ahupua`a* and *'ili*) extended out into the sea, delineating discrete fishery areas. Inland from the coast, rich alluvial soils, an equable climate, and abundant water supply allowed the extensive cultivation of traditional crops, especially wetland taro. Handy and Handy characterized the *ahupua`a* in the region as each having

...a broad coastal plain which was converted by Hawaiians into an almost continuous expanse of *lo`i* irrigated with water from large streams flowing out of the deep valleys that cut back into the Ko`olau range. The hinterland must have produced great quantities of sweet potato, yam, banana, upland *taro*, *wauke*, *olonā*, and *'awa*. Undoubtedly the population was large... (1972:452)

The valleys were described by early visitors to the region as "in a high state of cultivation". Evidence of prehistoric field systems (*lo`i*) and irrigation channels (*'auwai*) has been found throughout the valley floors. The upland forests and ridges that divide the valleys undoubtedly

contained a wide variety of valuable resources as well, one of which is known to have been a high-quality basalt that was quarried and used in the manufacture of stone tools.

Archaeological sites identified within Waiāhole reflect many of the traditional activities associated with the utilization of these resources, including agriculture, habitation, tool manufacture, and religious observance. Irrigated taro fields have been identified along the streambeds from the upper reaches of the valleys to where the streams meet the sea. Adze quarries have been identified on the ridges between the valleys, and evidence of the manufacture of stone tools has been found throughout the valley floors. The quarry sites that comprise the Waiāhole Quarry Complex, have been recommended for inclusion in the National and State Registers of Historic Places.

Dating analyses from archaeological studies suggest that occupation of Waiāhole Valley may have begun around AD 1200 (Tomonari-Tuggle and Tuggle 1984:1-16), while the bulk of activities probably occurred in late prehistoric and early historic times (Shapiro *et al.* 1988:36). Early census data indicate that in 1831-32, a total of 419 persons lived within the two valleys of Waiāhole/Waikāne (Schmitt 1973:19). The population was probably considerably higher at the time of European contact though, since by the 1830s, the native Hawaiian population had already been severely diminished by contact with western diseases. Also, many of the native inhabitants from these outlying districts had begun moving to the newly burgeoning population centers, such as Honolulu.

Many researchers believe that the Hawaiian population reached its maximum at around the time of western contact. In his study of land use at Waiāhole, Michihiro Miyagi noted that

...in the later period of Hawaiian occupation... all the land in the valley suitable for the cultivation of taro was probably so utilized. The intensive use of the land is indicated by the existence of kuleana on small strips of stony land along the tributaries in the valley head. Remains of taro-patch dikes can still be seen in the rough areas above the forest reserve boundary. If such unfavorable areas were utilized for taro, it can be concluded that there was some measure of pressure on the resources of the valley. (1963:78)

In his analysis of land holding patterns based on land claims made at Waiāhole during the *Māhele*, Miyagi found that the majority of *kuleana*, lands granted to commoners, were used for the cultivation of taro and were located in the lowlands "in relation to high water table and the possibility of water diversion from streams" (1963:76). A small number of holdings were located in *kula*, or open pasture areas, "but their numbers and size is small as compared with lowland plots... they were probably utilized for house lots and gardens" (Miyagi 1963: 76-77).

Bushnell *et al.* (2002) conducted an extensive examination of traditional and cultural practices for the Waiāhole Beach Park. While this study encompassed land in both Waikāne and Waiāhole Ahupuaʻas, it covers all of the land *makai* of Kamehameha Highway in Waiāhole Ahupuaʻa. Nine people were interviewed and the study concluded that the area was strong in oral tradition, particularly in relation to the ocean, fishing, and shellfish gathering.

### **C. Mid-1800s and the Great Mahele**

The Organic Acts of 1845 and 1846 initiated the process of the *Māhele* – the division of Hawaiian lands – which introduced private property into Hawaiian society. In 1848 the crown and the *aliʻi* (royalty) received their land titles; the common people received their *kuleana*

(individual parcels) in 1850. It is through records of Land Commission Awards (LCAs) generated at the *Māhele* that the first specific documentation of life in Waiāhole, as it had evolved up to the mid-19<sup>th</sup> century, come to light.

Two *'ili* at Waiāhole (Hopeka and Makawai) were kept as “Crown Lands”. Six *'ili* at Waiāhole – Apua, I, Makanilua, Poahamai, Poea and Uau – were taken as “Government Lands”. There were a total of fifty-three small (less than 10 acre) LCA (*kuleana*) awards at Waiāhole for a total of 106.89 acres. The average size of these awards was 2.02 acres and the range was 0.47 to 5.6 acres. There were, however, four larger awards at Waiāhole: LCA 105 to William Walker (81.6 acres), LCA 5936 to Pu'uiki (225 acres), LCA 7137 to Kaho'ohanohano (93 acres), and LCA 8603 to Kaniau (57.2 acres). Subsequently there were three large grants of land: grants 702 and 703 (total 264.68 acres) to Kekakeiki in 1860 and grant 874 (113.33 acres) to Kaopulupulu in 1862.

The table below shows the LCAs (*kuleana*) awards in the project area. There was no available information for LCA # 1563 and Grand Awards (GA) # 4689:9 & 11. There were a total of seven LCAs and two GAs in the subject property. The six LCAs (Table 1) that have information on awardee, amount of land, *ili*, and land usage consisted of 10 pieces of land. These LCA awards were dominantly used for *lo'i*, house lots, and *kula*. The average size of these awards was 2.7 acres and the range is 1.47 to 5.6 acres.

Table 1. Land Commission Awards of Record within the Project Area

LCA #	Awardee	Amount	Ili	Land Use
07563 1, 2 & 3	Kahoopulupulu	1.47 Acs.	Kaululoa	4 <i>lo'i</i> , 1 house lot, and 1 <i>kula</i>
07564	Kauihou	2.7 Acs.	No Ili name	9 <i>lo'i</i> , 1 house lot and 1 <i>kula</i>
07662	Kaumaka	1.72 Acs.	No Ili name	3 <i>lo'i</i> , 1 house lot, and 1 <i>kula</i>
08180	Haole, Lotona	1.10 Acs.	Apau	6 <i>lo'i</i>
10228	Moo 2	2.2 Acs.	Kaululoa	15 <i>lo'i</i> , 1 house lot, and 1 <i>kula</i>
10438 1, 3, & 4	Naeole	5.6 Acs.	Kapikookau	15 <i>lo'i</i> , and 1 house lot
1563	No information	-	-	-

A portion of an 1878 Hawaiian government survey map by J.F. Brown shows the profusion of *kuleana* parcels of taro *lo'i* on both side of Waiāhole Stream in the *makai* reaches of Waiāhole Ahupua'a (Figure 8). The map suggests that the lands immediately along the Waiāhole Stream were predominantly used for *lo'i* cultivation. The northern bank of the stream bounds the northern portion of the project area. Figure 9 is a close-up view of the project area of the 1878 map showing the LCAs at the time. Figure 10 is another early map (Dove 1897) showing a slightly different configuration of LCAs within the current project area.



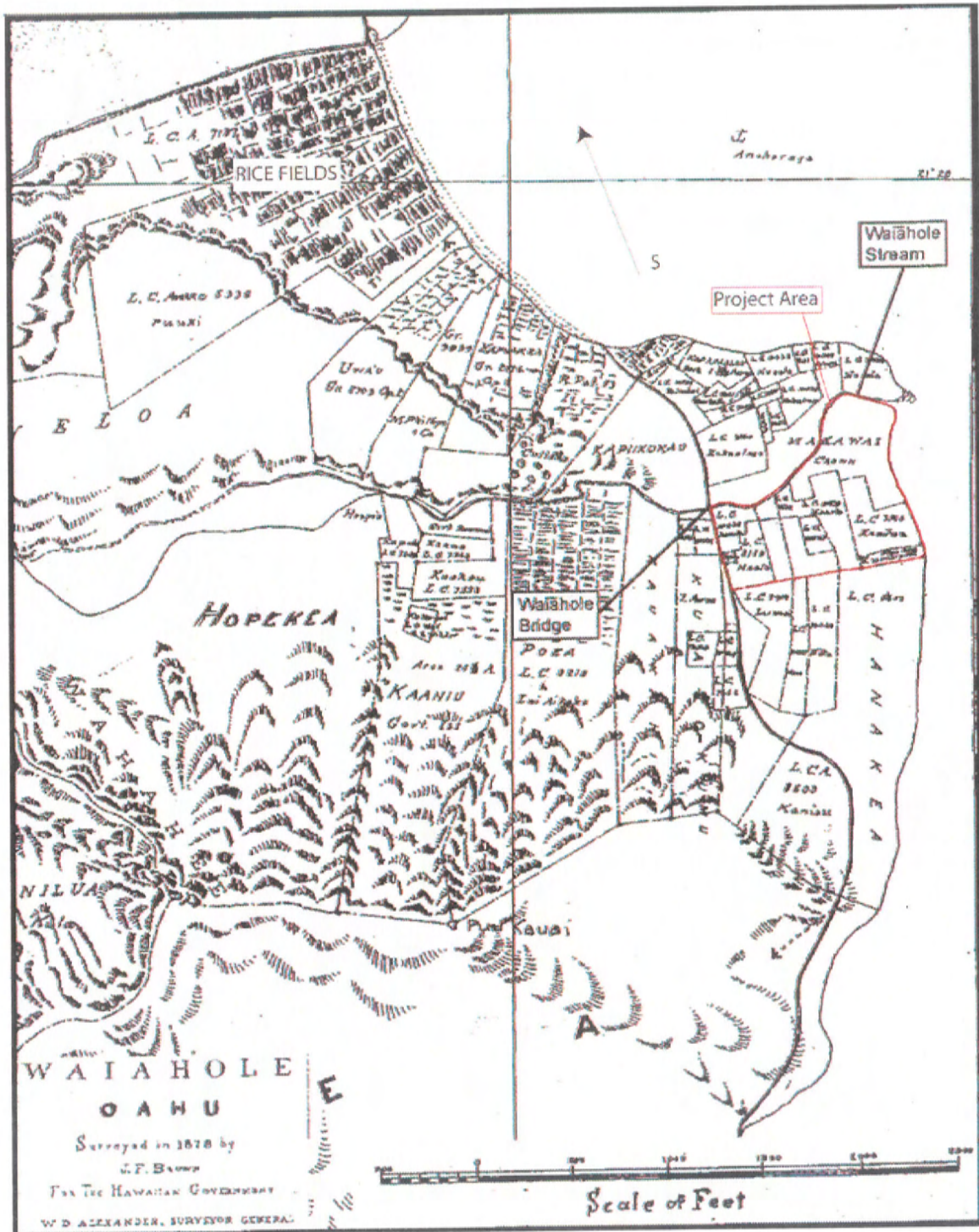


Figure 8. 1878 Brown map, showing LCA awards and extent of rice cultivation in the vicinity.



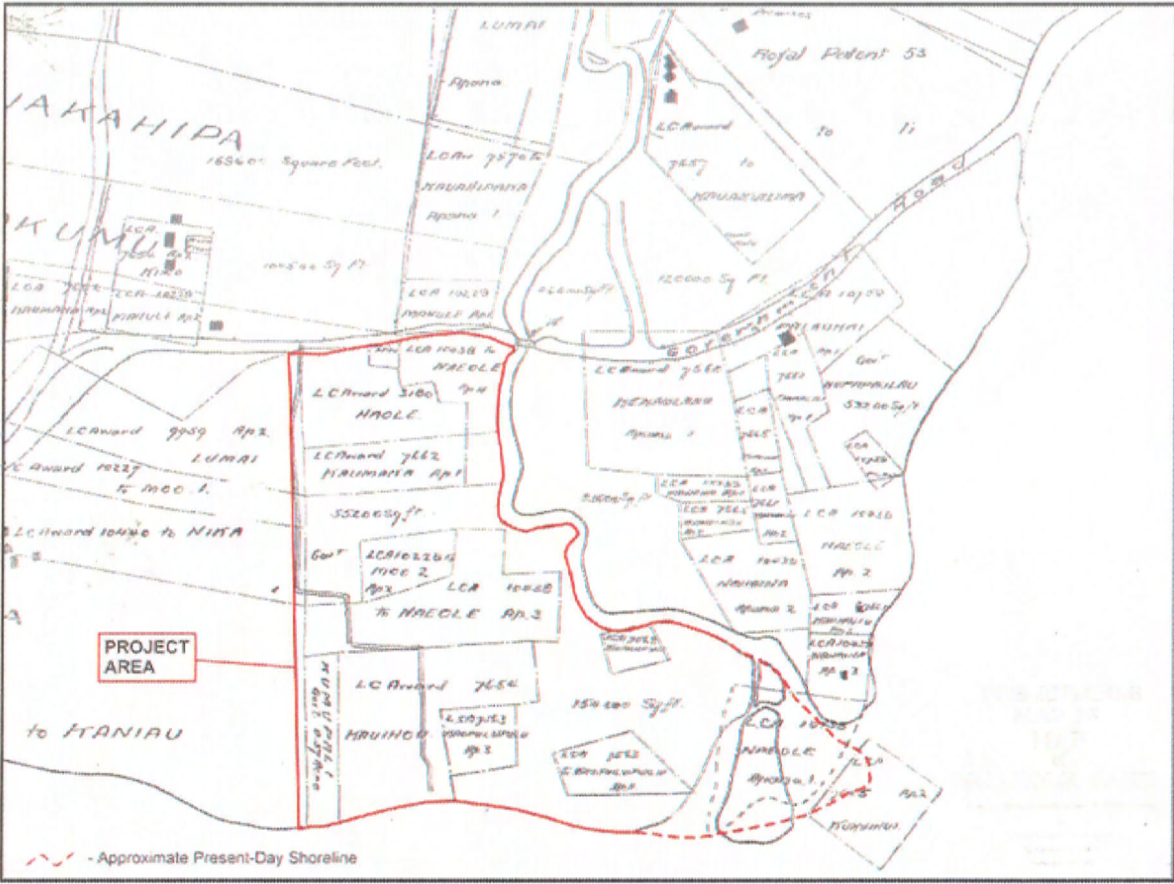


Figure 10. Dove 1897 public lands map of Waiāhole showing the current project area.

#### **D. Historic Land Use**

The amount of land in Waiāhole under cultivation appears to have decreased throughout early historic times, as it had throughout the Kāneʻohe Bay region. This period saw a steady decline in the native population and an increasing amount of land left fallow or converted to pasture for cattle grazing.

It can safely be assumed that by the time the *kuleana* were awarded [around 1850] there were many parcels of land that were not being cultivated by the Hawaiians primarily because of depopulation, roaming cattle, and the requirements of the Kuleana Act (Devaney et al. 1982:12).

The rate of population decline slowed after 1849 and the population began to increase in parts of Oʻahu in 1853, but the population of Koʻolaupoko continued to decline until 1872 (Kittelson 1972, cited in Devaney *et al.* 1982:13). The population increase outside of Koʻolaupoko reflected the emergence of the sugar cane industry and the development of Honolulu as a port city. Koʻolaupoko was not directly affected by these developments because the land was not suited to the cultivation of sugar cane and it was geographically removed from the growing population center of Honolulu.

#### **E. Period of Chinese Rice Cultivation at Waiāhole**

Population increase in Koʻolaupoko began in the 1870s, and seems to have been directly related to the development of a rice growing industry in the region that began in the late 1860s or early 1870s. Chinese immigrants undertook rice production throughout the islands.

Having first been brought to the islands to serve as sugar plantation laborers, many remained in the islands following the completion of their contracts. Their accumulation of capital enabled them to rent land and turn to rice cultivation utilizing their traditional knowledge of methods of production which they had brought from China (Miyagi 1963:106) (see Figure 6).

Citing Bowser, Miyagi noted that by 1879 "there were at least six rice plantations, seven rice planters and one rice mill operated by a water wheel at Waiāhole. The lowlands formerly utilized for taro were ideal for planting and Waiāhole stream provided an abundance of water for irrigation" (Miyagi 1963:106).

Lum Pui Young's memoirs (1975) of his childhood in Waikāne relate that rice cultivation in the period of ca. 1906-1926 amounted to some 250 acres with approximately 150 of those acres grown by Sing Tai Wai. Young's map indicates extensive rice cultivation on the north side of the Waiāhole Stream mouth seaward of Kamehameha Highway. Sing Tai Wai employed 20-25 year-round workers and 15 to 25 more itinerant laborers during planting and harvesting time. The rice mill at Waiāhole was known as the Lansing Mill. The proprietor, Theodore F. Lansing, grew rice but also milled the rice of other growers. Young notes that the major transportation link to Honolulu during this time period was a daily round-trip by stagecoach owned by Chinese living in Kaʻalaea with a terminus at the Wing Wo Tai Mill in Waikāne. Most of the activities in the region were centered in Waikāne. Later, transportation was possible on a passenger truck owned by Hung Yew Yuen of Waikāne.

Young relates that during the period from 1913 to 1917 a contingent of 50 to 60 Chinese males were recruited to work on the Waiāhole Tunnel Project. They were used to build the railroad bed and trails from the seashore to the tunnel site. Japanese laborers did the actual tunneling. Young notes that during this period there were as many Chinese as native Hawaiians

living in this region. The rice industry reached its peak in Hawaii about 1910 then rapidly declined. Practically all of the Chinese rice fields were idle by 1925.

While rice cultivation came to dominate the landscape at Waiāhole, taro cultivation remained common and other crops such as introduced vegetables and fruits were grown. These included cabbage, radishes, onions, turnips, beans, lotus root, litchi, mango, lungan, pomelo, and banana (Devaney *et al.* 1982:53). Citing an informant, Miyagi notes that "the farmers of the valley sent their taro and other products to Honolulu by way of the Pali Road as late as 1910" (Devaney *et al.* 1982:108).

Pineapple planting also occurred for a brief time "by individual Chinese and Japanese farmers on moderately sloped hill land where rice and taro could not be grown" (Devaney *et al.* 1982:115).

The pineapples were hauled from Waiāhole to the Waikāne landing by train, and from Waikāne were sent by boat to the Libby Cannery at Wailau... there are still railroad tracks under the heavy brush at Waiāhole (Ferreira 1940:9, cited in Miyagi 1963:115).

The train track used to transport pineapples is likely the same that was constructed by the Waiāhole Water Company in 1913. Condé and Best note, "ten miles of railroad were built, including an ocean pier. One portion of the railroad was laid at the landing at Waikāne..." (1973:337). The railroad was built to transport supplies during the construction of "an engineering feat of epic proportions": a system of tunnels through the Ko'olau Mountains that supplied water to the O'ahu sugar plantations on the leeward side of the island. Once the tunnel system was complete and operational in 1916, the railroad was removed.

The pineapple industry proved to be very short-lived in the region and the Libby Cannery at Wailau was moved to Honolulu in the early 1920s. It is believed that many of the agricultural fields and, perhaps, houses were abandoned at this time (Miyagi 1963:116). Since the decline in rice production, land use in the valley may best be characterized as "diversified agriculture." Writing in 1963, Miyagi characterized this as the "Japanese Period" because in Waiāhole, Japanese farmers gradually replaced Chinese farmers and dominated land use through the 1930s and 1940s (Miyagi 1963:132). By 1961, the four major land uses at Waiāhole were identified as diversified agriculture (consisting primarily of bananas, papaya and taro), grazing (primarily dairy, but also beef cattle), residential use (as of September, 1962, 453 persons resided in Waiāhole), and forest (including the pali with no trees, wooded areas, waste land, and shrub land). Miyagi concluded that in the 1960s, land use was in a general state of decline in Waiāhole and "will probably continue to follow its trend of decline while the area awaits the development of the future" (Miyagi 1963:163).

Despite Miyagi's prediction of a "trend of decline", taro farming has continued in Waiāhole Ahupua'a to the present.

### III. PREVIOUS ARCHAEOLOGICAL RESEARCH

#### A. Previous Archaeological Studies

Previous archaeological and historical studies in Waiāhole Ahupua‘a are shown in Figure 11, summarized in Table 2, and are described briefly in the text.

Miyagi (1963) wrote an M.A. thesis in geography on “Land Use in Waiāhole Valley, O‘ahu” which has been used extensively in later studies. He documents land use during three major periods: pre-contact, 1778 to 1920, and 1920 to 1961.

Kikuchi (1964) observed that:

The entire length and width of [Waiāhole] valley was once extensively terraced into taro patches, *lo`i*, and was irrigated by a network of ditches, *‘auwai*, of which only *makai*, or seaward portions of Wai-āhole are still maintained. Traces of abandoned taro plots and ditches can be readily distinguished along the paths and inland trails. (Kikuchi 1964:1)

Kikuchi also found considerable evidence of the manufacture of stone tools within the valley, including a lithic scatter in a bulldozed field (later designated SIHP # 50-80-10-2476), two adz quarries on one of the ridges along the edge of the valley (later designated SIHP # 50-80-10-2472 and -2475). Within the seaward portion of the *ahupua`a* he identified two house sites within several large *hau* tree groves “where the stream enters the sea” (later designated SIHP # 50-80-10-1086). He described one of these sites as follows:

The best-preserved site consisted of a high mound of dirt, 8-12 inches high, ringed with a pavement of small pebbles. Portions of the site were delineated by rows of stones marking the house site. A rectangular plot of stones with pavement within the general paved area may possibly be a grave. A wall of stones ran from the site directly into the ocean. Numerous adze chips and partial blanks were found within the two house sites. (Kikuchi 1964:2)

Handy and Handy, although not archaeologists, were interested in the traditional agricultural use of the land and made observations about features that are now considered to be archaeologically significant.

There were formerly *lo`i* throughout the seaward lowlands of Waiāhole. Some were in swampy lands, but most of them were irrigated by the stream from which the *ahupua`a* takes its name. Groups of *lo`i* adjoining Waikāne were planted up into recent times (Handy and Handy 1972:453).

Griffin and Pyle's (1974) reconnaissance of the lower one-third of Waiāhole-Waikāne found a number of *lo`i* and miscellaneous walls *mauka* and *makai* of the highway. They found no evidence of the habitation sites identified by Kikuchi. They remarked, "it was evident that much of the sites within the study area have been destroyed, otherwise obliterated, or are in an advanced stage of deterioration" (1974:4). Griffin and Pyle summarized their findings as follows:

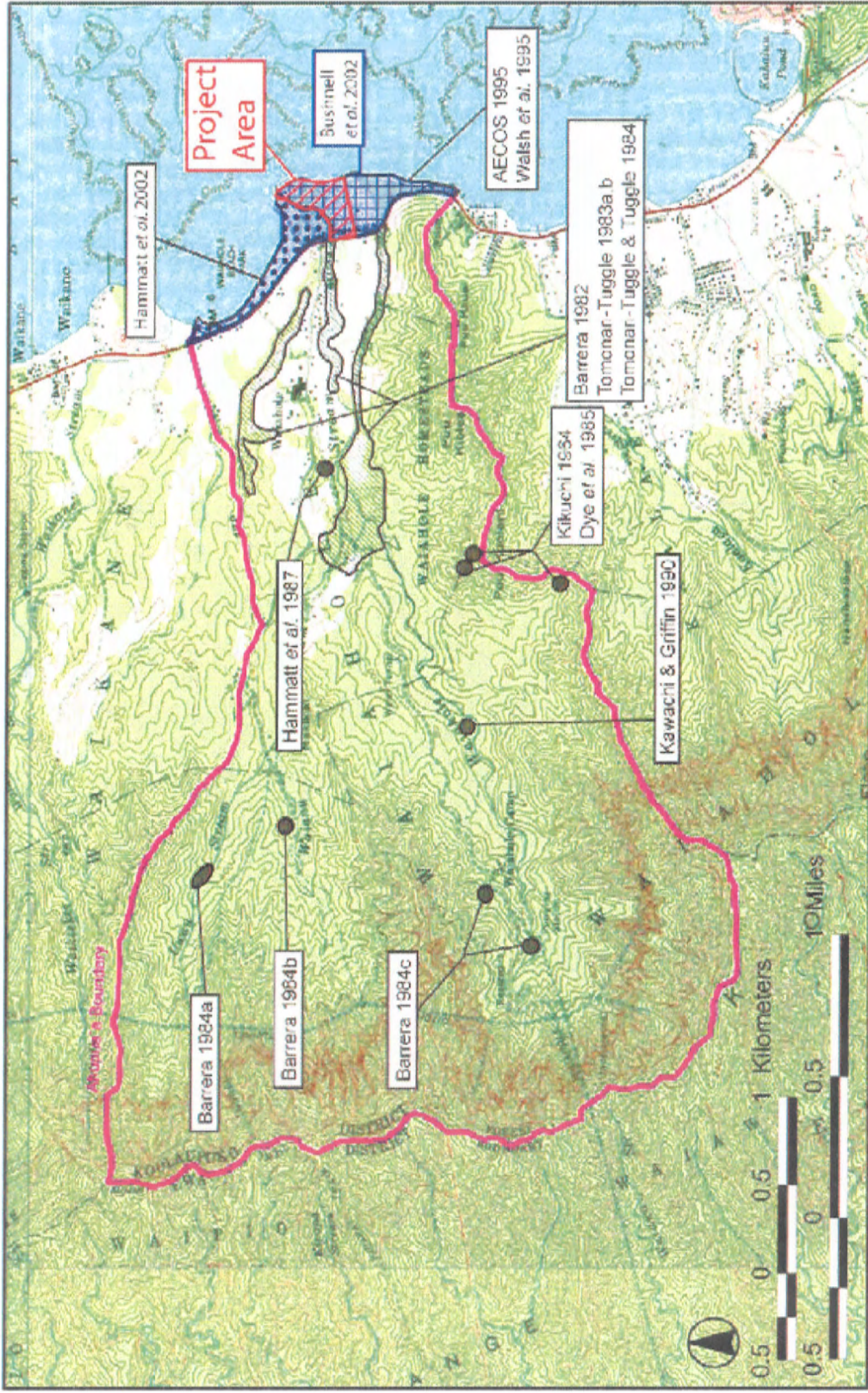


Figure 11. Map of Previous Archaeological Studies in Waiāhole Ahupua'a.

Table 2. Previous Archaeological and Historical Studies in Waiāhole Ahupua'a.

Source	Area of Study	Nature of Study	Findings
Miyagi 1963	Waiāhole Valley	Historical Land Use Study - M.A. Geography	Documents changes in landscape.
Kikuchi 1964	Waiāhole Valley	Archaeological Survey	Discusses adz quarry & other sites. Gives 4 traditions of Waiāhole from R. Paglinawan.
Handy & Handy 1972	Hawai'i in general including Waiāhole-Waikāne	"Native Planters" studies	Documents conditions <i>ca.</i> 1935 noting evidence of traditional Hawaiian land use.
Griffin & Pyle 1974	Lower one-third of Waiāhole-Waikāne	Archaeological Reconnaissance & Historical Investigation	Results described as disappointing. A number of <i>lo`i</i> and misc. walls were observed <i>mauka</i> and <i>makai</i> of the hwy. Kikuchi (1964) sites could not be relocated.
Young 1975	Waiāhole, Waikāne, Hakipu`u	Chinese History in Windward O`ahu	Documents Chinese rice cultivation <i>ca.</i> 1906-1926.
Barrera 1982	Waiāhole Valley Agricultural Park	Archaeological Reconnaissance	Notes an abandoned system of taro terraces in the vicinity of LCA 10230.
Tomonari-Tuggle 1983a	Waiāhole Valley Agricultural Park	Archaeological Reconnaissance	Identifies 28 sites including habitation areas, lithic workshops and traditional and historic agricultural sites.
Tomonari-Tuggle 1983b	Waiāhole Valley Agricultural Park	Executive Summary	Executive summary and update of previous document.
Barrera 1984a	Uwau Stream, Waikāne	Archaeological Survey	Notes a possible <i>'auwai</i> .
Barrera 1984b	Waiānu Stream Waikāne	Archaeological Survey	No Sites.
Barrera 1984c	Near Waiāhole Camp, Waiāhole	Archaeological Survey	No Sites.
Tomonari-Tuggle & Tuggle 1984	<i>Mauka</i> portion Waiāhole Valley floor	Mapping & Excavation Report	Documentation of work at SIHP #s 50-80-10-3509, -3510, -3511, -3512, -3513 and -3526. Reports 8 <sup>14</sup> C dates from SIHP # -3512.
Dye <i>et al.</i> 1985	Pu`u Kuolani, Waiāhole	Adz Quarries Study	Evidence of adz manufacturing at 3 sites.



Source	Area of Study	Nature of Study	Findings
Hammatt <i>et al.</i> 1987	Lithic workshop SIHP # -3512, central Waiāhole Valley	Archaeological Testing	Documents adz flaking and habitation activities. Reports 1 <sup>14</sup> C date.
Kawachi & Griffin 1990	SIHP # 50-80-10- 4246,central Waiāhole Valley	Field check	Documents numerous agricultural terraces.
AECOS 1995	Waiāhole & Waikāne Ahupua‘a	Natural Resources Inventory	Provides descriptions of the flora and fauna in the area.
Walsh <i>et al.</i> 1995	Archaeological assessment of coastal areas of Waiāhole and Waikāne	Archaeological Assessment of coastal areas	Identified fields with <i>lo‘i</i> type soils and possible ‘ <i>auwai</i> at Waiāhole and historic structures or features in Waikāne
Hammatt <i>et al.</i> 2002	A 21 acre parcel as part of Waiāhole Beach Park improvements	Archaeological Inventory Survey	Identified two sites (SIHP # 1086 and 6396) consisted of six historic grave plots and a Pohaku O Kane
Hammatt <i>et al.</i> 2003	Waiāhole bridge replacement project	Cultural Impact Assessment	Recommendation for feature bridge construction is to consult the member of the community.

The results were, from an archaeologist's point of view, disappointing. The beach area revealed only a low seawall at the edge of the beach-turf line. This wall is undatable and may be of recent origin. In a few locations taro *lo‘i* are still observable behind the beach. In general the disturbance of the various site predicted areas are bad. Pasturage of cattle seems to have eradicated even the *lo‘i*, in most cases.... it is as if someone has taken an eraser and wiped clean the reminders of the former Hawaiian occupation of this part of Waiāhole-Waikāne. (1974:15-16)

With the exception of Kukuianiani Heiau in Waikāne “all the sites encountered during field operations are considered marginal” (1974:4). Griffin and Pyle provide a historical overview of the area drawing heavily upon Miyagi (1963).

Young (1975) was born in Waikāne in 1900 and produced a memoir of his early memories of the Chinese community in Waiāhole, Waikāne, Hakipu‘u *ca.* AD 1906-1926. His data are incorporated in the historic land use section of this study.

Barrera (1982) presents the results of a brief reconnaissance and literature review in support of the Waiāhole Valley Agricultural Park project. He notes an abandoned system of taro terraces in the vicinity of LCA 10230. He concludes, “the entire valley of Waiāhole is probably eligible to the State and National Registers of Historic Places as an archaeological district” (Barrera 1982:3).

Tomonari-Tuggle (1983a & b) reports on a more in-depth archaeological reconnaissance survey in support of the Waiāhole Valley Agricultural Park project studied previously by Barrera

(1982). This consisted of 5 discrete survey areas in the central portion of Waiāhole Valley. She documents twenty-eight sites, nineteen of which were in the area of the juncture of Waiāhole and Waianu Streams. These sites included residential areas, stone tool manufacturing workshops and agricultural features related to both traditional taro cultivation and historic rice cultivation. A brief history of settlement and land use is provided.

In 1984 William Barrera carried out a series of four archaeological surveys of proposed well locations in Waiāhole and Waikāne, at Uwau Stream, Waianu Stream, and two areas in central Waikāne and near Waiāhole Camp in Waiāhole. Three of these modest studies reported no sites with the Uwau Stream study noting only a possible *'auwai*.

In 1984, Tomonari-Tuggle & Tuggle documented excavation and mapping work at SIHP #s 50-80-10-3509, -3510, -3511, -3512, -3513 and -3526 all located near the confluence of Waiāhole and Waianu Streams and previously described in their earlier work (Tomonari-Tuggle 1983a & b). They report six <sup>14</sup>C dates from SIHP # -3512 (the locus of most of their research) and concluded the site was used for both agriculture and habitation from the late pre-contact times into the historic period. They report some relatively early carbon date (Beta 100031) of *ca.* AD 1040-1480 from SIHP # -3512.

Dye *et al.* (1985) studied a Waiāhole quarry complex located on opposite slopes of a small ridge that trends north into Waiāhole Valley from Pu'u Kuolani. Kikuchi (1963) reported quarrying activity in the area. This complex includes SIHP # 50-80-10-2472 (B.M. Site # 50-Oa-G2-7), 50-80-10-2475 (B.M. Site # 50-Oa-G2-8) and 50-80-10-2476 (B.M. Site # 50-Oa-G2-9). The study (Dye *et al.* 1985: 65) relates that Dr. Patrick McCoy did some mapping and collecting at the complex in 1982 but there are evidently no reports of this work. The study relates that Kikuchi (1982) published descriptions by Macdonald of two thin sections from the complex. This study recommended nomination of SIHP #s 50-80-10-2472 (B.M. Site # 50-Oa-G2-7) and 50-80-10-2475 (B.M. Site # 50-Oa-G2-8) to State and National Registers of Historic Places

Cultural Surveys Hawai'i (Hammatt *et al.* 1987) carried out archaeological testing of a lithic workshop (SIHP # 50-80-10-3512) located on a low knoll overlooking the confluence of Waianu and Waiāhole Streams that was identified in a survey by Tomonari-Tuggle in 1983 and tested by her in 1984. Both habitation and flaking activity were documented. Final stage flaking of adzes took place at the site and this is suggested to have been the single most important economic activity at the site. The one <sup>14</sup>C date recovered, AD 1655-1950, was regarded as consistent with six of the dates reported by Tomonari-Tuggle. The earliest Tomonari-Tuggle dates are questioned because of their apparent shared stratigraphic context with later dates (Hammatt *et al.* 1987:41).

The State Historic Preservation Division conducted a field check (Kawachi & Griffin 1990) documenting several terraces in central Waiāhole Valley designated SIHP 50-80-10-4246.

AECOS Inc. (1995) carried out a Natural Resources Inventory of two coastal areas of Waiāhole & Waikāne Ahupua'a. One of the parcels is now the current project, which is the southern most of the two areas. AECOS Inc. (1995) discussed descriptions of vegetation, fauna, wetlands and streams offering insights on the history of land use in this area.

Cultural Surveys Hawai'i (Walsh *et al.* 1995) carried out an archaeological assessment of coastal areas of Waiāhole & Waikāne on the present project area. This study notes vaguely defined fields with *lo'i* type soils and a possible *'auwai* within the current project area. To the

south of the current project area a buried cultural layer with possible water-worn basalt flakes and charcoal was observed.

CSH (Hammatt *et al.* 2002) conducted an archaeological inventory survey of an approximately 21-acre parcel as part of the Waiāhole Park improvements. This parcel is adjacent to and north of the current project area. This survey identified two sites and a modern *imu*. SIHP # 50-80-10-1086 is a concentration of six historic graves and SIHP # 50-80-10-6396 is a possible Pohaku O Kane or God Stone. SIHP # 50-80-10-1086 is on the north side of Waiāhole Stream and will not be impacted by the currently proposed project.

CSH (Hammatt *et al.* 2003) carried out a cultural impact assessment for the Waiāhole bridge replacement project at the northwest corner of the current project area. Specific cultural concerns raised by the community were: 1) the presence of taro *lo'i* and *'auwai* adjacent to the bridge; 2) the health of the Waiāhole Stream; and 3) the impact of the new bridge on the rural culture of Waiāhole. The recommendations from the community was that future bridge construction plans and activities proceed in consultation and coordination with the community members who would be involved with the *lo'i* and *'auwai* restoration project.

## **B. Summary of Previous Archaeological Dating**

Archaeological dating (Table 3) has been reported from four prior studies (eight dates from Tomonari-Tuggle & Tuggle 1984 and one from Hammatt *et al.* 1987). Beta Analytic, Inc analyzed all nine dates. With the exception of two dates on wood, which both came back as modern, all of the dating has been on charcoal. Of the nine dated samples, seven yielded date ranges entirely post-dating AD 1650. One of the reported date ranges would be consistent with habitation *ca.* AD 1400-1650. The oldest reported date range (AD 1040-1480) could well lie within this *ca.* AD 1400-1650 period as well. The study by Hammatt *et al.* (1987:41) questioned the earliest Tomonari-Tuggle dates because of their apparent shared stratigraphic context with later dates. The absence of earlier dates is somewhat surprising given the widely held belief that occupation in windward O'ahu occurred relatively early in the Hawaiian cultural sequence (Kirch 1985:69). Certainly nothing like the early occupation reported at other windward O'ahu sites at Bellows, Kawainui and Kahana can be supported at this time.

Table 3. Radiocarbon Dates Reported for Waiāhole Valley. All  $^{14}\text{C}$  Dates were Recovered from SIHP # 50-80-10-3512.

Reported Sample #	Reference	$^{14}\text{C}$ Years B.P.	C13/ C12	C13 Adjusted C14	Calendar Range AD
3512-1	Tomonari-Tuggle & Tuggle, 1984 App. 3 p.17	Modern	-	-	Modern
3512-2	Tomonari-Tuggle & Tuggle, 1984 App. 3 p.17	Modern	-	-	Modern
Beta 100028	Tomonari-Tuggle & Tuggle, 1984 App. 3	Less than 130 B.P.	23.48 0/00	Less than 130 B.P.	Post 1820
Beta 1000289	Tomonari-Tuggle & Tuggle, 1984 App. 3	180+/-50 B.P.	-23.26 0/00	210+/- 50 B.P.	1690-1790
Beta 100030	Tomonari-Tuggle & Tuggle, 1984 App. 3	480+/-60 B.P.	-27.67 0/00	440+/-60 B.P.	1450-1570
Beta 100031	Tomonari-Tuggle & Tuggle, 1984 App. 3	720+/- 220 B.P.	-26.49 0/00	690+/- 220 B.P.	1040-1480
Beta 100032	Tomonari-Tuggle & Tuggle, 1984 App. 3	Less than 140 B.P.	-27.76 0/00	Less than 140 B.P.	Post 1810
Beta 100033	Tomonari-Tuggle & Tuggle, 1984 App. 3	160+/-70 B.P.	-26.52 0/00	130+/- 70 B.P.	1750-1890
Beta 21086	Hammatt <i>et al.</i> 1987:39	190+/-70	-29.4	120+/- 70 B.P.	1655-1950

### C. Summary of Past Land Use Patterns

It seems probable that a variety of activities including habitation, lithic tool manufacture, and irrigated agriculture were undertaken at Waiāhole by the *ca.* AD 1400-1650 period. It seems probable that this irrigated agriculture and associated habitation increased in late pre-contact times to at least the extent documented in *Mahele* records (see Appendix A and Table 1). The use of the lands of the present project area adjacent to the Waiāhole Stream for habitation and agriculture appears to have continued unbroken to the present, although with notably less intensity after *ca.* 1910.

#### IV. PREDICTIVE MODEL

The information gathered from legends, traditional accounts, and history of Waiāhole Ahupua‘a provide a good background to produce a predictive model for this project area. The legends indicate the existence and importance of taro in Waiāhole. The myths also indicate land usage, and the attitude and values of the people previously living in the Waiāhole region.

Waiāhole Valley was described by early visitors as “in a high state of cultivation” and the evidence of field systems (*lo‘i*) and irrigation channels (*‘auwai*) have been found throughout the valley floors. The project area’s location along the coast and Waiāhole Stream make it likely that both habitation and agricultural features would be present. *Kuleana* awards from the mid 1800s indicate that seven LCAs were claimed within the subject parcel. Physical evidence of these LCAs may still be present there. These LCA awards also indicate that habitation and agriculture were occurring on the same lots, suggesting that a broad range of site types may be present.

There have been numerous archaeological studies in Waiāhole Ahupua‘a, however, five of these studies are in close proximity or in the vicinity of the project area. Barrera (1982) noted an abandoned system of taro terraces on a parcel approximately 300 meters northwest of the subject parcel. Also, at about 250 meters northwest of the project area, Tomonari-Tuggle(1983a & b) identified 28 sites. These sites included residential areas, stone tool manufacturing workshops and agricultural features related to both traditional taro cultivation and historic rice cultivation. These sites were reexamined and excavated in (1984) by Tomonari-Tuggle and Tuggle. In addition, Hammatt et al. (2002) identified two sites, a complex of historic burials and a possible ceremonial site (God stone or *pohaku o Kane*) on a parcel adjacent to and north of the project area. Similar types of constructed features may be encountered within the current project area.

AECOS Inc. (1995) carried out a Natural Resources Inventory and Walsh *et al.* (1995) conducted an archaeological assessment of the subject property. No available data on archaeological findings from AECOS Inc. (1995). Bushnell *et al.* (2002) also provided extensive information based upon person interviews about traditional land use patterns.

Walsh *et al* (1995) report vaguely defined fields with *lo‘i* type soils and a possible *‘auwai* and buried cultural layer with possible water worn basalt flakes and charcoal south of the current project area. Also on the northwest corner of the subject parcel Hammatt *et al.* (2003) mentioned the existence of *lo‘i* fields around the Waiāhole Bridge area.

With this in mind, the types of archaeological sites and/or cultural materials within the project area were expected to include both historic and pre-contact surface features such as walls, mounds, terraces, associated with agriculture, as well as, other structures consistent with habitation. Also given the probability that Waiāhole Ahupua‘a supported a rather substantial pre-contact population, and there was also a possibility that pre-contact burials might be encountered.

## V. INVENTORY SURVEY RESULTS

### A. Introduction

A total of three sites were discovered within the project area during fieldwork: SIHP #s 50-80-10-6756 (subsurface structural remnant), -6757 (historic road segment), and -6758 (prehistoric/historic agricultural infrastructure). In one location within the project area all three of these sites are superimposed one on top of the other. Based on the stratigraphic relationships at this one location, the agricultural infrastructure, which is primarily made up of Stratum C (see below), is the oldest, followed by the structural remnant (Stratum H, discussed below), with the historic road, overlying them both, as the most recent feature.

### B. Pedestrian Inspection

Owen O'Leary and Matt McDermott conducted a pedestrian inspection of the project area on December 8, 2004. At this time two features were discovered within the project area, which have both been included under SIHP # 50-80-10-6758. The first is an *'auwai* that runs adjacent to the western end of the southern edge of the project area. The second is an earthen berm approximately 0.5 meters tall and 65 meters long. The berm runs roughly parallel to Kamehameha Highway approximately 50 meters east of the road. These two features will be fully described below.

### C. Subsurface Testing

#### 1. Stratigraphy

Waiāhole Stream and its numerous flooding events over the course of time have created a relatively consistent stratigraphy throughout the project area. Because of this, a single descriptive stratigraphic sequence was developed that describes the sediments exposed in all excavations. The locations of the subsurface testing activities can be seen in Figure 7.

Within the stratigraphy there are three principle horizons, some of which encompass more than one stratigraphic layer. The A-horizon is the current ground surface of the project area and exhibits on-going soil formation.

The B-horizon is dense, clay-enriched, and contains few gravelly or stony inclusions. This B-horizon was ubiquitous in the backhoe trenches. This layer's light charcoal flecking and clay enrichment are undoubtedly the result of agricultural use of the project area. The light charcoal flecking found in this layer was present throughout the trenches.

The C-Horizon is the basal horizon in the project area and it is made up sediments that have accumulated over the course of the repeated flooding events of Waiāhole Stream. The C-horizon also includes the high-energy stream bed-load deposits that were noted in various locations in the project area. These cobbly, gravelly, sandy deposits represent short-term, flood-associated stream channels and may also represent old alignments of Waiāhole Stream itself.

- Stratum A            A-horizon; 10 YR 2/2, very dark brown; silt loam; moderate, medium, crumb structure; very friable moist consistency; slightly plastic; no cementation; abrupt smooth lower boundary. This is the current ground surface within the project area and it has been in place long enough for a fair amount of soil formation to have taken place. It is present throughout the project area except in those areas where it has been removed by modern disturbances such as the construction base-yard.
- Stratum B            A/B-horizon; 10 YR 3/2, very dark grayish brown; clay loam; weak, fine, granular structure; friable moist consistency; slightly plastic; no cementation; abrupt wavy lower boundary; this is a transitional mix of strata A and C and it overlies strata C and H.
- Stratum C            B-horizon; 10 YR 3/2, very dark grayish brown mottled with 10 YR 5/6, yellowish brown; clay; structureless, firm moist consistency; very plastic; no cementation; abrupt wavy lower boundary. This layer has become clay enriched through the agricultural use of the project area. This layer makes up part of SIHP # 50-80-10-6758. There is light charcoal flecking throughout this stratum and notably there are few natural gravel inclusions. A *kukui* nut was selected from this stratum out of Trench 5A and submitted to Beta Analytic for AMS radiocarbon analysis. A sediment sample was also collected from this layer from the side wall of Trench 5B and submitted for pollen analysis.
- Stratum D            C-horizon; 10 YR 3/2, very dark grayish brown; clay; structureless, very firm moist consistency; very plastic; no cementation; abrupt wavy lower boundary; this is a portion of the parent material that was laid down by flooding events from Waiāhole stream.
- Stratum E            C-horizon; 10 YR 3/2, very dark grayish brown; fine to medium sandy clay; structureless, very friable moist consistency; slightly plastic; no cementation; abrupt wavy lower boundary. A sediment sample from this stratum in Trench 2 was collected and submitted to Beta Analytic for AMS radiocarbon analysis. A sediment sample was also collected from this layer from the side wall of Trench 2 and submitted for pollen analysis.

Stratum F	C-horizon; 5 YR 4/6, yellowish red; very gravelly, cobbly, medium to coarse sand; structureless, loose moist consistency; non-plastic; no cementation; abrupt wavy lower boundary; this layer represents the meandering stream channels that were present in the past as Waiāhole Stream moved laterally across the delta/flood plain and new outlet channels to the ocean formed and old ones were abandoned. As expected, this layer contains 70-80% gravel and some small cobbles.
Stratum G	C-horizon; 10 YR 3/1, very dark gray; fine to medium sandy clay; structureless, very friable moist consistency; slightly plastic; no cementation; abrupt wavy lower boundary.
Stratum H	Structural layer; 10 YR 3/2, very dark grayish brown; very cobbly gravelly clay; structureless, friable moist consistency; plastic; no cementation; abrupt wavy lower boundary. The lack of sands and gravels within this layer indicates that the stratum was not deposited through natural mechanisms. This is a structural foundation layer and has been given the SIHP # 50-80-10-6756. Within this layer basalt flakes, an adze blank, volcanic glass, marine shell, animal bone, and charcoal were found in the wet screened sample.
Stratum I	Fill layer; 10 YR 5/4, yellowish brown; medium to coarse sand; structureless, loose dry consistency; non-plastic; no cementation; abrupt smooth lower boundary. This is a modern fill layer.
Stratum J	Fill layer; 10 YR 5/1, gray; gravelly, fine to medium sandy loam; structureless, hard dry consistency; non-plastic; no cementation; very abrupt wavy lower boundary. This modern fill layer is associated with the modern road that was cut out into the project area from Kamehameha Hwy for the construction base-yard (mentioned in the "Built Environment" section above). It is made up of 30-40% gravel.
Stratum K	Fill layer; 7.5 YR 3/4, dark brown; clay loam; structureless, slightly hard dry consistency; plastic; no cementation; very abrupt smooth lower boundary. This is another fill layer with 10-15% gravel.



## 2. Trenching

### a. Trench 1

Trench 1 was excavated closest to Kamehameha Highway and was oriented perpendicular to the highway (Figure 7). Trench 1 was 6.1 meters long, averaged 1.3 meters deep, and exhibits the typical three-horizon stratigraphy for the project area. A stratigraphic profile (Figure 12) and a photograph of the representative stratigraphy (Figure 13) of trench 1 are shown below.

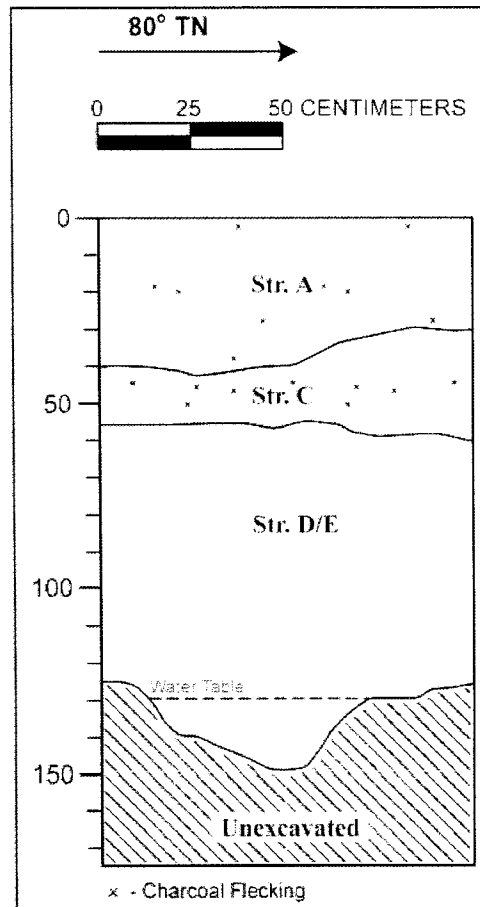


Figure 12. Schematic of the stratigraphic profile of Trench 1.

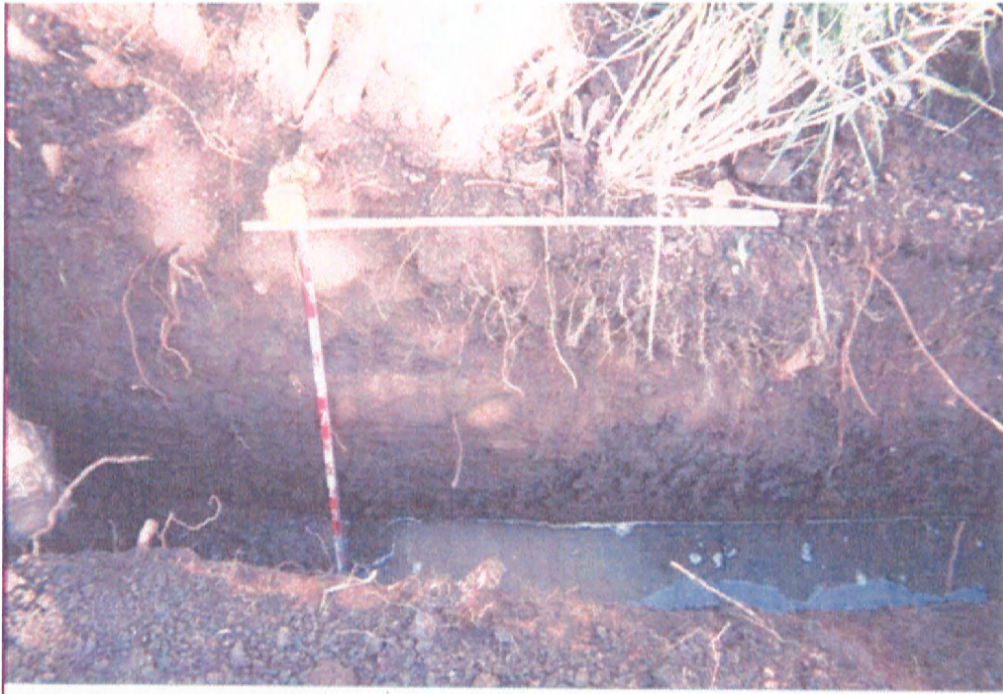
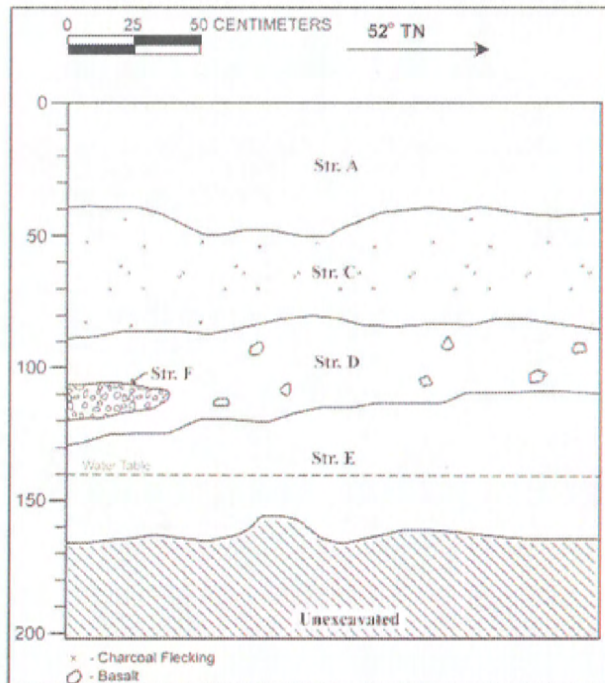


Figure 13. Photograph looking north-northwest at the stratigraphic profile of Trench 1.

## b. Trench 2



Trench 2 (See Figures 14 through 17) was also oriented perpendicular to Kamehameha Highway. Trench 2 was 11 meters long and demonstrated the standard three horizon stratigraphy described above. Trench 2 differs from the standard low energy depositional environment because it contains a 0.2-meter thick band (Stratum F) of sandy clay containing 70-80% gravel and small cobbles. These inclusions all show evidence of rounding due to water abrasion. This stratum represents an old stream channel. Two stratigraphic profiles were drawn for Trench 2. Sediment samples were submitted from Stratum E for radiocarbon dating, pollen analysis and micro-charcoal particle quantification.

Figure 14. Stratigraphy profile A for Trench 2.



Figure 15. Photograph looking south at the stratigraphic profile of Trench 2.

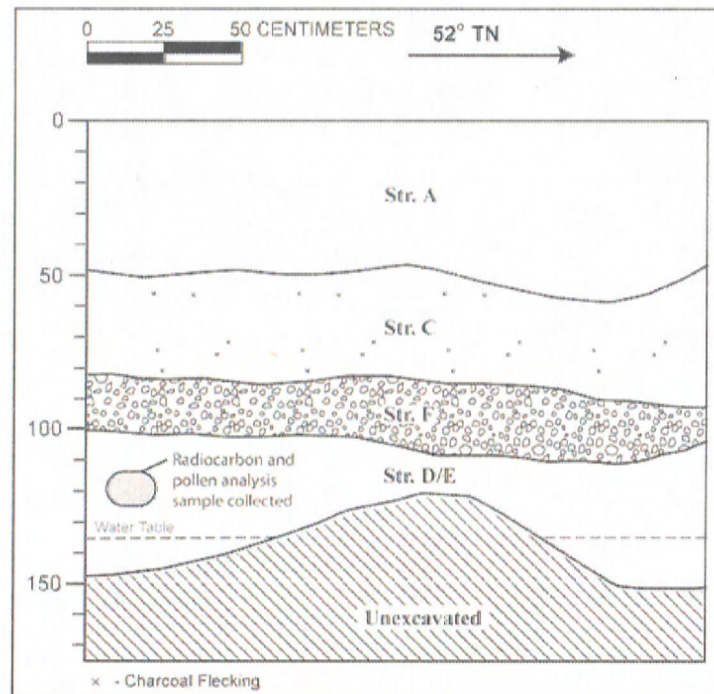


Figure 16. Stratigraphic profile B of Trench 2 showing stratum F, which represents a meandering stream channel.



Figure 17. Photograph looking south showing Trench 2, profile B.

A sediment sample was submitted to Beta Analytic for radiocarbon dating of the organic material within it. The location where this sample was collected can be seen in Figure 16. As previously discussed Stratum D/E is not associated with human occupation. This sample was submitted in an attempt to determine the age of these relatively deeper alluvial sediments and investigate the rate of alluvial deposition within the project area.

Beta Analytic returned a calibrated result of  $880 \pm 40$  BP. This date was calibrated using OxCal version 3.5, a program designed for calibrating radiocarbon ages into calendar ages. It was determined that there is a 95.4% probability that the actual age of the organic material with the sediment is between AD 1030 and AD 1260. These results may indicate that there is a moderate rate of deposition (following Ferring 1986:261) on the order of approximately 0.175 cm/year (calculated using 140 cm of accumulation over 800 years). However, it should be noted that the meandering stream channels like the one depicted in Figure 16 (Stratum F) would have removed an indeterminate amount of the fine grained sediment deposited by the preceding flooding events. Accordingly, this depositional rate should be considered tentative at best because of this unconformity.

EcoPlan Associates examined a sediment sample for pollen and micro-charcoal content. The sample did not contain sufficient pollen for analysis. Two slides were examined and only three indeterminate grains were observed. Repeated wetting and drying may have caused the deterioration of the pollen. The charcoal concentration was  $2.17 \text{ mm}^2$  per cc of sediment. This suggests that this deposit postdates the arrival of Polynesians to O'ahu. The pollen and microparticle charcoal results provided by EcoPlan Associates are included as Appendix B. This determination fits with the radiocarbon dates obtained from Layer E and the overall chronology of settlement of the Hawaiian Islands.

c. Trench 3

Trench 3 (Figures 18 and 19) continued in the same general east-west direction as Trenches 1 and 2. It was 5.5 meters long and approximately 1.75 meters deep. This trench is located at the edge of the old construction base-yard and thus provides an excellent example of where the top natural horizon (stratum A) has been removed and replaced with a thick (50 cm) layer of modern construction debris.

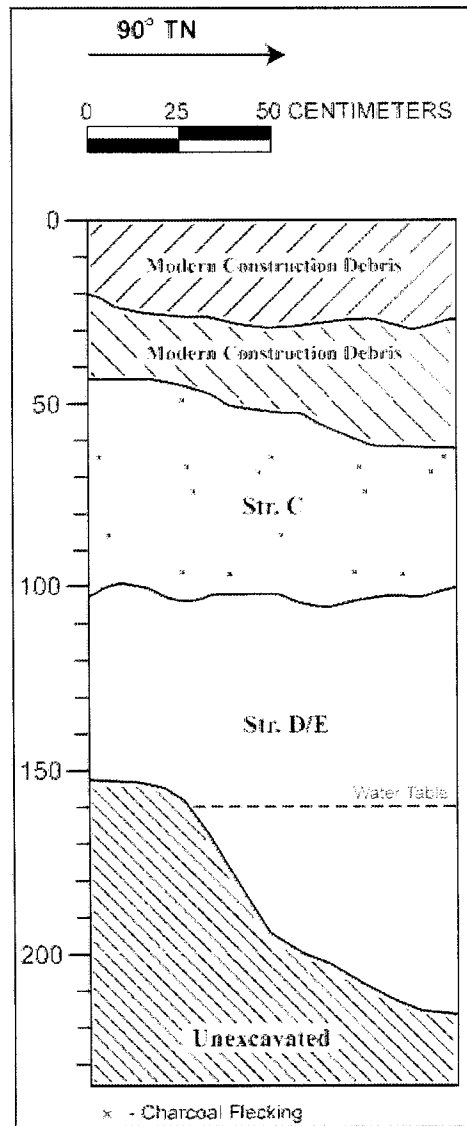


Figure 18. Schematic of the stratigraphic profile of Trench 3.



Figure 19. Photograph looking south at the stratigraphic profile of Trench 3.

d. Trench 4

Trench 4 (Figures 20 and 21) was 8.5 meters long and averaged 2.1 meters deep. Like Trench 3, Trench 4 has a layer of modern construction debris at the surface. Unlike Trench 3, the natural A-horizon was simply capped instead of being cleared away. The typical B and C-horizons are also present. In addition to the standard stratigraphy Trench 4 contained a stratum (G) that appeared to be a mix of both terrestrial and marine depositional processes. The rapidly rising water table prevented a complete investigation of Stratum G.

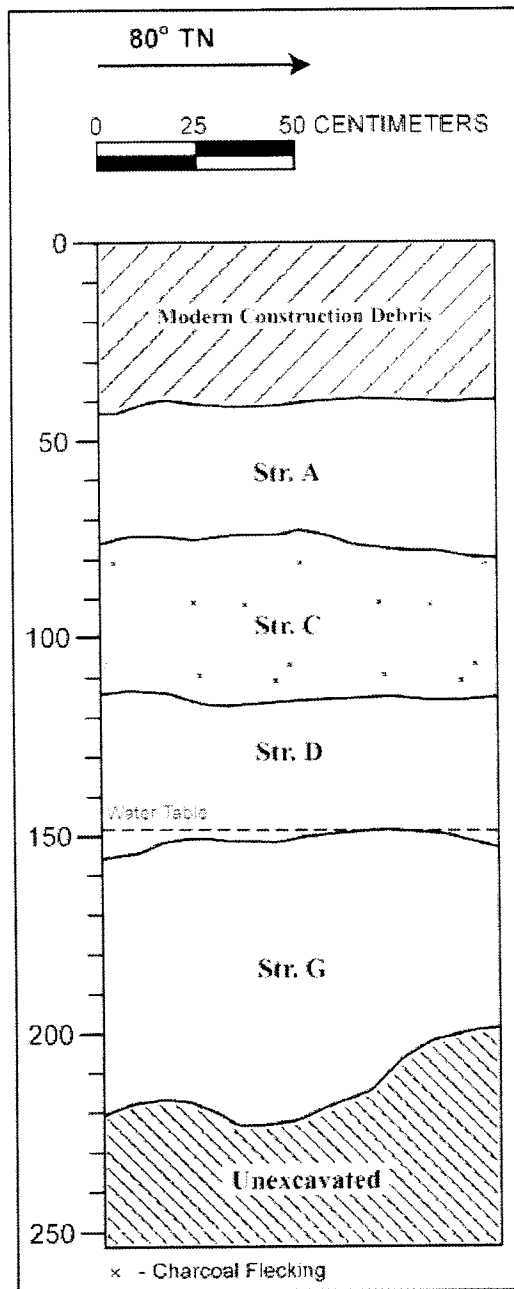


Figure 20. Schematic showing the stratigraphy of Trench 4.





Figure 21. Photograph looking south showing the stratigraphy of Trench 4.

e. Trench 5A

Trenches 5A through 5E are all interconnected because of the discovery of SIHP #s 50-80-10-6756 and 50-80-10-6757 in Trench 5A. The subsequent trenches were excavated to determine the geographic extent of the two sites. The relationship between the five trenches as well as the locations where stratigraphy was drawn is shown in Figure 22. The trenches have been alphabetically labeled in the order that they were excavated. The central area of Trenches 5A–5E is shown in Figure 23.

Trench 5A (Figure 24) contains the top two soil horizons typical for the project area. It also includes a hybrid stratum (B) that is a combination of the regularly found strata A and C. This is the only place with the project area where this layer was discovered and it is likely a product of the non-naturally deposited stratum H. Stratum H is SIHP # 50-80-10-6756 and will be discussed in detail below. Soil samples were collected from both the north and south wall of this trench, from Stratum H, for wet screening in the laboratory. Because of the heavy rains that occurred around the time of the excavation of this trench, the water level was quite high and it was not possible to excavate to a deeper depth to determine if strata D/E was present below Stratum C. Trench 5A was 24 meters long, which was divided into two sections for the profile: 5A for the portion of the trench to the west of Trench 5B and Trench 5A Extension for the area to the east of Trench 5A. Trench 5A averaged 1.0 meter deep.

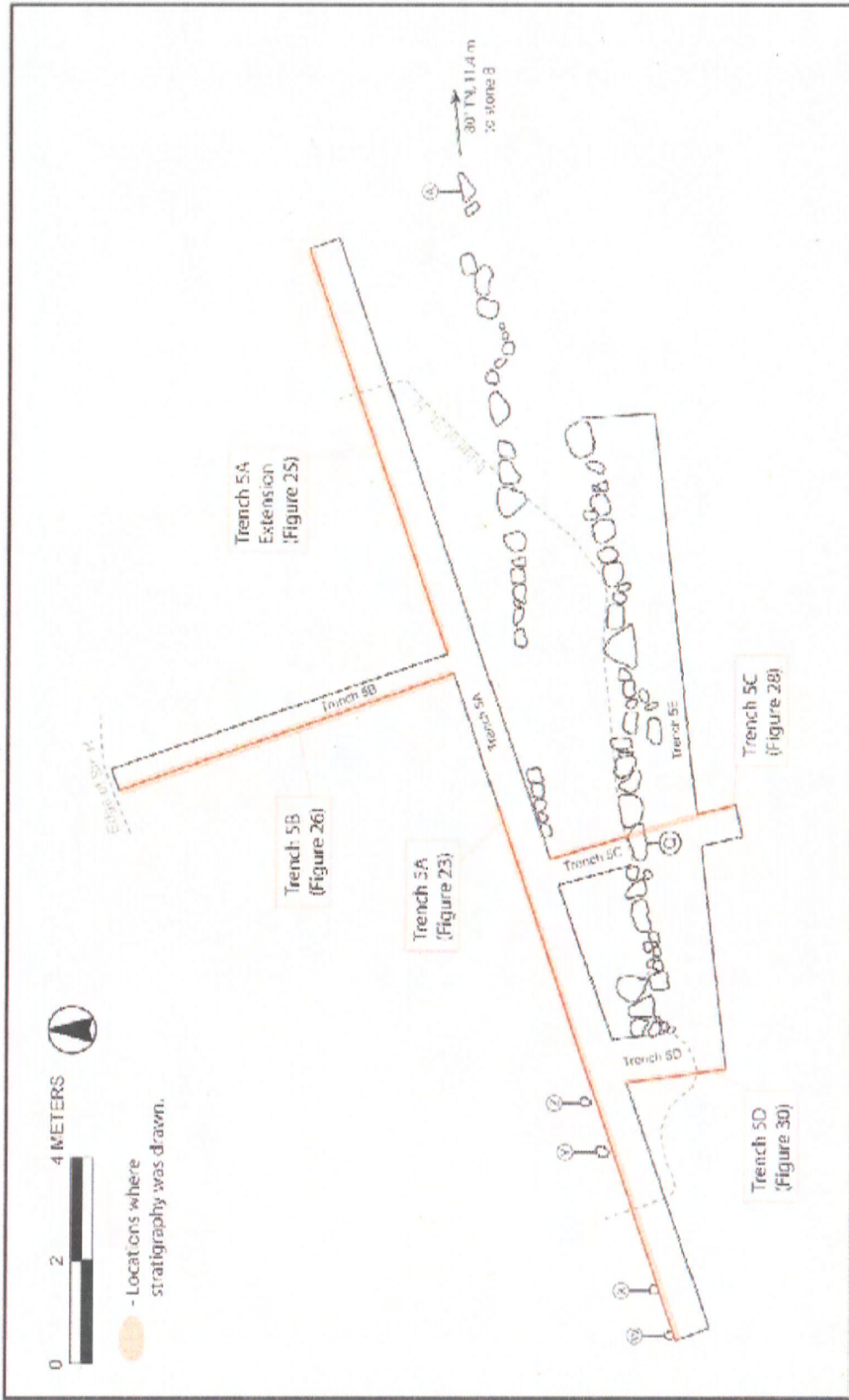


Figure 22. Plan view map showing the location of Trenches 5A through 5E and the locations where the stratigraphy was recorded.



Figure 23. Photograph looking west at Trenches 5A-5E.

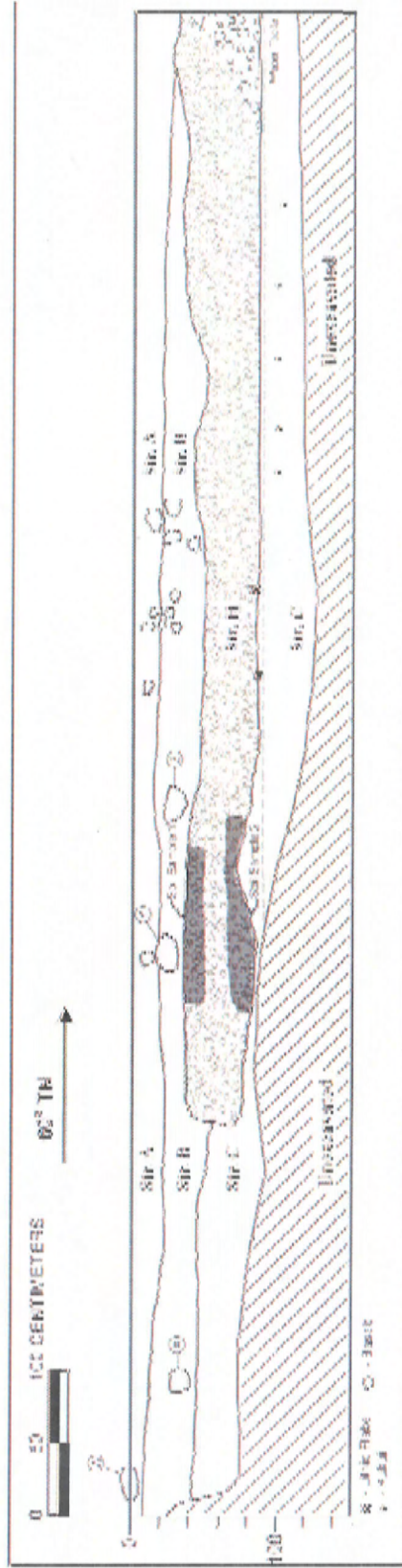


Figure 24. Stratigraphic profile 5A of the north wall of the western end of Trench 5A.



Figure 25. Photograph looking northwest showing the stratigraphy of Trench 5A. Stratum H is the darker layer with lighter colored inclusions to the right of the photo scale.

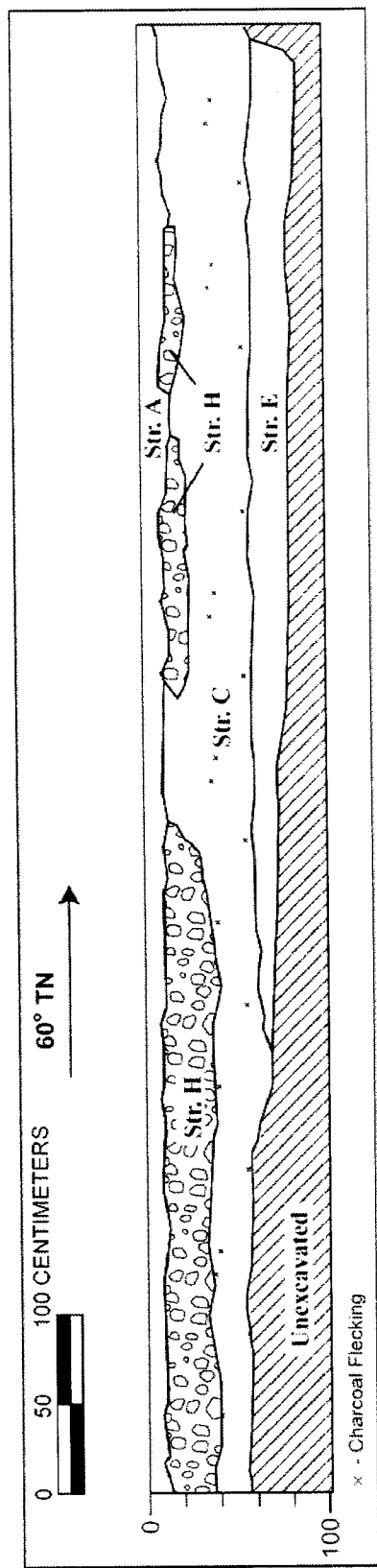


Figure 26. Stratigraphic profile of Trench 5A Extension. Profile depicts the end of Trench 5A east of Trench 5B.

f. Trench 5B

Trench 5B (Figure 27) was excavated to determine the northern most extent of SIHP # 50-80-10-6756. This trench was 7.0 meters long and had an average depth of 0.8 meters. As in trench 5A, stratum H clearly overlies the earlier agricultural layer (stratum C) and is underneath the modern A-horizon. Two soil samples were collected from this trench: one from Stratum C and the other from Stratum F. As was seen in Trench 2, Stratum C lies directly on top of Stratum F, which represents a former stream channel. The high water table prevented any deeper investigations to determine what was below Stratum F.

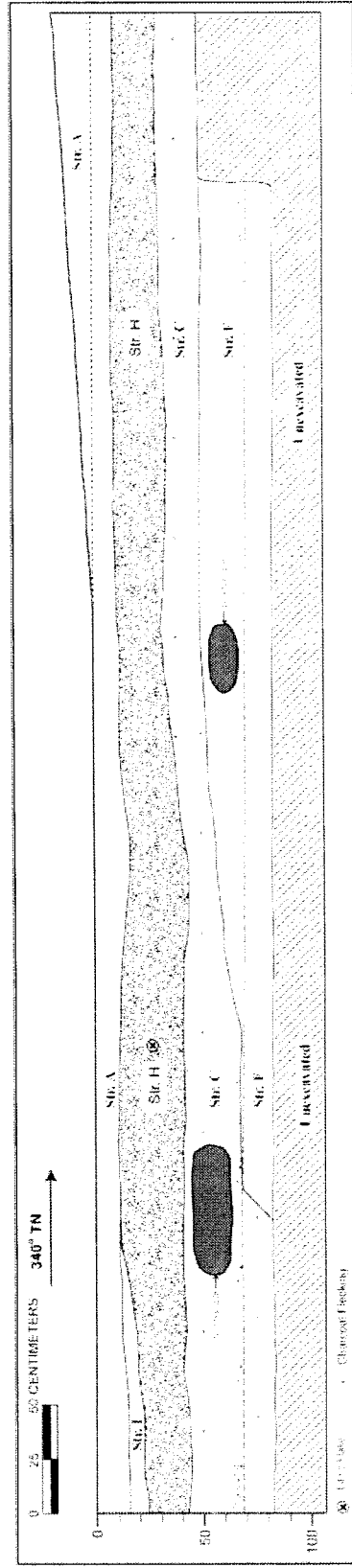


Figure 27. Stratigraphic profile showing the entire west wall of trench 5B and locations of the bulk samples that were collected.



## g. Trench 5C

Trench 5C was 3.0 meters long and had an average depth of 0.5 meters. It was excavated to determine the southern most extent of SIHP # 50-80-10-6756. Trench 5C (Figures 28 and 29) is similar to 5A and 5B in that stratum H is underneath the modern surface of the project area (Stratum A). A large basalt boulder (labeled as Q in figures) was encountered in the middle portion of the trench. This proved to be the first indication of SIHP # 50-80-10-6757, a historic road segment. Stratum H (SIHP # 50-80-10-6756) abruptly ended at the northern most edge of the basalt boulder. The south side of the profile for Trench 5C clearly shows the natural stratigraphy of the project area of the A-horizon overlying the B-horizon. An extremely shallow water table the day of the excavation of this trench prevented the trench from being dug any deeper than 0.55 meters.

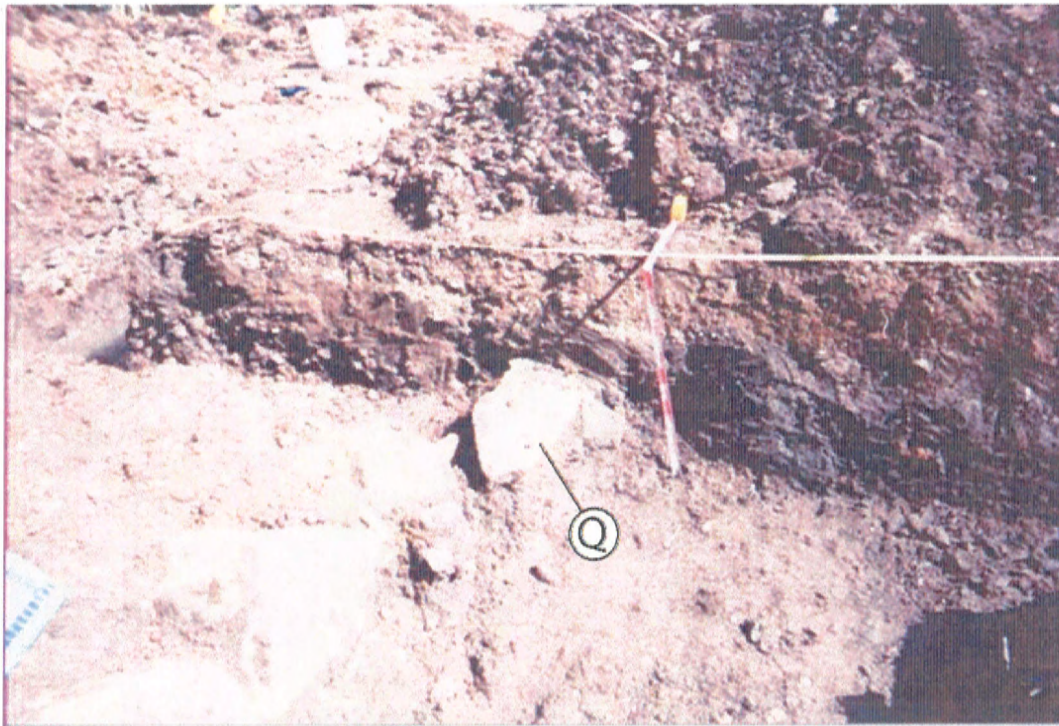


Figure 28. Photograph look east showing the east wall of Trench 5C.

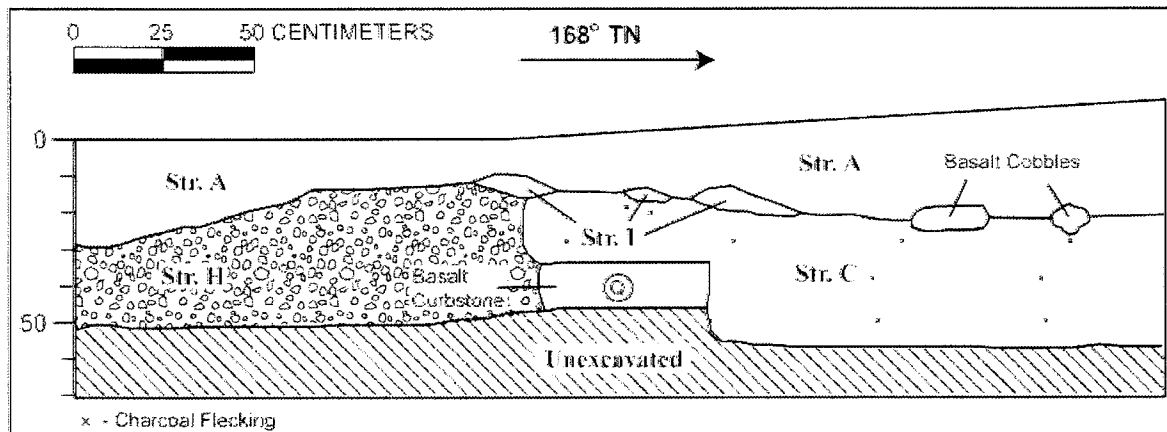


Figure 29. Stratigraphic profile of the east wall of Trench 5C.

#### h. Trench 5D

Like Trench 5C, Trench 5D was excavated to determine the southern extent of Stratum H (SIHP # 50-80-10-6756). Trench 5D (Figures 30 and 31) was 2.0 meters long and had an average depth of 0.65 meters. Trench 5D shows the southern extent of Stratum H and it also revealed more portions of the embedded stone alignments that are part of SIHP # 50-80-10-6757. Strata J and K are modern fill layers associated with the modern road that once extended in this area from the construction base-yard.



Figure 30. Photograph looking west at the stratigraphic profile of trench 5D.

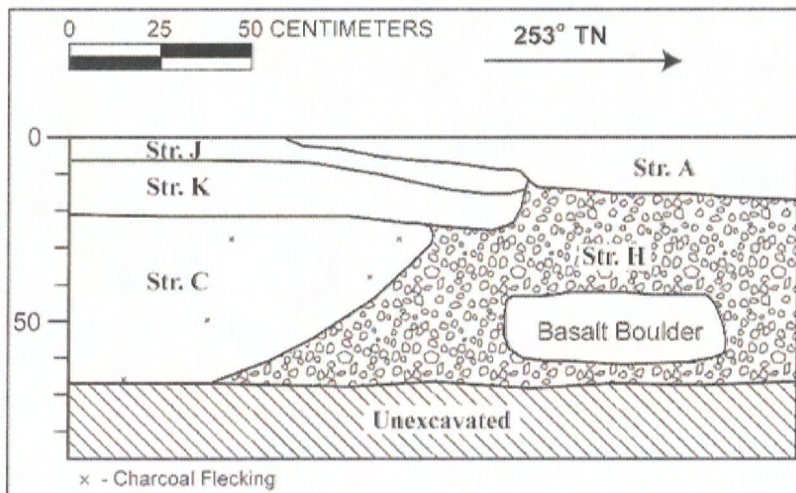


Figure 31. Stratigraphic profile of the west wall of trench 5D.

i. Trench 6

Trench 6 (Figures 32 and 33) was 5.6 meters long and had an average depth of 1.0 meter. Trench 6 exhibits the same three-horizon sequence for the project area with a moderately developed soil layer on top of the old agricultural surface on top of the parent material of flooding events. Just below the water table Stratum F was discovered again, but water seeped into the trench preventing further excavation.



Figure 32. Photograph looking southeast at the south wall of Trench 6.

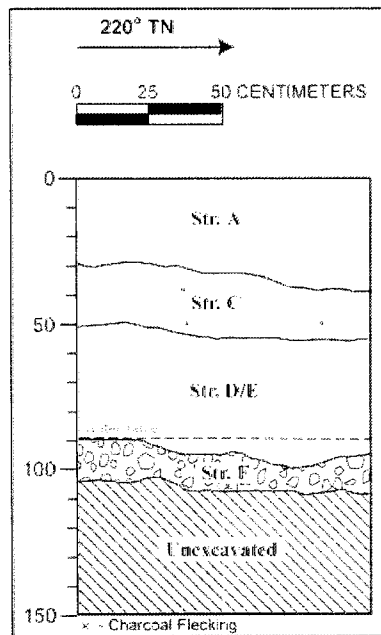


Figure 33. Stratigraphic profile of a section of the south wall of Trench 6.

j. Trench 7

Trench 7 was 7.7 meters long and had an average depth of 1.1 meters. It was excavated in an attempt to find *lo'i* walls in the middle of the project area based upon the previously mentioned aerial photograph overlay. Trench 7 (Figures 34 and 35) contained a perfect example of the three-horizon sequence common to the project area.



Figure 34. Photograph looking south at the stratigraphy of Trench 7.

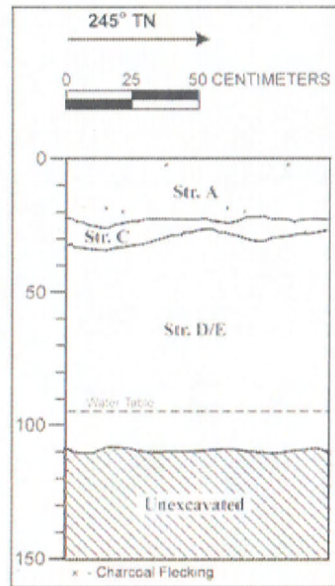


Figure 35. Stratigraphic profile of the south wall of Trench 7.

k. Trench 8

Trench 8 was located for the same reasons as Trench 7 and had a total length of 7.0 meters. Trench 8 averaged 1.2 meters deep. Like Trench 7, Trench 8 (Figures 36 and 37) exhibits the typical three-horizon stratigraphy. In addition, Stratum F is found underneath the fine-grained parent material deposited by multiple flooding events.



Figure 36. Photograph looking north at the stratigraphy found in Trench 8.

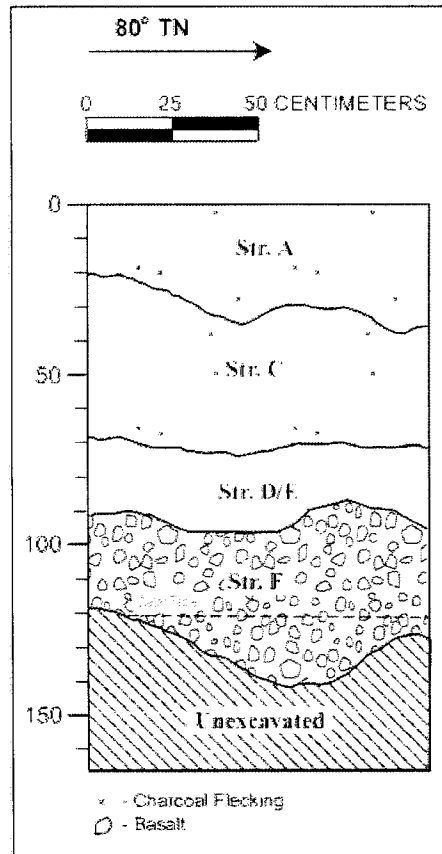


Figure 37. Stratigraphic profile of a section of the north wall of Trench 8.

#### 1. Trench 9

Trench 9 was the longest trench excavated for the inventory survey with a total length of 29.5 meters and it had an average depth of 1.9 meters. It clearly shows the three-horizon stratigraphy for the project area (Figures 38 and 39). This trench and trenches 10 and 11 were all excavated in an attempt to section the *lo'i* walls in the middle of the old pond system. Trenches (9, 10, and 11 are all located in the middle of the old construction base-yard and thus have had the top layer of sediment (Stratum A) removed. In its place is a highly fragmentary asphalt layer and modern construction debris.



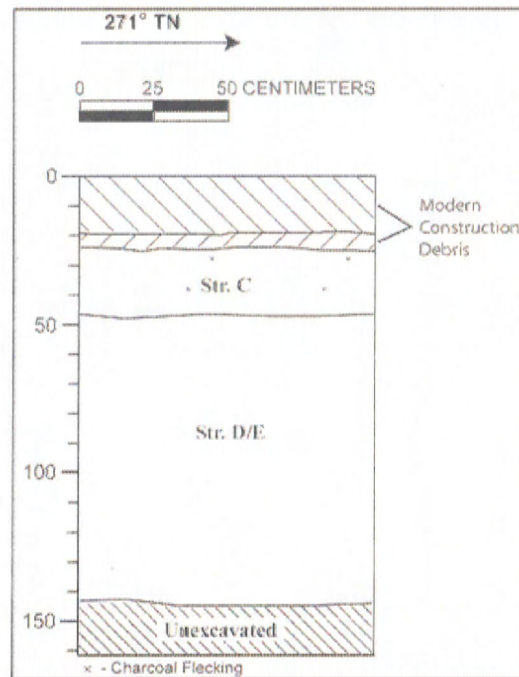
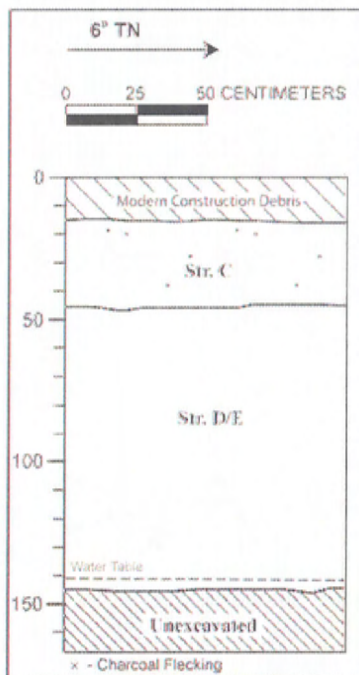


Figure 38. Stratigraphic profile of a section of the south wall of Trench 9.



Figure 39. Photograph looking south at the stratigraphy of Trench 9.

## m. Trench 10



Trench 10 had a total length of 13.5 meters and an average depth of 1.4 meters. This trench also exhibited the three-horizon stratigraphy with the A-horizon having been replaced by construction debris (Figures 40 and 41).

Figure 40. Stratigraphic profile of a section of the west wall of Trench 10.



Figure 41. Photograph looking west at the stratigraphy of Trench 10.

## n. Trench 11

Trench 11 was 1.5 meters long and had an average depth of 1.4 meters. This trench is almost an exact copy of Trench 10 with the A horizon having been replaced by construction debris (Figures 42 and 43).

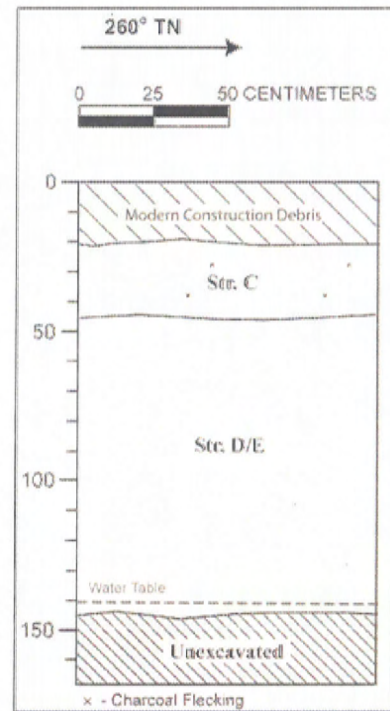


Figure 42. Stratigraphic profile of a section of the south wall of Trench 11.



Figure 43. Photograph looking south at the stratigraphy of Trench 11.

## o. Trench 12

Trench 12 was located just north of Trench 7 and was 9.7 m long. It had an average depth of only 0.9 meters because of the very high water table. Like Trenches 7 and 8, Trench 12 displayed an excellent example of the three-horizon stratigraphy within the project area (Figure 44).

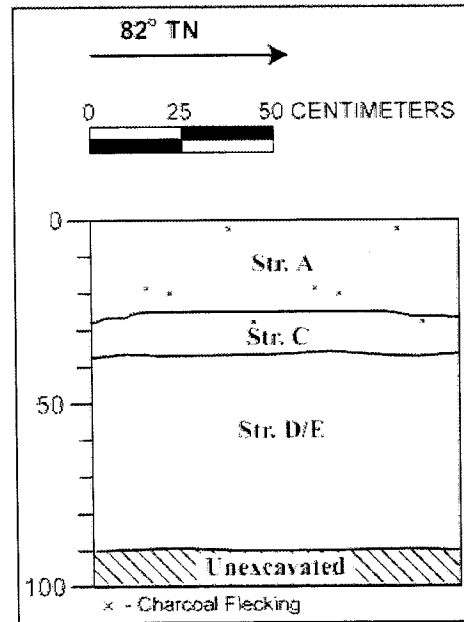


Figure 44. Stratigraphic profile of a section of the north wall of Trench 12.

## p. Trench 13

Trench 13, located north of Trench 9 reflects the stratigraphy of Trenches 9 through 11, but it most closely matches the stratigraphy from Trench 4. The modern construction debris from the base-yard is present, but it is on top of the natural horizons. The base-yard did not scrape off the modern soil in this particular location (Figures 45 and 46).

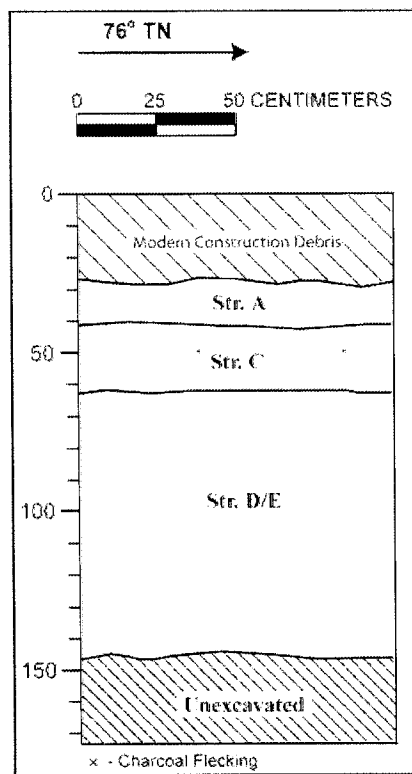


Figure 45. Stratigraphic profile of a section of the north wall of Trench 13.

## q. Trench 14

Trench 14 was excavated in an attempt to find the northern most boundary of Stratum H (SIHP # 50-80-10-6756). Trees and large piles of modern construction debris (e.g., piles of concrete) prevented Trench 5B from extending any farther north than it did. It should be noted that Stratum H was not found in Trench 14 (Figure 7). The total length of the trench was 5.5 meters and it had an average depth of 1.4 meters. Within Trench 14 a previously excavated modern trench that had been back filled with sediment and construction rubble was discovered (Figures 47 and 48).

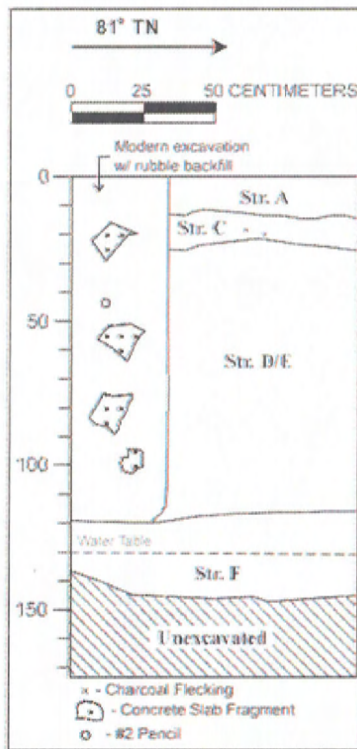


Figure 46. Stratigraphic profile of a section of the north wall of Trench 14.



Figure 47. Photograph looking west showing Trench 14.

### 3. Stripping Areas

Stripping Areas began as an extension of Trenches 5A through 5C. As the large basalt boulders were discovered in Trenches 5A, 5C, and 5D and the field crew began to see stone alignments they instructed the backhoe operator to clear off the A-horizon (Stratum A) and expose the rocks in several locations. The stripping areas were then undertaken in several other locations within the project area in order to expose representative portions of SIHP # 50-80-10-6757. The stripping areas are numbered in the order they were excavated. The locations of the stripping can be seen in Figure 7. A more detailed map of the five stripping areas is shown in Figure 48.

#### a. Stripping Area 1

This area of cleared sediment was approximately 3.0 meters by 10.0 meters (Figure 49). This area shows two parallel lines of embedded basalt boulders. Trenches 5A, 5C, and 5D display the relationship between SIHP #s 50-80-10-6756 and 50-80-10-6757. This will be discussed in more detail below.

#### b. Stripping Area 2

Stripping Area 2 was located to the east of Stripping Area 1. After clearing off the top stratum (A), SIHP # 50-80-10-6757 is clearly visible. Stripping Area 2 was approximately 6.0 meters east-west and 5.0 meters north-south (Figures 50 and 51).

#### c. Stripping Area 3

Stripping area three was located just northwest of the end of Trench 5A (Figure 52) and was 5.5 meters east-west and 4.0 meters north-south. The rock alignment shown in Figures 52 and 53 is the north row of curbstones for SIHP # 50-80-10-6757.

#### d. Stripping Area 4

Stripping Area 4 was approximately 9.5 meters east-west by 5.0 meters north-south. Both the north and the south rows of curbstones can be seen in the plan-view (Figure 54). Several stones are missing from both curbs due to disturbance.

#### e. Stripping Area 5

Closest to the base-yard, Stripping Area 5 has undergone heavy disturbance. Wood, Metal piping, and PVC pipes were found between where the curbstones would have been (Figure 55). The stripping area was approximately 10.0 meters east-west and 6.0 meters north-south.

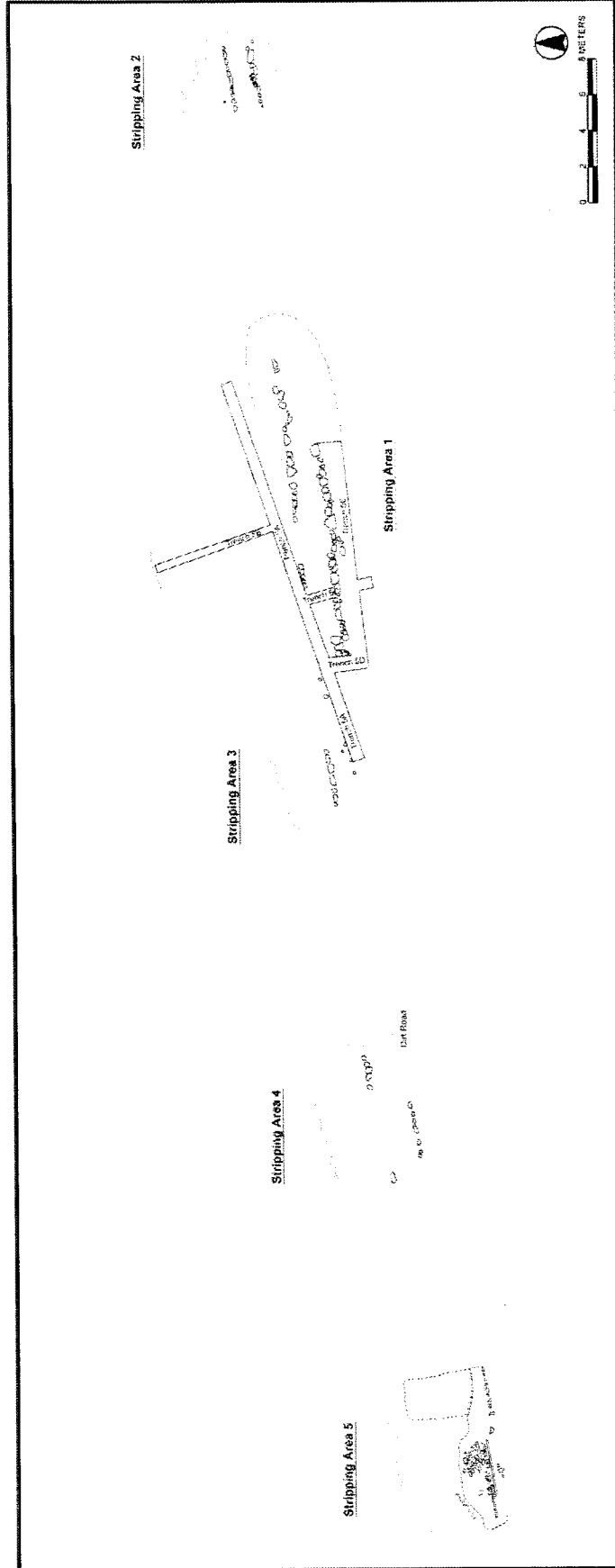


Figure 48. Plan view schematic of the five stripping areas and SIHP # 50-80-10-6757.



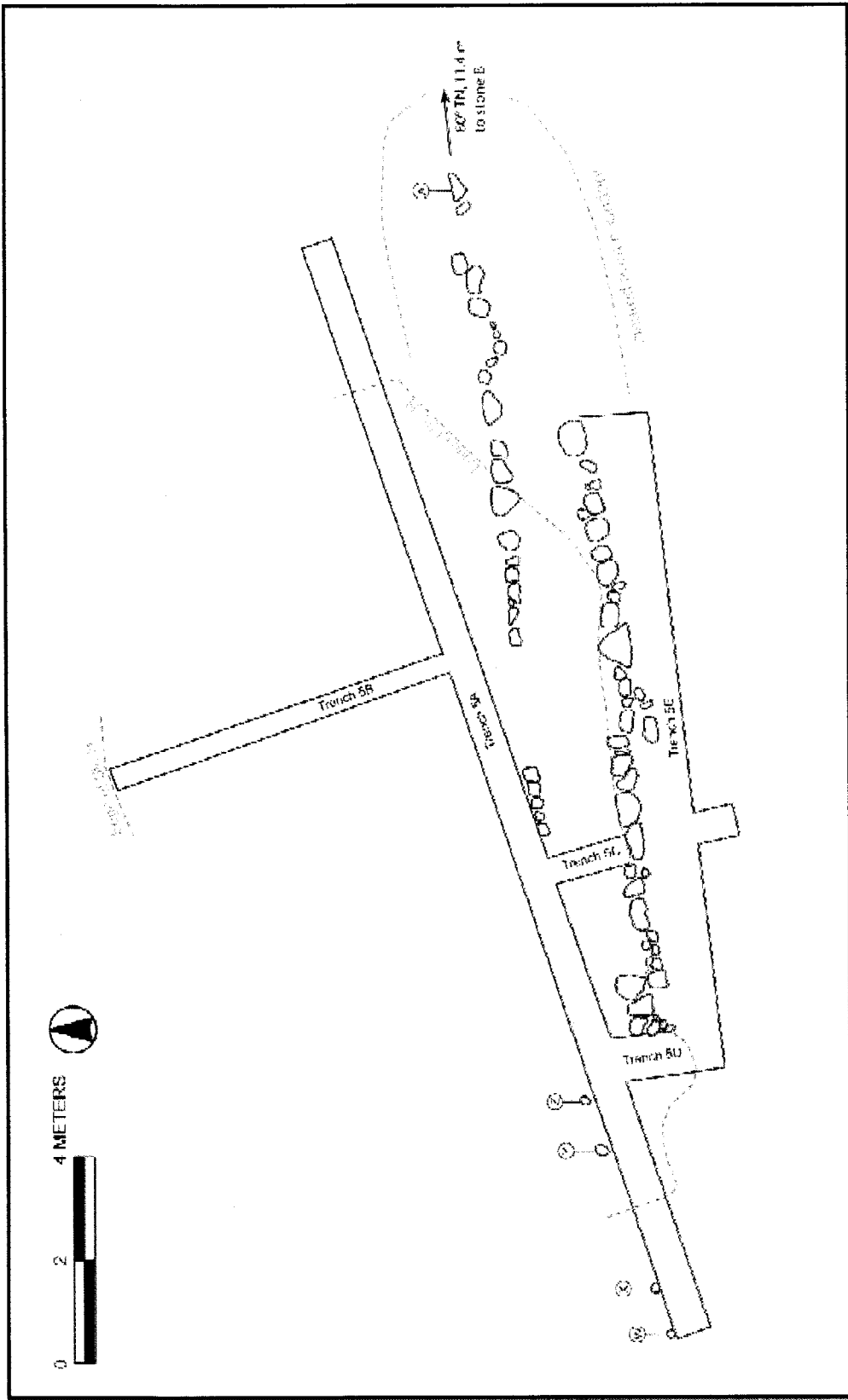


Figure 49. Stripping Area 1 extends to either side of the two rows of basalt stones and from the west end of the stones to about 0.5m beyond the east end of the stones.

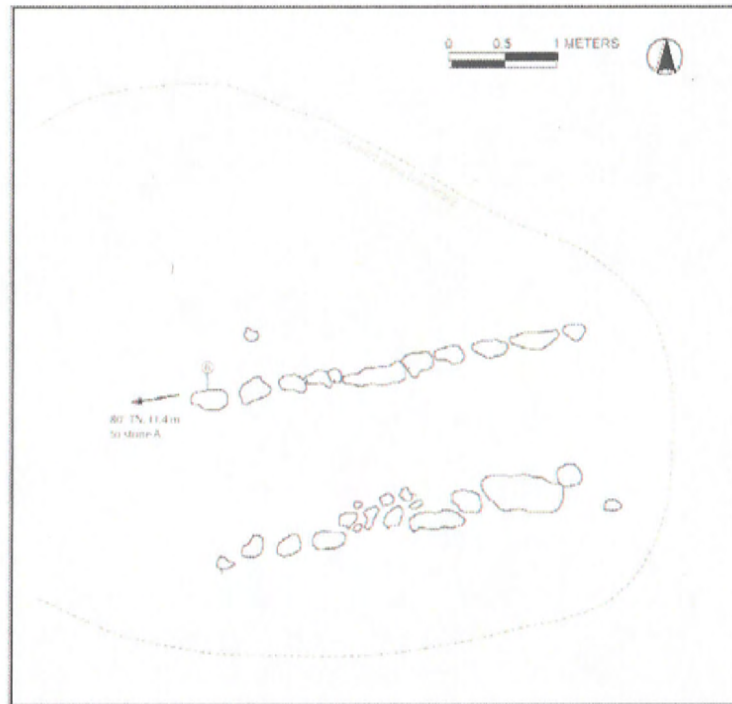


Figure 50. Plan-view schematic of Stripping Area 2 showing part of SIHP # 50-80-10-6757.



Figure 51. Photograph looking east at Stripping Area 2.

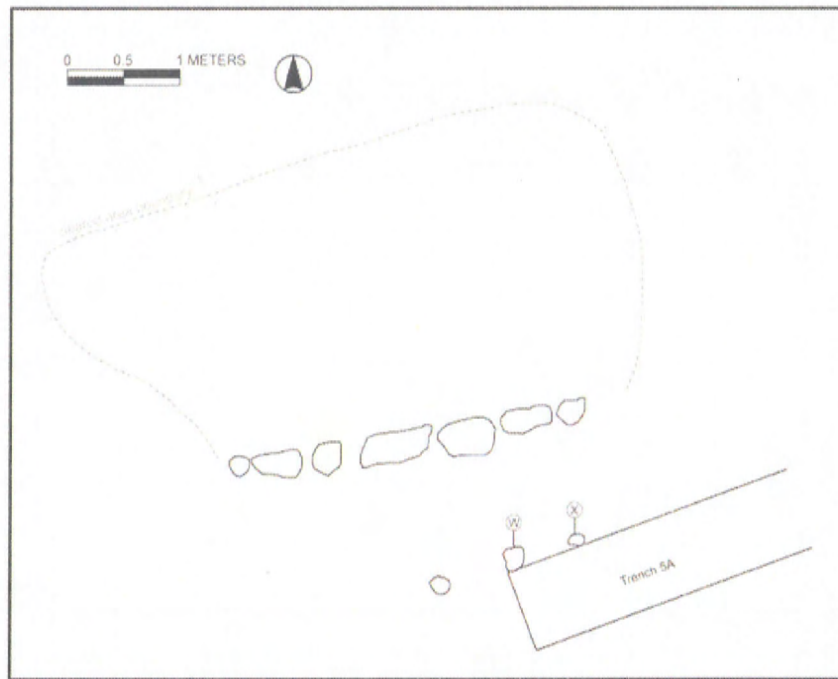


Figure 52. Plan-view schematic of Stripping Area 3 showing the relationship between SIHP # 50-80-10-6757 and Trench 5A.



Figure 53. Photograph looking east showing Stripping Area 3, Trench 5A, and Stripping Area 1.

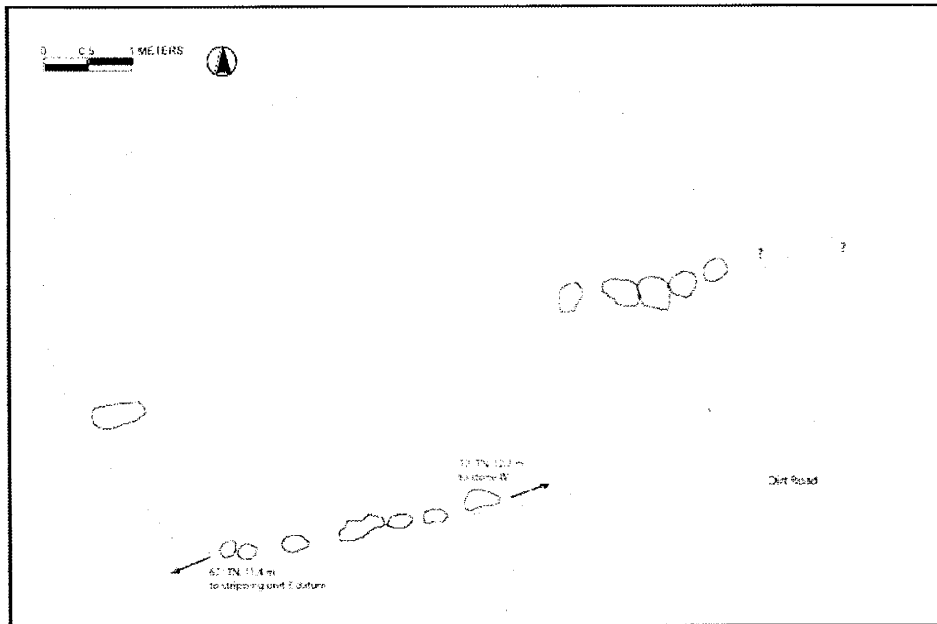


Figure 54. Plan-view schematic showing SIHP # 50-80-10-6757 as exposed in Stripping Area 4.

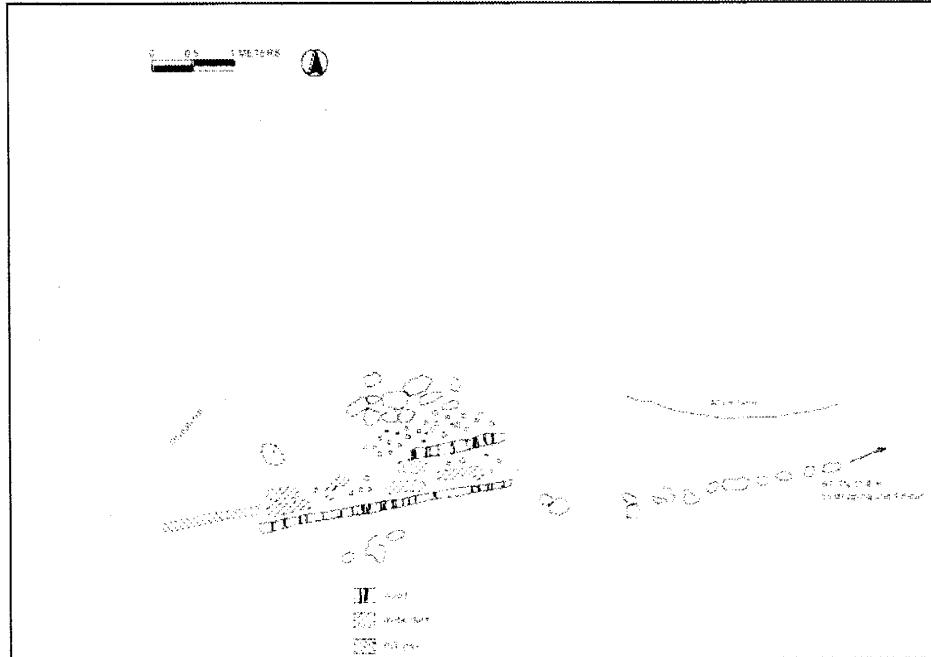


Figure 55. Plan view schematic showing SIHP # 50-80-10-6757 as exposed in Stripping Area 5 and the modern disturbance due to the construction base-yard.

**D. SIHP # 50-80-10-6756**

**SIHP #:** 50-80-10-6756  
**FUNCTION:** Habitation  
**SITE TYPE:** Subsurface structural foundation  
**TOTAL FEATURES:** 1  
**DIMENSIONS:** 13.75 m by 8.25 m  
**CONDITION:** Good  
**AGE:** Pre-historic/historic

SIHP # 50-80-10-6756 is a man-made buried stratigraphic deposit with an irregular shape. It is referred to as Stratum H throughout this document. Through limited backhoe testing it has been determined that the deposit is 13.75 meters long oriented northeast-southwest and at least 8.25 meters oriented north-south. The cross sections of the site were drawn during the documentation of trenches 5A, 5B, 5C, and 5D. The currently known extent of SIHP # 50-80-10-6756 can be seen in Figure 48. It ranges in thickness from 20-50 centimeters (Figure 56).



Figure 56. Photograph looking northwest at the sidewall of Trench 5A showing the thick band of clay sediments with cobble inclusions that is SIHP # 50-80-10-6756.

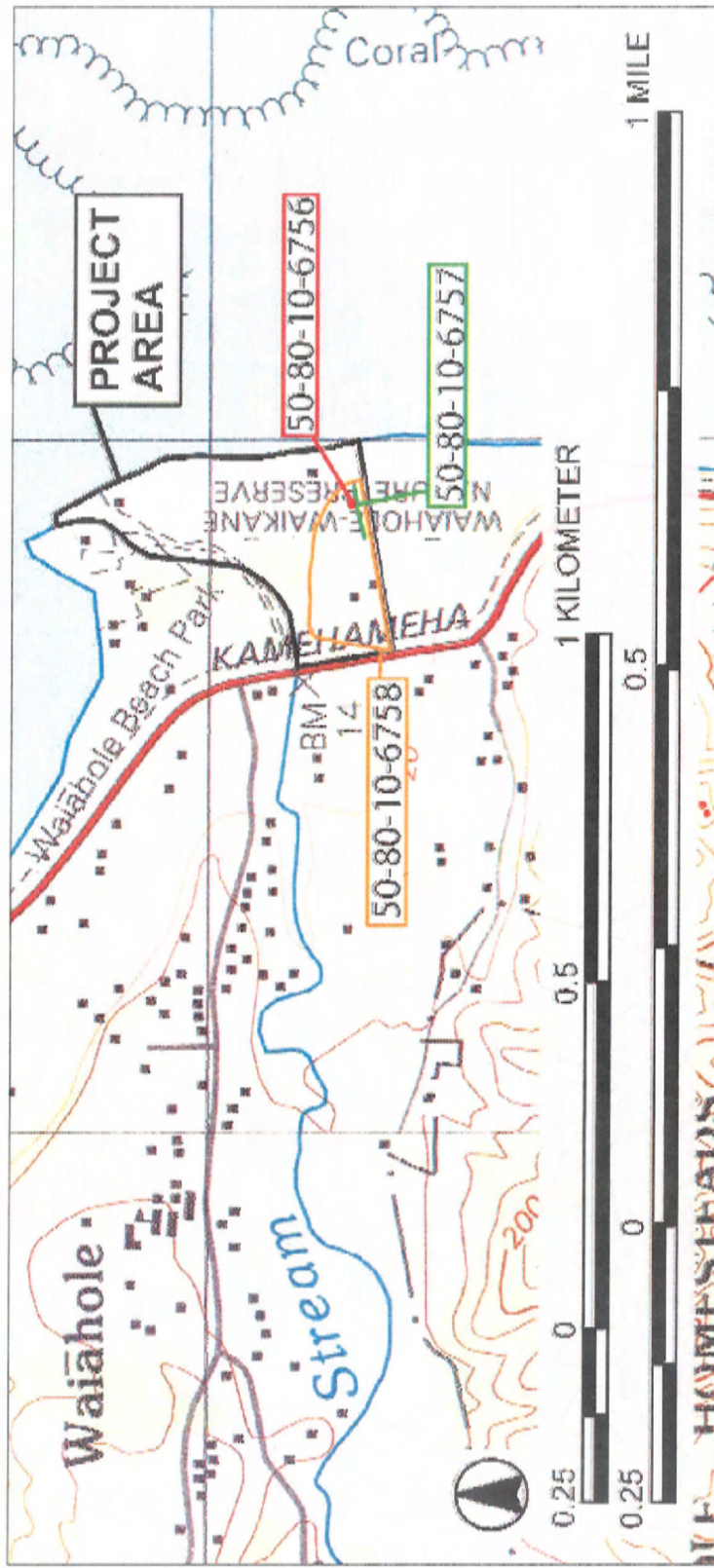


Figure 57. 1998 USGS topographic map (1:24,000) showing the locations of SIHP #s 50-80-10-6756, 50-80-10-6757, and 50-80-10-6758.



Figure 58. Photograph looking southeast showing the stratigraphic relationship between the three SIHP #s (50-80-10-6756, -6757, and -6758) within the project area.

The layer described as 10 YR 3/2, very dark grayish brown; very cobbly, gravelly, clay; structureless, friable moist consistency; plastic; no cementation; abrupt wavy lower boundary. The lack of sands and gravels within this layer indicates that the stratum was not deposited through natural mechanisms. As is shown in Figure 24, this site was not visible on the ground surface at the time of the pedestrian survey. It was buried underneath a 20 cm thick layer soil (Strata A and B). Sandwiched between SIHP #s 50-80-10-6758 and 50-80-10-6757, SIHP # 50-80-10-6756 is younger than the agricultural growing surface, but older than the historic road (Figure 58). The location of the three sites within the project area can be seen in Figure 56.

The only artifacts that were found during on site excavation were three basalt flakes and an adze blank. A total of 18 gallons of sediment were wet screened through 1/8-inch mesh back at the CSH laboratory. These bulk sediment samples were collected from both the north and south walls of Trench 5A. Within this layer (Stratum H), basalt flakes, volcanic glass flakes, *kukui* nut shells, marine shell, animal bone, and charcoal were found in the samples collected for wet screening (Table 4). The artifacts recovered did not sufficiently represent their respective types, and thus did not warrant inclusion in this report.

There was no evidence of significant disturbance to the site in the several trenches from which it was visible. Part of SIHP # 50-80-10-6757 overlies the southern edge of SIHP # 50-80-10-6756 (Figures 48 and 58). There is no evidence that SIHP # 50-80-10-6757 bisects SIHP # 50-80-10-6756 because stratum H did not continue anywhere to the south of the southern row of curbstones.

Table 4. Catalogue of materials recovered during subsurface testing.

Bag #	Trench	SIHP # 50-80-10	Stratum	Wall (N,S,W,E)	Sample (Top or Bottom)	Depth (cmb)	# pieces	Length (cm)	Width (cm)	Thickness (cm)	Weight (g)	Material	Function	Comments
1	5A	-6756	H	N	top	40-50	1	1.6	1.7	0.3	3.9	basalt	flake	
2	5A	-6756	H	N	top	40-50	1	0.6	0.5	0.1	0.4	v-glass	shatter	
3	5A	-6756	H	N	top	40-50	14				1.6	charcoal	none	
4	5A	-6756	H	N	top	40-50	5	2.3-6.4	1.5-5.2	1.6-3.2	453.6	basalt	FCR	
5	5A	-6756	H	N	bottom	60-75	6				1.3	charcoal	none	
6	5A	-6756	H	N	bottom	60-75	4	1.2-2.9	1.1-2.3	0.1-0.9	22.4	basalt	flakes	
7	5A	-6756	H	N	bottom	60-75	4	2.4-8.5	1.8-5.2	1.7-3.5	765.4	basalt	FCR	
8	5E	-6756	H	N		50-60	2	2.3	1.2	1.7	3.6	kukui nut		plotted in-situ
9	5A	-6758	C	N		95	3	2.7	1.6	0.8	6.4	kukui nut		plotted in-situ
10	5B	-6756	H	W		30	1	2.5	1.7	0.7	7.1	basalt	flake	
11	5A	-6758	C	N		90	1	6.1	4	1.5	94.7	basalt	flake	
12	5E	-6756	H	N		50-60	3	4.5	4	1.4	101.5	basalt	flake	under stone alignment
13	5E	-6757	C	N		c. 70	3	4.0-12.0	1.5-1.7	0.1-1.6	47.9	wire/leather		misc. historic from Strip Area 1
14	5A	-7658	C	N		80	1	4.7	3.4	0.4	24.3	basalt	flake	
15	5A	-6756	H	S	bottom	60-75	1	1.2	0.6	0.5	0.7	charcoal	none	
16	5A	-6756	H	S	bottom	60-75	6	0.7-6.1	0.3-3.3	0.2-1.2	54	basalt	flake	
17	5A	-6756	H	S	bottom	60-75	1	17.5	9.2	9	2211.3	basalt	adze blank	
18	5A	-6756	H	S	bottom	60-75	10	3.4-10.3	2.1-6.7	2.0-5.5	2381.3	basalt	FCR	
19	5B	-6758	C	W		47-63	23				1.5	charcoal	none	
20	5B	-6756	H	W		30-40	4	2.7-6.8	2.0-5.7	1.3-3.9	283.5	basalt	FCR	
21	5A	-6756	H	S	top	40-50	2	1.1-2.3	0.7	0.7	5.1	metal	square nails	
22	5A	-6756	H	S	top	40-50	2	0.5-1.3	0.4-0.9	0.1	0.4	shell	food	
23	5A	-6756	H	S	top	40-50	2				1.4	charcoal	none	
24	5A	-6756	H	S	top	40-50	1	1.4	0.8	0.2	0.8	animal bone	food	
25	5A	-6756	H	S	top	40-50	2	1.0-1.6	0.6-1.2	0.4-0.9	3.5	coral	?	
26	5A	-6756	H	S	top	40-50	1	0.6	0.4	0.1	0.4	v-glass	shatter	
27	5A	-6756	H	S	top	40-50	4	1.9-10.3	1.9-5.9	0.3-4.7	566.9	basalt	flakes	



It is likely that this site was used as a structural foundation for one or more buildings. The variety of cultural materials found within the matrix of the foundation indicate that the most likely use of the foundation was for habitation purposes.

*Kukui* nuts were extracted from Stratum C directly under the structural foundation. In the vicinity of SIHP # 50-80-10-6756, relatively abundant *kukui* nut shell and whole nuts were found within the agriculturally modified Stratum C – a component of SIHP # 50-80-10-6758, described below. Handy and Handy report that *kukui* nut branches and leaves were commonly used by Native Hawaiian agriculturalists as “green manure” to enrich their taro soil (Handy and Handy 1972:89). These abundant *kukui* nut may be an indication of this “green manure” practice.

One whole *kukui* nut from Stratum C was submitted to Beta Analytic for AMS radiocarbon dating. A conventional radiocarbon age of  $340 \pm 40$  years before present (BP) was returned by Beta Analytic. The lab’s complete report can be found in Appendix C. Using OxCal version 3.5, a program designed for calibrating radiocarbon dates into calendar ages, it was determined that there is a 95.4% probability that the actual age of the *kukui* nut is between AD 1450 and AD 1650.

These results indicate that the occupation and use of the area was taking place before the arrival of Europeans in the Hawaiian Islands. It also suggests that SIHP # 50-80-10-6756 was originally constructed in prehistoric times. The presence of both prehistoric and historic artifacts (square nails) within the habitation platform also makes it likely that the platform was utilized through later prehistory and into the early historic period.

EcoPlan Associates examined a sediment sample for pollen and micro-charcoal content (Appendix B). Cyperaceae (sedge family) dominated the sample from this sample making up 86 percent of the assemblage. The second most abundant family is Poaceae (grass family), which contributed 5% to the total pollen count. No Polynesian introductions were identified in the sample. The charcoal concentration of more than 33 mm squared per cc of sediment indicates vegetation clearance and field maintenance in the Wāiahole watershed. The combination of opportunistic sedges and grasses and a high charcoal concentrations indicates that the area was being subjected to regular human disturbance. The lack of pollen from Polynesian introductions is likely due to poor pollen preservation, with only the “hardier” sedges and grasses represented.

SIHP # 50-80-10-6756 is recommended to the National and Hawai‘i Registers under criterion D<sup>2</sup> for its information content.. The stratigraphic position, recovered artifacts, and radiocarbon dating results from this site all combine to provide important details about both the prehistoric and historic use of the area and the changes that took place over time. Both prehistoric and historic artifacts have been found within the site and it is likely that further excavation could provide more information as to the pattern of use of the site itself as well as contextual information about the region as a whole. This includes both agricultural and habitation practices.

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<sup>2</sup> Eligibility for listing on the Hawai‘i State and National Register is evaluated based on the following broad criteria: “A” site reflects major trends or events in the history of the state or nation; “B” site is associated with the lives of persons significant in our past; “C” site is an excellent example of a site type/work of a master; “D” site has yielded or may be likely to yield information important in prehistory or history; and, “E” (State Register only) site has traditional cultural significance to an ethnic group; includes religious structures and/or burials.

**E. SIHP # 50-80-10-6757**

<b>SIHP #:</b>	50-80-10-6757
<b>FUNCTION:</b>	Transportation
<b>SITE TYPE:</b>	Road
<b>TOTAL FEATURES:</b>	1
<b>DIMENSIONS:</b>	68 m by 2 m
<b>CONDITION:</b>	Good
<b>AGE:</b>	Historic

SIHP # 50-80-10-6757 is comprised of two parallel rows of angular basalt boulders embedded into the sediment (Figure 48). The five separate sections of the site found within the five stripping areas were mapped using standard tape and compass techniques.

The curbstones averaged 40x50x30 cm in size. The total distance of exposed stones is 68 meters, although the feature may extend beyond these dimensions. The average width between the two rows of stones is two meters (Figure 50). A 20 cm thick layer of soil (Stratum A) covered the entire site. Because of this there were no visible signs of this site on the modern ground surface during the pedestrian survey.

In most areas the curbstones are made up of only one course. Within Stripping Area 1, where SIHP # 50-80-10-6757 overlies SIHP # 50-80-10-6756, the southern row of stone is two courses high where they abut the edge of the structural foundation. The site was likely constructed this way in order to create a level road surface in this area.

Some historic artifacts such as shoe leather and metal wires (Table 4) were found in the sediments between the two rows of curbstones in Stripping Area 1. The physical layout of site 50-80-10-6757 indicates that it is most likely a historic road. It was likely used as a means to move agricultural materials to and from the pond fields, and connect the coast with interior areas, during the historic period.

Based on its physical characteristics this road segment would best be described as a "type C" trail following the trail typology of Apple (1965). Type C trails were generally constructed between 1841 and 1918 and consist of parallel alignments of curbstones. Local labor forces constructed type C trails to improve transportation on foot and by horse and mule. Often type C trails were "up-graded" to type D trails with improvements to support wheeled vehicles. This appears to be the case with SIHP # 50-80-10-6757. The roadways width and straightness would have supported traffic by mule, horse, or oxen driven carts. Based on available evidence, including the artifacts found in association with the road, it is likely that the road was constructed in the late 19<sup>th</sup> or early 20<sup>th</sup> centuries.

SIHP # 50-80-10-6757 is recommend for eligibility to the National and Hawai'i Registers under criteria C and D of the HAR. The road represents a substantial input of time and labor and thus is representative of historic period land use patterns in relation to pond field agriculture during historic time periods.

**F. SIHP # 50-80-10-6758**

<b>SIHP #:</b>	50-80-10-6758
<b>FUNCTION:</b>	Agriculture
<b>SITE TYPE:</b>	Former pond field area
<b>TOTAL FEATURES:</b>	3 currently identified
<b>DIMENSIONS:</b>	230 m by 100 m
<b>CONDITION:</b>	Good
<b>AGE:</b>	Pre-historic/historic

SIHP # 50-80-10-6758 consists of three features discovered during investigations: A) Stratum C, and old agricultural surface, B) an earthen berm, and C) an *'auwai* (refer to Figures 7 and 57). The three features were part of what was once a series of *lo'i*, or *taro* pond fields within the project area. Pond fields have been documented extensively throughout Waiāhole Valley (Griffin and Pyle 1974; Handy and Handy 1972, Kikuchi 1963; Miyagi 1963). The archaeological features encountered during this inventory survey make up a small portion of this larger agricultural complex.

**Feature A) Subsurface Agricultural Stratum**

SIHP # 50-80-10-6758 is principally comprised of Stratum C, which is the old agricultural surface that made up the pond fields and was used for growing taro. Through subsurface testing Stratum C was found to extend for approximately 230 meters in an east-west orientation and 100 meters in a north-south orientation (Figure 57). Stratum C most likely extends beyond where it was positively identified by CSH personnel.

Stratum C is best described as: 10 YR 3/2, very dark grayish brown mottled with 10 YR 5/6, yellowish brown; clay; structureless, firm moist consistency; very plastic; no cementation; abrupt wavy lower boundary. This is the agricultural layer that made up the growing surface of the *lo'i*. However, Stratum C is not a purely homogeneous layer.

The characteristics of Stratum C vary across the project area. When Figures 12, 14, 16, etc... are examined, Stratum C is shown to range in thickness from 20 to 50 cm. Under the construction base yard (Figure 7) the stratum averages 25 cm in thickness and contains only light charcoal flecking. Beneath and around the overlying structural foundation (SIHP # 50-80-10-6756) the stratum is 40-50 cm thick and the charcoal flecking is heavier. The stratum contains natural inclusions such as semi-rounded basalt gravels and small cobbles. It also contains artifacts. The most abundant type of artifact found in Stratum C around the structural foundation was basalt flakes (Table 4). As discussed above *kukui* nutshells and whole *kukui* nuts were found in the upper portions of Stratum C underneath the structural foundation (SIHP # 50-80-10-6756).

A *kukui* nut was selected from Stratum C out of Trench 5A and submitted to Beta Analytic for AMS <sup>14</sup>C dating. As discussed above, the results of this analysis were that there was a 95.4% probability that the *kukui* died between AD 1450 and AD 1650. This indicates that the agricultural surface portion of SIHP # 50-80-10-6758 was first established at least by the later part of Hawaiian prehistory. It also provides an earliest possible date for all sediment layers and

features that are stratigraphically above Stratum C, for example the sediments that make up SIHP # 50-80-10-6756.

A sediment sample was also collected from this layer from the side wall of Trench 5B and submitted for pollen analysis and micro-charcoal quantification. No pollen from Polynesian introduced plants was discovered, but it was determined from the large quantities of Poaceae pollen that there area had undergone heavy modification by humans (See Appendix B). The microcharcoal concentration also reflected vegetation clearance (burning) and/or and field maintenance in the Waiāhole watershed.

Feature B) Raised Earthen Berm

During the pedestrian inspection a berm (Figure 59) that runs roughly parallel to Kamehameha Highway was discovered approximately 50 meters east of the highway. The berm extends for approximately 66 meters north-south. The earthen berm was recorded with the Trimble GPS unit and displayed on a georeferenced modern aerial photograph (Figure 7). An aerial photograph taken in 1949 (Figure 5) also shows a raised berm, which at the time was separating two *lo'i*. This berm is also oriented roughly parallel to Kamehameha Highway. Comparison of these two Figures (5 and 7) shows that it is quite possible that the berm discovered during the pedestrian survey is the same large pond wall immediately east of Kamehameha Highway as observed in the 1949 aerial photograph (Figure 5).

The berm is earthen, with a few sub-angular basalt cobbles scattered along its upper surface. It is approximately 2-3 meters wide. It retains a level surface to the west and is 50-70 cm higher in elevation than the level land surface to the east of the berm. The dense vegetation within the project area prevented field personnel's ability to photograph the berm.

Feature C) 'Auwai remnants

The remnants of an 'auwai begin from a culvert that runs underneath Kamehameha Highway (Figure 60) at the southwestern corner of the current project area (Figure 7). This is likely the same 'auwai that is depicted on the Dove 1897 map (Figure 10). Based on survey results, the 'auwai no longer extends more than 120 meters into the project area, as depicted on the Dove 1897 map (Figure 10). The 'auwai is an earthen ditch that averages 50-70 cm wide (interior dimensions) and 20-40 cm deep (Figure 61). While the 'auwai was dry at the time the field work was conducted, at one time it would have carried the water that was used for the *lo'i*.

SIHP # 50-80-10-6758 is recommended for eligibility to the National and Hawai'i Registers under criterion D for its informational content. The wetland pond-fields within the project area are a small portion of the larger agricultural system that once filled much of Waiāhole Valley (see discussion of Barrera 1982 on page 29 of this report). The extensive pond fields have been documented broadly in the form of traditional Hawaiian tales and mythology, Land Commission Awards, previous archaeological research as well as the fact that there still numerous *lo'i* under production within the valley today. However, because there has been extensive disturbance in the project area, it appears that many of the typical surface features, such as the pond walls and trail features, have been largely obliterated. Because of this, SIHP # 50-80-10-6758 does not possess the necessary integrity to convey its significance thus preventing it from being deemed significant under criterion A (broad pattern of history).

Those portions of the site that have not been disturbed (e.g. the agricultural growing surface itself), have previously, and are likely to yield information important for research into both

historic and prehistoric agricultural land use studies and how land use may have changed over time. For these reasons SIHP # 50-80-10-6758 is recommended for eligibility to the National and Hawai'i Registers to the under criterion D.

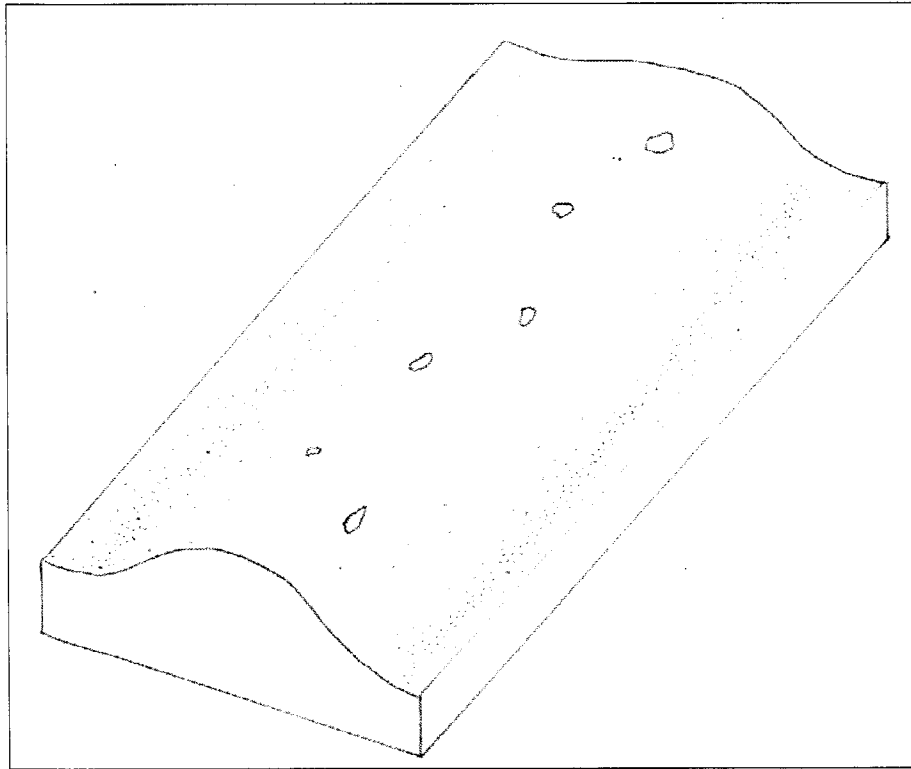


Figure 59. A schematic showing a representative section of the berm found within the project area (a component feature of SIHP # 50-80-10-6758).



Figure 60. Photograph looking southwest at the culvert under Kamehameha Highway where the *'auwai* (SIHP # 50-80-10-6758) begins in the project area.



Figure 61. Photograph looking east at the *'auwai* (SIHP # 50-80-10-6758) in the project area.

### G. Cultural Consultations

Matt McDermott and Owen O'Leary interviewed Pat and Joe Royas, long time residents of Waiāhole, at The Poi Factory at the corner of Waiāhole Valley Road and Kamehameha Highway over lunch on December 8, 2004. They informed us that the Picanso family lived across Kamehameha Highway from the current project area and that they farmed in the project area up until the mid 1960s. At that time they swapped land with the City and County of Honolulu and in exchange for the land in the current project area they received a parcel of land farther back in Waiāhole Valley. Pat and Joe also indicated that a landscaping company used the portion of the project area closest to the highway as a base-yard. There are numerous abandoned vehicles still in the project area from the base-yard.

Project area resident Larry Cabbab informed Owen O'Leary and Matt McDermott that he had lived at two different locations within the project area for a total of 21 years. His residence is currently located at the northern tip of the project area at the mouth of Waiāhole Stream. Mr. Cabbab also indicated that a portion of the project area was used as a construction base-yard during the late 1980s. He thought that 1987, in particular, was the year of the heaviest use.

Mr. Cabbab also spoke about how the property has been used by criminals over the last several years as a dumping site for stolen vehicles that have had all of the useful parts removed from them.

Through Pat and Joe Royas Matt McDermott and Owen O'Leary were put in contact with the Waiāhole-Waikāne Community Association and met with them on the evening of January 11, 2005. In attendance were Guy Nakamoto, Hanaeh Sala, Bernie Paaoncial, Jae Paaoncial, Sas Lopes, Mel Cabral, Joe Royas, Pat Royas, Bernie Lan Ho, Madonna Kauhokapu-Meria, Jean Davidson, Robert Capella, and Bob Nakata. The association was presented with our findings up to January 11, which included the three sites discussed above, but not the radiocarbon results or the pollen analysis information. The association was also informed of CSH's recommendations for the three sites outlined within this document.

Several members of the association were able to provide us with information about the project area. According to Mr. Lan Ho, another long time resident of Waiāhole Valley, the project area had always been under *taro* cultivation and never used for rice. He also talked about how there had once been a water flume on the south side of Waiāhole Stream just *mauka* of the bridge. He indicated that this was where most of the water came from that was used to grow *taro* in the current project area. No remnants of this flume structure were found within the current project area during this investigation. Many of the attendees at the meeting noted that the water level in Waiāhole Stream had dropped markedly over the years.

Overall the association had a positive reaction to the recommendations CSH's has put forth for the three historic properties and felt that the steps would be sufficient mitigation measures for the historic properties. No additional archaeological historic properties were identified as a result of the consultation process.

## VI. INVENTORY SURVEY SUMMARY

Cultural Surveys Hawai'i Inc., at the request of the City and County of Honolulu has completed an inventory survey of an approximately 9-acre parcel south of Waiāhole Stream and east of Kamehameha Highway within Waiāhole Ahupua'a, Ko'olaupoko District, O'ahu Island.

Cultural and historical background research was undertaken in addition to the archaeological fieldwork. This background research included, but was not limited to, a review of past archaeological studies in the region, oral interviews with knowledgeable local informants, and historic document searches. Document searches included aerial photographs, historic maps extending back to the early 20<sup>th</sup> century, and Māhele records. Previous historic preservation documentation of the parcel includes Bushnell *et al.* (2002), Walsh *et al.* (1995), and AECOS (1995). A number of other archaeological studies that have been conducted within Waiāhole Valley (Barrera 1982, 1984a, 1984b, 1984c; Dye *et al.* n.d.; Griffin 1990; Hammatt *et al.* 1987; Hammatt *et al.* 2002; Kawachi and Kikuchi 1964; Tomonari-Tuggle 1983a, 1983b; Tomonari-Tuggle and Tuggle 1984) were examined as well.

Accounts by authors such as Pukui (1983) and Kamakau (1869) describe land usage, and the attitude and values of the people previously living in the Waiāhole region. There is a particularly strong focus on *taro*. *Taro* continues to be grown in valley today in much the same way as it was when native Hawaiians first settled there. At least part of the project area was under taro cultivation up until the 1960s. The section of the project area closest to Kamehameha Highway was used as a construction base-yard in the late 1980s and the area has remained unused since.

Three historic properties were discovered within the project area: 50-80-10-6756, 50-80-10-6757, and 50-80-10-6758. Site 50-80-10-6756 is a structural foundation. Both lithic and midden materials, as well as two small pieces of square nail were recovered from within the foundation indicating that it was most likely used for habitation purposes. A *kukui* nut recovered from beneath the foundation was submitted for Beta Analytic and returned a date of AD 1450 to 1650. The platform may have been constructed prior to the arrival of Europeans and the various artifacts suggest that it was utilized throughout the late prehistoric and early historic periods.

SIHP # 50-80-10-6757 is a historic road that partially overlies, and thus post-dates, SIHP # 50-80-10-6756. The road is demarcated by two rows of large basalt boulders that run in a roughly east-west direction. The artifacts found between the curbstones and the construction style indicates that this site is from the historic period. This site appears to have been disturbed by the base-yard that was located within the project area during the late 1980s.

SIHP # 50-80-10-6758 is what remains of the old agricultural pond field system. Most of the surface features, such as *lo'i* walls and trails, have been obliterated, but some features such as the berm and *'auwai*, as well as much of the old agricultural surface, still remain.

Portions of the project area are covered in dense, ground obscuring vegetation where it was not possible to observe surface archaeological features. Additionally, because subsurface testing was restricted to areas where backhoe access was possible through this dense vegetation, it is possible that there might be additional, as yet undocumented, surface and/or subsurface features within the project area. These could be as yet undocumented features of SIHP # 50-80-10-6758, or features from some other undocumented archaeological site. For this reason, a program of archaeological monitoring is recommended for the proposed project; refer to the discussion below.



## VII. SIGNIFICANCE ASSESSMENTS

The inventory survey investigation and documentation of the project area's three historic properties have provided sufficient information for significance evaluations. Significance is determined after evaluation of each historic property in light of the five broad criteria used by the National and Hawai'i State Registers of Historic Places. Criteria A-D apply to both the National and State Registers; criterion E applies only for significance evaluations to the State Register. The criteria are the following:

- A Historic property reflects major trends or events in the history of the state or nation.
- B Historic property is associated with the lives of persons significant in our past.
- C Historic property is an excellent example of a site type.
- D Historic property has yielded or may be likely to yield information important in prehistory or history.
- E Historic property has cultural significance to an ethnic group, including, but not limited to, religious structures, burials, and traditional cultural properties.

SIHP # 50-80-10-6756, the most likely prehistoric/early historic structural foundation, is recommended eligible to both the State and National Registers under criterion D, for its informational content. The feature's stratigraphic position, recovered artifacts, and radiocarbon dating results all combine to provide important details about both the prehistoric and historic use of the area and the changes that took place over time. This includes both agricultural and habitation practices.

SIHP # 50-80-10-6757, the historic road segment, is recommend eligible to both the State and National Registers under criterion D, for its informational content. This remnant roadway represents a substantial input of time and labor. It is representative of historic period land use and transportation patterns. In its current condition, buried by approximately 10-20 cm of sediment, the roadway remnant is a subsurface archaeological feature that is only important for its archaeological information. With proper excavation and exposure, the roadway would likely have sufficient integrity to convey its historic significance under State and National Register criterion C, as an excellent example of a site type—namely rural curbstone roadways constructed in the late 19<sup>th</sup> and early 20<sup>th</sup> centuries. Under federal historic preservation legislation, the properly excavated and exposed SIHP # 50-80-10-6757 would most likely “embody the distinctive characteristics of a type, period, or method of construction” (part of the definition for significance under criterion C listed in 36 CFR Part 60.4). Accordingly, it is recommended that management decisions for this historic property be made in consideration of the properties significance under State and National Register criteria C and D.

SIHP # 50-80-10-6758 is best considered a geographic component of an agricultural district that includes nearly all of the ahupua'a of Waiāhole. As noted previously, back in early 1980s Barrera suggested, “the entire valley of Waiāhole is probably eligible to the State and National Registers of Historic Places as an archaeological district” (Barrera 1982:3). This observation was made in consideration of the numerous traditional accounts of the area's agricultural productivity

and the numerous remnant and in-use agricultural fields and irrigation features. This archaeological district would most likely also include the *ahupua'a*'s prehistoric quarries and habitation sites. Although a Waiāhole archaeological district does not yet exist, if it did the district would likely be eligible to the State and National Registers under criteria A, C, and D.

There is abundant evidence from traditional Hawaiian legends, historical accounts, Land Commission Awards, and historic maps and aerial photographs, that the current project area was once largely covered with pond fields. Based on the information obtained through the project's consultation efforts, these pond fields were always used for taro cultivation, not for rice. However, because there has been extensive disturbance in the project area, it appears that nearly all of the surface features for a typical pond field agricultural complex, such as the pond walls, terraces, embankments, irrigation ditches, and trail features, have been largely obliterated. Based on the results of the current inventory survey, only scattered, largely disarticulated remnants, including an earthen berm, a segment of 'auwai, and subsurface agriculturally modified soil layers, have survived the project area's modern land use. Because of this, SIHP # 50-80-10-6758 does not possess the necessary integrity to convey its historic significance under State and National Register criteria A and C.

Although SIHP # 50-80-10-6758 has been largely altered by modern land use, it does contain important archaeological information pertinent to both historic and prehistoric agricultural land use. Accordingly, SIHP #5 0-80-10-6758 is recommended eligible to both the State and National Registers under criterion D, for its information content.

### VIII. UNDERTAKING EFFECT RECOMMENDATION

Excavation of large areas for the construction of modern pond fields will likely destroy portions of SIHP # 50-80-10-6758 (prehistoric/historic agricultural infrastructure). The excavation of large areas in other portions of the project area to create areas of standing water for wetland rehabilitation will potentially destroy SIHP #s 50-80-10-6756 (structural remnant) and 50-80-10-6757 (historic road alignment), depending upon where those excavations are located. Accordingly, under federal historic preservation legislation (36 CFR Part 800), an undertaking-specific effect determination of “adverse effect” is warranted for the proposed *lo‘i* and wetland restorations at the City’s Waiāhole Beach Park. In compliance with Section 106 of the National Historic Preservation Act, a determination of “adverse effect” requires the development of a Memorandum of Agreement (MOA) for the proposed undertaking. This MOA should be developed in consultation among the City, SHPD, USACE as the undertaking’s lead agency, any other stake-holding federal agencies, concerned consulting parties, and the Advisory Council on Historic Preservation (should they choose to participate). Under Hawai‘i State historic preservation review legislation (HAR 13-275) a project effect recommendation of “effect with proposed mitigation commitments” is warranted.

## IX. MITIGATION RECOMMENDATIONS

In order to alleviate the proposed undertaking's adverse effect on properties recommended eligible to the National and Hawai'i Register, CSH offers the following mitigation recommendations. If found acceptable, these mitigation recommendations should be incorporated into the undertaking's Memorandum of Agreement. The proposed *lo'i* and wetland restoration should be designed to avoid and preserve SIHP # 50-80-10-6756 (structural remnant) and SIHP # 50-80-10-6757 (historic road alignment). These sites are located along the boundaries of the proposed *lo'i* and wetland restoration and their avoidance should not unduly complicate the proposed restoration's design and layout. SIHP # 50-80-10-6758 (prehistoric/historic agricultural infrastructure) is part of a large prehistoric and historic agricultural district that was once extant throughout much of Waiāhole. Portions of this district are still farmed today. Within the current project area, the agricultural infrastructure has lost its integrity through disuse and extensive ground disturbance and cannot convey its historical significance as part of this larger district. The archaeological remnants of this agricultural infrastructure still contain important information, however. Additionally, because of the project area's dense vegetation, it is possible that there are both surface and subsurface archaeological features that remain undocumented. Accordingly, in order to mitigate the potential destruction of portions of SIHP # 50-80-10-6758, and any other as yet undocumented archaeological sites, during the proposed *lo'i* and wetland restoration a program of archaeological data recovery, in the form of an archaeological monitoring program (per the language of HAR 13-275-8<sup>3</sup>), is recommended. This monitoring program should focus on the remnants of the old agricultural field system within the project area. CSH recommends that the archaeological monitoring program be carried out to comply with and fulfill the requirements of HAR Chapter 13-279 "Rules Governing Standards for Archaeological Monitoring Studies and Reports."

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<sup>3</sup> Under Hawai'i State historic preservation review legislation, historic preservation mitigation must take one of five forms: A) Preservation; B) Architectural Recordation; C) Archaeological Data Recovery; D) Historical Data Recovery; and E) Ethnographic Documentation (HAR Chapter 13-275-8). Under this legislation, an archaeological monitoring program is considered a form of archaeological data recovery.

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**APPENDIX A: LAND COMMISSION AWARDS**



- Articles
- Information
- Samples
- Patents
- Mahele Database
- Boundary Commission
- Land Grants
- Royal Patents
- Review Cart & Checkout

DOCUMENT DELIVERY

[Change password](#)

[Log out](#)

### Mahele Database Documents

Number: 07563

Claim Number:	<b>07563</b>		
Claimant:	<b>Kahoopulupulu</b>		
Other claimant:	Hopkins, C.G. opposes		
Other name:	Kaopulupulu		
Island:	<b>Oahu</b>		
District:	<b>Koolaupoko</b>		
Ahupuaa:	<b>Waiahole</b>		
Ili:	<b>Kaululoa</b>		
Apana:	<b>3</b>	Awarded:	<b>1</b>
Loi:	<b>4</b>	FR:	
Plus:		NR:	<b>353v5</b>
Mala Taro:		FT:	<b>428v11</b>
Kula:	<b>1</b>	NT:	<b>182v10</b>
House lot:	<b>1</b>	RP:	<b>4969</b>
Kihapai/Pakanu:		Number of Royal Patents:	<b>1</b>
Salt lands:		Koele/Poalima:	<b>No</b>
Wauke:		Loko:	<b>No</b>
Olona:		Lokoia:	<b>No</b>
Noni:		Fishing Rights:	<b>No</b>
Hala:		Sea/Shore/Dunes:	<b>Yes</b>
Sweet Potatoes:		Auwai/Ditch:	<b>No</b>
Irish Potatoes:		Other Edifice:	<b>No</b>
Bananas:		Spring/Well:	<b>No</b>
Breadfruit:		Pigpen:	<b>No</b>
Coconut:		Road/Path:	<b>No</b>
Coffee:		Burial/Graveyard:	<b>No</b>
Oranges:		Wall/Fence:	<b>No</b>
Bitter Melon/Gourd:		Stream/Muliwai/River:	<b>Yes</b>

Sugar Cane:	Pali:	No
Tobacco:	Disease:	No
Koa/Kou Trees:	Claimant Died:	No
Other Plants:	Other Trees:	
Other Mammals: No	Miscellaneous:	<b>House was built on this site for Kaahumanu which she lived in, in intervals, mala `awa</b>

**No. 7563, Kahoopulupulu  
N.R. 353v5**

To the Land Commissioners, Greetings to you all: I hereby state my claim for land in the Ahupua`a of Waiahole, District 6, Division 3, Island of Oahu. There are two taro lo`i, one kula, one taro lo`i which adjoins the `Ili of Kauhelo, one house site, one taro lo`i which adjoins the `Ili of Apau, and one mala of `awa which is adjacent to the `Ili of Uwau. It is a true right from the konohiki, in the time of Kamehameha II. That is my petition on this 23rd day of December, in the year of our Lord 1847, at Waiahole, Koolaupoko.  
KAHOOPULUPULU

**F.T. 428v11**

No. 7563, Kahoopulupulu

Kahauolono, sworn says, he knows the land of claimant in Waiahole. It consists of 4 kalo patches in 3 pieces.

The first piece, of 2 patches, is bounded:  
On Kaneohe and Punaluu sides by Haole's land  
Mauka by the konohiki  
Makai by Kaumaka's land.

The second piece, of one patch, is bounded:  
On Kaneohe side and Makai by the konohiki  
Mauka by Haole's land  
Punaluu side by a stream.

The third piece, of one patch, is bounded:  
On Kaneohe side by Government land  
Mauka and Punaluu side by the konohiki  
Makai by the sea beach.

Claimant's house lot adjoins the third piece of kalo land. It is not enclosed. He has held the land since the time of Kamehameha I.

See page 182 volume 10.

**N.T. 182-183v10**

No. 7563, Kaopulupulu, Waiahole 13 October 1852, vs. C.G. Hopkins (for Kamehameha III) (from page 428, Vol. 10, Part 2)

Kaiui (witness for the konohiki), sworn, I have seen that land section over which there is a dispute consisting of a house site and a patch in the ili of Kaululoa in Waiahole of Koolaupoko, Oahu.

Mauka, Konohiki's land  
Koolauloa, A stream

Makai, Sea  
Kaneohe, Kumupali land.

Land to Kaopulupulu from Kapu during the time of Kaahumanu I. It is just as small house site, it is nearly all washed away by the sea. This place with its bound-aries shown above was given to Kapu as konohiki, then the patch was given also, the tenants cultivated, the konohiki always had a supply of taro from this patch whenever he visited.

Upon Kapu's death, the land passed on to Kalaekeleawe; Kaopulupulu was living there when Kapu Makapaa received the land, then gave it to Kaialiilii. When Kaopulupulu was released in 1844, Kaialiilii lived there and he also received this patch. He and the tenants of the land did work on this land on Fridays. Later, he went to live with Kapu permanently and the patch was left without an attendant till Kalili had a lease for it from the King.

In 1848, Uluhani, the daughter of Kaopulupulu had asked I. Kalili for a house site but Kapu sent a correspondence to the effect that when a house was erected, there should be a payment. Permission was granted to build, it was completed in 1849. It was blown down by the wind and burned in that same year, later I. Kalili built a new house there under the konohiki, in which to live until released.

A house for Kaahumanu was built twice on this house site where she had actually lived at intervals.

Imilama, sworn, I have seen this place over which there is a dispute. I had first seen it at the time it was obtained by Kaialiilii and Kaopulupulu was living just makai of Kalili's house which is standing there at present. I hare never seen Kaopulupulu cultivating this patch and the house which had fallen to the ground was Kaopulupulu's old house on the old house site. This was in 1848. The house was moved to the site of the konohiki and was repaired in 1849, but it was burned to naught in that same year. He has been without a house site to this day. The house which is there now is for I. Kalili under the konohiki.

Kuala, sworn, I had first seen (this place) during the reign of Kamehameha I and Hounalele was the konohiki. Alapai was the overseer who lived there and worked in the patch. After him was Pea who had possession of the house lot and patch. When it was Liholiho's reign, Nauka became konohiki and Oponui, the overseer; after them were Keawekolohe, konohiki and Pohaiku overseer, then after them came Kapu as konohiki and Kaopulupulu as the overseer at the time of Kaahumanu I. Kaopulupulu's own house lot was not on that place, it was on the makai side and nearly taken by the sea, but the patch had become his (patch) Just as it was for the persons before him. After Kapu's death, Kapu Mikapaa succeeded him with Kaialiilii as overseer. Kaialiilii had the patch after Kaopulupulu's release. He was destitute to 1848 then his house was erected on the konohiki's place, but in 1849, it was destroyed by fire. I. Kalili built a house and cultivated the patch for the King, when he had become an overseer.

Kaonulupulu - I have no witnesses because they are all supporting the konohiki.

[Award 7563; R.P. 4969; Waiahole Koolaupoko; 3 ap.; 1.47 Acs]

Number: 07564

Claim Number:	<b>07564</b>
Claimant:	<b>Kauihou</b>
Other claimant:	
Other name:	
Island:	<b>Oahu</b>
District:	<b>Koolaupoko</b>
Ahupuaa:	<b>Waiahole</b>

Ili:			
Apana:	1	Awarded:	1
Loi:	9	FR:	
Plus:		NR:	353v5
Mala Taro:		FT:	425v11
Kula:	1	NT:	
House lot:	1	RP:	1427
Kihapai/Pakanu:		Number of Royal Patents:	1
Salt lands:		Koele/Poalima:	No
Wauke:		Loko:	No
Olona:		Lokoia:	No
Noni:		Fishing Rights:	No
Hala:		Sea/Shore/Dunes:	No
Sweet Potatoes:		Auwai/Ditch:	No
Irish Potatoes:		Other Edifice:	No
Bananas:		Spring/Well:	No
Breadfruit:		Pigpen:	No
Coconut:		Road/Path:	No
Coffee:		Burial/Graveyard:	No
Oranges:		Wall/Fence:	No
Bitter Melon/Gourd:		Stream/Muliwai/River:	No
Sugar Cane:		Pali:	No
Tobacco:		Disease:	No
Koa/Kou Trees:		Claimant Died:	No
Other Plants:	1	Other Trees:	
Other Mammals:	No	Miscellaneous:	mala `awa

**No. 7564, Kauihou**  
**N.R. 353-354v5**

To the Land Commissioners, Greetings to you all: I hereby state my claim for land in the Ahupua`a of Waiahole, District 6, Division 3, Island of Oahu. There are nine taro lo`i, one kula, one house site, and one mala of `awa adjoining the `Ili of Hihimanu. It is a true right from the Konohiki, in the time of Kamehameha III. That is my petition on this 22nd day of December, in the year of our Lord 1847, at Waiahole, Koolaupoko.  
 KAUIHOU X

**F.T. 425v11**  
 No. 7564, Kauihou

John Kalili, sworn says, he knows the land of claimant in Waiahole. It consists of 9 kalo patches bounded:

On Kaneohe and Punaluu sides by the konohiki  
 Mauka by Kaumuloa's land  
 Makai by the sea beach.

Claimant has also a piece of kula land planted with vines, tobacco, &c. It may contain half an acre. His house

site is in this piece of kula. He has held the land over ten years.

[Award 7564; R.P.1427; Kumupali Waiahole Koolaupoko; 1 ap.; 2.7 Acs]

Number: 07662

Claim Number:	<b>07662</b>		
Claimant:	<b>Kaumaka</b>		
Other claimant:			
Other name:			
Island:	<b>Oahu</b>		
District:	<b>Koolaupoko</b>		
Ahupuaa:	<b>Waiahole</b>		
Ili:			
Apana:	<b>2</b>	Awarded:	<b>1</b>
Loi:	<b>3</b>	FR:	
Plus:		NR:	<b>426v5</b>
Mala Taro:		FT:	<b>427v11</b>
Kula:	<b>1</b>	NT:	
House lot:	<b>1</b>	RP:	<b>1582, 2537</b>
Kihapai/Pakanu:		Number of Royal Patents:	<b>2</b>
Salt lands:		Koele/Poalima:	<b>No</b>
Wauke:		Loko:	<b>No</b>
Olona:		Lokoia:	<b>No</b>
Noni:		Fishing Rights:	<b>No</b>
Hala:		Sea/Shore/Dunes:	<b>No</b>
Sweet Potatoes:		Auwai/Ditch:	<b>Yes</b>
Irish Potatoes:		Other Edifice:	<b>No</b>
Bananas:		Spring/Well:	<b>No</b>
Breadfruit:		Pigpen:	<b>No</b>
Coconut:		Road/Path:	<b>No</b>
Coffee:		Burial/Graveyard:	<b>No</b>
Oranges:		Wall/Fence:	<b>No</b>
Bitter Melon/Gourd:		Stream/Muliwai/River:	<b>Yes</b>
Sugar Cane:		Pali:	<b>No</b>
Tobacco:		Disease:	<b>No</b>
Koa/Kou Trees:		Claimant Died:	<b>No</b>
Other Plants:		Other Trees:	
Other Mammals:	<b>No</b>	Miscellaneous:	

**No. 7662, Kaumaka**  
**N.R. 426v5**

To the Land Commissioners, Greetings to you all: I hereby state my claim for land in the Ahupua`a of Waiahole, District 6, Division 3, Island of Oahu. There are two taro lo`i, one lo`i adjoining the `Ili of Opaea, one kula and one house site. It is a true right from the konohiki from the time of Kamehameha III. That is my petition on this 22nd day of December, A.D. 1847, at Waiahole, Koolaupoko.  
KAUMAKA X

**F.T. 427v11**  
No. 7662, Kaumaka

Nika, sworn, says he knows the land of claimant in Waiahole. It consists of 3 kalo patches, bounded:

On Kaneohe side by a watercourse  
Mauka and Maka by the konohiki  
Punaluu side by a stream.

Claimant has also a piece of kula land, which was recently cultivated. It may be half an acre. His house lot is in this piece of kula land and is not enclosed. He has held the land for over ten years.

[Award 7662; R.P. 1586 & 2537; Waiahole Koolaupoko; 2 ap.; 1.72 Acs]

Number: 10228

Claim Number:	<b>10228</b>		
Claimant:	<b>Moo 2</b>		
Other claimant:			
Other name:			
Island:	<b>Oahu</b>		
District:	<b>Koolaupoko</b>		
Ahupuaa:	<b>Waiahole</b>		
Ili:	<b>Kaululua</b>		
Apana:	<b>2</b>	Awarded:	<b>1</b>
Loi:	<b>15</b>	FR:	
Plus:		NR:	<b>528v4</b>
Mala Taro:		FT:	<b>434v11</b>
Kula:	<b>1</b>	NT:	
House lot:	<b>1</b>	RP:	<b>2817</b>
Kihapai/Pakanu:		Number of Royal Patents:	<b>1</b>
Salt lands:		Koele/Poalima:	<b>No</b>
Wauke:		Loko:	<b>No</b>
Olona:		Lokoia:	<b>No</b>
Noni:		Fishing Rights:	<b>No</b>
Hala:		Sea/Shore/Dunes:	<b>No</b>
Sweet Potatoes:		Auwai/Ditch:	<b>No</b>
Irish Potatoes:		Other Edifice:	<b>No</b>
Bananas:	<b>1</b>	Spring/Well:	<b>No</b>

Breadfruit:		Pigpen:	<b>No</b>
Coconut:		Road/Path:	<b>No</b>
Coffee:		Burial/Graveyard:	<b>No</b>
Oranges:		Wall/Fence:	<b>No</b>
Bitter Melon/Gourd:		Stream/Muliwai/River:	<b>No</b>
Sugar Cane:	1	Pali:	<b>Yes</b>
Tobacco:		Disease:	<b>No</b>
Koa/Kou Trees:		Claimant Died:	<b>No</b>
Other Plants:		Other Trees:	
Other Mammals:	<b>No</b>	Miscellaneous:	

**No. 10228, Moo 2, Waiahole, December 23, 1847**  
**N.R. 528v4**

Greetings to you all, the Land Commissioners: I hereby petition for my claim for land in the `ili of Kaululoa in the Ahupua`a of Waiahole, District 6, Division 3, Island of Oahu. There are fifteen taro lo`i, one kula and one house site. It is a true right from the konohiki, from the time of Kamehameha III. That is my petition to you on this 23rd day of December, 1847.  
MOO

**F.T. 434v11**  
No. 10228, Moo 2nd

Palaoa, sworn says, he knows the land of Claimant in Waiahole. It consists of kalo patches.

bounded on:  
Kaneohe side by a pali  
Mauka by Kainaloha's land  
Punaluu side by Kuhia's land  
Makai by Paikau's land.

Claimant has also a piece of kula land, planted with sugar and bananas. It may be about half an acre. his House site adjoins his kalo land, and is not enclosed. He has held the land for seven years.

[Award 10228; R.P. 2817; Waiahole Koolaupoko; 2 ap.; 2.12 Acs]

Number: 10438

Claim Number:	<b>10438</b>	
Claimant:	<b>Naeole</b>	
Other claimant:	Kameo, daughter; heir	
Other name:		
Island:	<b>Oahu</b>	
District:	<b>Koolaupoko</b>	
Ahupuaa:	<b>Waiahole</b>	
Ili:	<b>Kapikookau</b>	
Apana:	<b>5</b>	Awarded: <b>1</b>



Loi:	<b>15</b>	FR:	
Plus:		NR:	<b>553v4</b>
Mala Taro:		FT:	<b>419v11</b>
Kula:		NT:	
House lot:	<b>1</b>	RP:	<b>1426</b>
Kihapai/Pakanu:		Number of Royal Patents:	<b>1</b>
Salt lands:		Koele/Poalima:	<b>No</b>
Wauke:		Loko:	<b>No</b>
Olona:		Lokoia:	<b>No</b>
Noni:		Fishing Rights:	<b>No</b>
Hala:		Sea/Shore/Dunes:	<b>Yes</b>
Sweet Potatoes:		Auwai/Ditch:	<b>No</b>
Irish Potatoes:		Other Edifice:	<b>No</b>
Bananas:		Spring/Well:	<b>No</b>
Breadfruit:		Pigpen:	<b>No</b>
Coconut:		Road/Path:	<b>Yes</b>
Coffee:		Burial/Graveyard:	<b>No</b>
Oranges:		Wall/Fence:	<b>No</b>
Bitter Melon/Gourd:		Stream/Muliwai/River:	<b>Yes</b>
Sugar Cane:		Pali:	<b>No</b>
Tobacco:		Disease:	<b>No</b>
Koa/Kou Trees:		Claimant Died:	<b>No</b>
Other Plants:		Other Trees:	
Other Mammals:	<b>No</b>	Miscellaneous:	

**No. 10438, Naeole, Waiahole, December 22, 1847**  
**N.R. 553v4**

To the Land Commissioners, Greetings: I hereby state my claim for land at Kapikookau in the Ahupua`a of Waiahole, District 6, Division 3, Island of Oahu. There are four taro lo`i. Six taro lo`i adjoin in the Ahupua`a of Waiahole, four taro lo`i adjoin in the `ili of Kaaniu. It is a true right from the konohiki in the time of Kamehameha III. That is my petition on December 22, 1847 at Waiahole.  
NAEOLE

**F.T. 419v11**  
No. 10435!, Naeole (Deceased)  
[should be 10438]

Kahunoku, sworn, says he knows the land of Claimant in Waiahole. It consists of 15 kalo patches, in 4 pieces.

The first piece, of one patch, is bounded on:  
Kaneohe side by a path  
Mauka by the Konohiki  
Punaluu side by sea beach  
Makai by Claimant's House lot.

The second piece, of 4 patches, is bounded on:  
Kaneohe side by Nahaina's  
Mauka by Government land  
Punaluu side by sea beach  
Makai by Kaukaiu's House lot.

The third piece, of 5 patches, is bounded on:  
Kaneohe side by Naole's  
Mauka by Road  
Punaluu side by river  
Makai by Kaumaka's.

The fourth piece, of 5 patches, is bounded on:  
Kaneohe side by Hanakea's  
Mauka by the Konohiki  
Punaluu side by a stream  
Makai by Government land.

Claimant's House lot adjoins the first piece of kalo land.

It is bounded on:  
Kaneohe side by a river  
Mauka by kalo patch  
Punaluu side and Makai by sea beach.

Claimant held this land from the time of Kamehameha I, till he died in 1848, leaving his land to Kameo, wife of Judge Kalili, his daughter.

[Award 10438; R.P.; 1426; Waiahole Koolaupoko; 4 ap.; 5.6 Acs]

# Waiihona 'Aina

Claim Number: **08180**

Claimant: **Haole, Lotona**

Other claimant: **Kiailuakini, grandson; heir**

Other name:

Island: **Oahu**

District: **Koolaupoko**

Ahupuaa: **Waiahole**

Ili: **Apau**

Apana: <b>1</b>	Awarded: <b>Yes</b>
Loi: <b>6</b>	FR:
Plus:	NR: <b>500v5</b>
Mala Taro:	FT: <b>430v11</b>
Kula:	NT:
House lot:	RP: <b>1092</b>
Kihapai/Pakanu:	Number of Royal Patents:
Salt lands:	Koele/Poalima: <b>No</b>
Wauke:	Loko: <b>No</b>
Olona:	Lokoia: <b>No</b>
Noni:	Fishing Rights: <b>No</b>
Hala:	Sea/Shore/Dunes: <b>No</b>
Sweet Potatoes:	Auwai/Ditch: <b>No</b>
Irish Potatoes:	Edifice: <b>No</b>
Bananas:	Spring/Well: <b>No</b>
Breadfruit:	Pigpen: <b>No</b>
Coconut:	Road/Path: <b>No</b>
Coffee:	Burial/Graveyard: <b>No</b>
Oranges:	Wall/Fence: <b>No</b>
Bitter Melon/Gourd:	Stream/Muliwai/River: <b>No</b>
Sugar Cane:	Pali: <b>No</b>
Tobacco:	Disease: <b>No</b>
Koa/Kou Trees:	Claimant Died: <b>No</b>
Other Plants:	Other Trees:

MISC:

**No. 8180, Lotona Haole**  
**N.R. 500v5**

To the Land Commissioners, Greetings: I hereby state my claim for land in the `Ili of Apau, Ahupua`a of Waiahole, District 6, Division 3, Island of Oahu. There are four taro lo`i. It is a true right from the konohiki from the time of Kamehameha III. That is my petition on this 22nd day of December, AD 1847, at Waiahole, Koolau Poko.  
LTONA HAOLE

**F.T. 430v11**  
No. 8180, Lotona Haole (Deceased)

John Kalili, sworn, says he knows the land of claimant in Waiahole.

It consists of 6 kalo patches bounded on:  
Kaneohe side by a watercourse  
Mauka by the road  
Punaluu side by a stream  
Makai by Hoopulupulu's land.

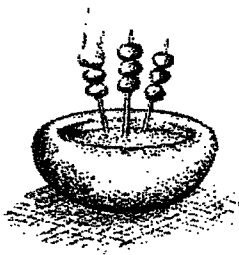
Claimant held the land since 1845, he died in 1848, leaving the land to Kiailuakini, his grandson.

[Award 8180; R.P. 1092; Apuu Waiahole Koolaupoko; 1 ap.; 1.10 Acs]

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 **Glossary**

BACK



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**APPENDIX B: POLLEN AND MICROCHARCOAL ANALYSES**

# POLLEN AND CHARCOAL PARTICLE ANALYSES, WAIHAOLE DELTA

Bruce G. Phillips  
EcoPlan Associates, Inc., Mesa, Arizona

Two samples from the Waiahole Delta project were pollen and micro-charcoal particle analyses. Sample CSH 3-E came from a thick, fine-grained alluvial deposit beneath an A horizon and argillic B horizon, which are the result of the historic and prehistoric agricultural use of the project area. The deposit dates approximately A.D. 1200. Sample CSH 1-C came from possible pond field sediments that contained abundant kukui (*Aleurites moluccana*) endocarp fragments and basalt flakes, and dates to approximately A.D. 1600 to 1700. The analyses were intended to shed light on the local environment at the time of deposition and to document taxa of archaeobotanical importance.

## Methods

Sediment samples were sent to the Laboratory of Paleocology, Northern Arizona University, Flagstaff, for pollen extractions. Sample bag contents were mixed thoroughly, and 20 cc subsamples were taken. Some samples had less than 20 cc of sediment and were processed entirely. Approximately 25,000 grains of *Lycopodium* were added to estimate pollen concentration. Samples were then treated with 10 percent hydrochloric acid to reduce carbonates, followed by a swirl-and-decant step ((Mehring 1967):136–137) to reduce the heavier matrix fraction (greater than 180 µm). Silicates were reduced by a hydrofluoric acid treatment of approximately 20 hours. Heavy liquid flotation in zinc bromide (with a specific gravity of 1.9) was followed by acetolysis to further reduce organics. The remaining residues were washed with water and alcohol, stained with saffranin, and suspended in glycerol.

At EcoPlan Associates laboratories, extracts were mounted and examined at a viewing power of 400X on an Olympus BHTU compound microscope. Subsequent percentage calculations were based on 200+ grain counts. Identifications were aided EcoPlan reference material and by keys (Selling 1946, 1947; (Moore, et al. 1991)). Each fossil pollen grain was identified to the generic level when possible. If a grain could not be differentiated from similar genera, it was identified only to the family level. Pollen grains that were broken, corroded, or degraded beyond recognition were assigned to the indeterminate category. Following standard examination, slides were scanned at 100X magnification to record cultigens and rare pollen types with possible cultural significance. Pollen concentrations were calculated with the following formula:

$$\text{Concentration (grains/cc)} = \frac{\text{pollen grains counted}}{\text{tracers counted}} \times \frac{\text{tracer concentration}}{\text{sample volume}}$$

Charcoal particles were measured using a 10 X 10 grid square pattern eyepiece reticle (cf. Galehouse 1971). *Lycopodium* tracers were recorded and the concentration of charcoal particles was determined with the formula:

$$\text{Concentration (mm}^2\text{/cc)} = \frac{\text{charcoal area}}{\text{tracers counted}} \times \frac{\text{tracer concentration}}{\text{sample volume}}$$

## Results and Conclusions

Sample CSH 3-E did not contain sufficient pollen for analysis; two slides were examined and only three indeterminate grains were found. Repeated cycles of wetting and drying might have caused pollen deterioration (Holloway 1981). Charcoal concentration was approximately 2.17 mm<sup>2</sup> per cc of sediment, indicating the deposit likely post-dates the arrival of Polynesians to the island.

Pollen in Sample CSH 1-C was well preserved; indeterminate grains made up only 5.6 percent of the 200+ grain count and total concentration was relatively high at greater than 12,000 grains per cc of sediment. The number of palynomorph types identified was low, including five pollen types, one pteridophyte spore, and algal spores. Cyperaceae (sedge family) pollen was extremely abundant, comprising more than 86 percent of the assemblage; Poaceae (grass family) pollen was second most abundant, making up nearly 5 percent pollen spectrum. This combination of opportunistic plants suggests that the area was impacted by human disturbance, such as clearing of natural vegetation for agriculture or aquaculture or through periodic maintenance of such environments. The high percentage of sedge pollen also suggests a well-watered environment, such as a pond field. No Polynesian introductions were identified in the analysis, including lower magnification scans. It is possible that the sediment sample represented at time when the field was fallow or abandoned. The presence of kukui endocarp but not pollen could mean that the macrobotanical remains were in a reduced state, processed to a point where any pollen that once clung to plants was deposited elsewhere. Charcoal concentration was high, exceeding 33 mm<sup>2</sup> per cc of sediment, reflecting vegetation clearance and field maintenance in the watershed.

Galehouse, Jon

1971 Point Counting. In *Procedures in Sedimentary Petrology*, edited by R.E. Carver, pp. 385-407. Wiley Publishing, New York.

Holloway, Richard G.

1981 Preservation and Experimental Diagenesis of the Pollen Exine. Unpublished Ph.D. dissertation, Texas A&M University, College Station, Texas.

Mehringner, Peter

1967 Pollen Analysis of the Tule Springs Area, Nevada. In *Pleistocene Studies in Southern Nevada*, edited by H.M. Wormington and D. Ellis, pp. 130-200. Anthropological Papers 13. Nevada State Museum, Carson City, Nevada.

Moore, P.D., J.A. Webb and M.E. Collinson

1991 *Pollen Analysis*. Blackwell Scientific Publications, London.

Table 1. Palynological and charcoal data from sample CHS 1-C, Waiahole Delta, Oahu.		
Type:	Count	Percent
Pollen:		
Cyperaceae (sedge)	185	86.4
Poaceae (grass)	10	4.7
Cheno-am type	4	1.9
<i>Euphorbia</i>	2	0.9
Asteraceae (high-spine)	1	0.5
Indeterminate	12	5.6
Sum	214	
Tracers	22	
Concentration (grains/cc)	12,159	
Pteridophyte spore:		
Monolete, psilate	2	
Algal spores	21	
Charcoal:		
Concentration (mm <sup>2</sup> /cc)	33.92	



**APPENDIX C: RADIOCARBON ANALYSIS**

FROM: Darden Hood, Director (mailto:<mailto:dhood@radiocarbon.com>)  
**(This is a copy of the letter being mailed. Invoices/receipts follow only by mail.)**

February 10, 2005

Dr. Hallett H. Hammatt  
Cultural Surveys Hawaii  
PO Box 1114  
Kailua, HI 96734  
USA

RE: Radiocarbon Dating Results For Samples WAIA41KUKUI1, WAIA41SED1

Dear Hallett:

Enclosed are the radiocarbon dating results for two samples recently sent to us. They each provided plenty of carbon for accurate measurements and all the analyses went normally. As usual, the method of analysis is listed on the report with the results and calibration data is provided where applicable.

As always, no students or intern researchers who would necessarily be distracted with other obligations and priorities were used in the analyses. We analyzed them with the combined attention of our entire professional staff.

If you have specific questions about the analyses, please contact us. We are always available to answer your questions.

Our invoice is enclosed. Please, forward it to the appropriate officer or send VISA charge authorization. Thank you. As always, if you have any questions or would like to discuss the results, don't hesitate to contact me.

Sincerely,

A handwritten signature in black ink that reads "Darden Hood". The signature is written in a cursive, flowing style.

Dr. Hallett H. Hammatt

Report Date: 2/10/2005

Cultural Surveys Hawaii

Material Received: 1/10/2005

---

Sample Data	Measured Radiocarbon Age	$^{13}\text{C}/^{12}\text{C}$ Ratio	Conventional Radiocarbon Age(*)
Beta - 200319 SAMPLE : WAIA41KUKUI1 ANALYSIS : AMS-Standard delivery MATERIAL/PRETREATMENT : (nutshell): acid/alkali/acid 2 SIGMA CALIBRATION : Cal AD 1450 to 1650 (Cal BP 500 to 300)	300 +/- 40 BP	-22.8 o/oo	340 +/- 40 BP
Beta - 200320 SAMPLE : WAIA41SED1 ANALYSIS : AMS-Standard delivery MATERIAL/PRETREATMENT : (organic sediment): acid washes 2 SIGMA CALIBRATION : Cal AD 1030 to 1250 (Cal BP 920 to 700)	880 +/- 40 BP	-25.0.0 o/oo	880 +/- 40 BP

---

# CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-22.8;lab. mult=1)

Laboratory number: **Beta-200319**

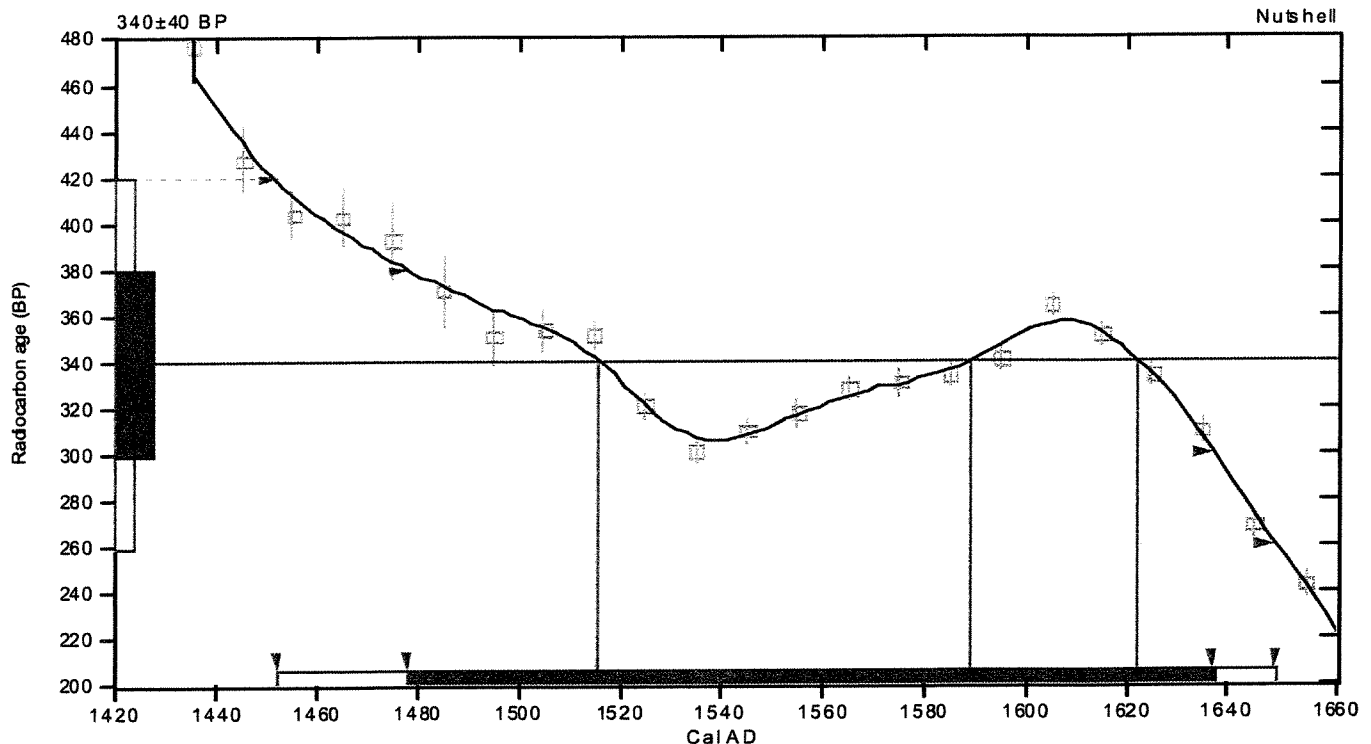
Conventional radiocarbon age: **340±40 BP**

**2 Sigma calibrated result: Cal AD 1450 to 1650 (Cal BP 500 to 300)**  
**(95% probability)**

Intercept data

Intercepts of radiocarbon age  
with calibration curve: Cal AD 1520 (Cal BP 430) and  
Cal AD 1590 (Cal BP 360) and  
Cal AD 1620 (Cal BP 330)

**1 Sigma calibrated result: Cal AD 1480 to 1640 (Cal BP 470 to 310)**  
**(68% probability)**



## References:

### Database used

*INTCAL98*

### Calibration Database

### Editorial Comment

*Stuiver, M., van der Plicht, H., 1998, Radiocarbon 40(3), pxii-xiii*

### INTCAL98 Radiocarbon Age Calibration

*Stuiver, M., et al., 1998, Radiocarbon 40(3), p1041-1083*

### Mathematics

### A Simplified Approach to Calibrating C14 Dates

*Talma, A. S., Vogel, J. C., 1993, Radiocarbon 35(2), p317-322*

## Beta Analytic Radiocarbon Dating Laboratory

4985 S.W. 74th Court, Miami, Florida 33155 • Tel: (305)667-5167 • Fax: (305)663-0964 • E-Mail: [beta@radiocarbon.com](mailto:beta@radiocarbon.com)

# CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-25;lab. mult=1)

Laboratory number: **Beta-2003 20**

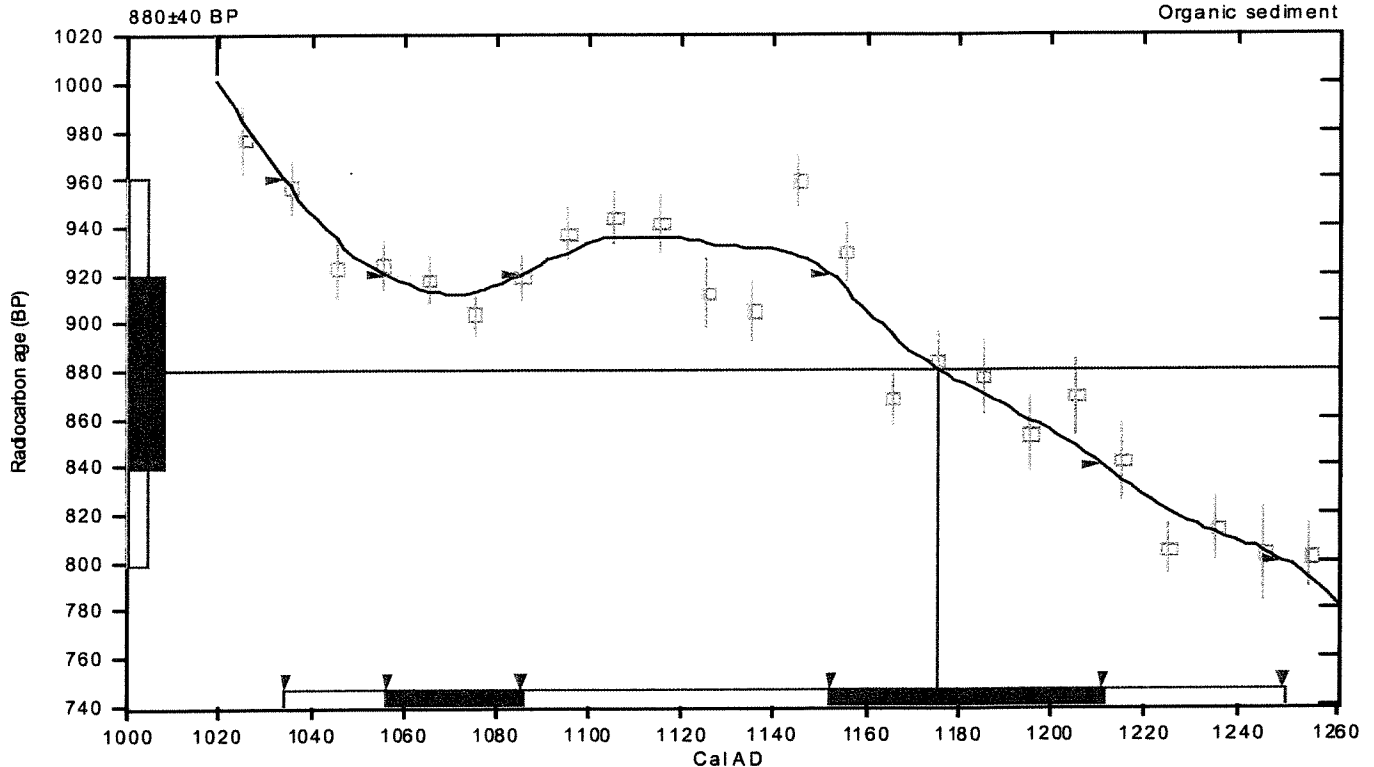
Conventional radiocarbon age: **880±40 BP**

**2 Sigma calibrated result: Cal AD 1030 to 1250 (Cal BP 920 to 700)**  
**(95% probability)**

Intercept data

Intercept of radiocarbon age  
with calibration curve: **Cal AD 1180 (Cal BP 780)**

**1 Sigma calibrated results: Cal AD 1060 to 1080 (Cal BP 890 to 860) and**  
**Cal AD 1150 to 1210 (Cal BP 800 to 740)**  
**(68% probability)**



## References:

### Database used

*INTCAL 98*

### Calibration Database

### Editorial Comment

*Stuiver, M., van der Plicht, H., 1998, Radiocarbon 40(3), pxii-xiii*

### INTCAL98 Radiocarbon Age Calibration

*Stuiver, M., et al., 1998, Radiocarbon 40(3), p1041-1083*

### Mathematics

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## Beta Analytic Radiocarbon Dating Laboratory

4 985 S.W. 74th Court, Miami, Florida 33155 • Tel: (305)667-5167 • Fax: (305)663-0964 • E-Mail: beta@radiocarbon.com

**Final Report  
Phase I Environmental Site Assessment and  
Limited Soil Sampling**

**Waiahole Beach Park**

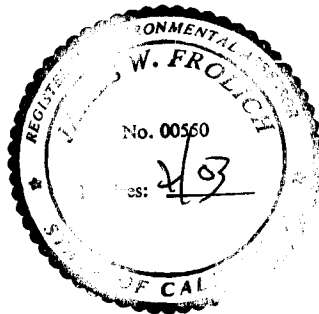
**January 23, 2003**

**Prepared for:  
Gerald Park, Urban Planner  
1400 Rycroft Street, Suite 876  
Honolulu, Hawaii 96814**



**Final Report  
Phase I Environmental Site Assessment and  
Limited Soil Sampling**

**Waiahole Beach Park**



***Prepared for:***  
Gerald Park, Urban Planner  
1400 Rycroft Street, Suite 876  
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***Prepared by:***  
The Environmental Company, Inc.  
1001 Bishop St., Pauahi Tower, Suite 1240  
Honolulu, HI 96813

**January 23, 2003**

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## **APPENDICES**

- A. Contacts and References
- B. Photo Documentation of Site Investigation
- C. Photo Documentation Before Demolition (Source: T. IIDA Contracting, Ltd)
- D. EDR Report
- E. Freedom of Information Act Letter
- F. Chain-of-Custody and Analytical Results

## 1.0 SITE DESCRIPTION

Waiahole Beach Park, 48-181 Kamehameha Highway, is located along Kaneohe Bay on the eastern coast of Oahu, Hawaii, and offers a direct view to China Man's Hat (See Figure 1-1, Site Location). This land is characterized by residential, recreational, and agricultural activities, including backyard livestock farming. The City and County of Honolulu Tax Map Key (TMK) identifies the site as 4-8-2:1-12. However, for purposes of this Phase I Environmental Site Assessment (ESA), the area of detailed focus will be limited to plots 1, 2, 4, and 5, which are the areas of suspected land use. The entire parcel of land is bordered by Kaneohe Bay to the east, Waiahole Stream to the south, Kamehameha Highway to the west, and a residential area to the north. Plot 1 is also bordered by an orchid farm and *The Poi Factory*, across Kamehameha Highway. To access these plots, a parking area is located where Plots 1 and 2 intersect, and another access road is located along the southern border of Plot 5.

With the exception of Plots 10 and 12, the site has been zoned Ag-2, Restricted Agricultural use, since 1986. Prior to 1986, the land was zoned Ag-1, General Agricultural Use. The change was a result of modifications to the zoning code in 1986, according to the City Planning Department. Plots 4-8-02-10 and -12 are zoned P2, General Preservation.

The property is approximately 20 acres in size. Plots 8, 9, 10, 11, and 12 consist of a long stretch of land that borders the ocean and is used by the residents as access to the beach. There is a crude shelter at Plot 8 that appears to be occupied by a resident. A parking area is established at Plot 1, and is littered with garbage, an abandoned car, and appliances.

Buildings and features on Plots 1, 2, 4, and 5 were recently demolished, and although there were residential buildings on the land previously, now it is only leveled land with stockpiled rubbish and trees. T. IIDA Contracting, Ltd. provided TEC with photos of the pig pens and waste pits before demolition. These photos are provided in Appendix C.

Two inhabitants are still residing on the land at this location. Ms. Charlene Fablo lives across the stream from the eastern edge of Plot 1 and the Bagio family live at the northeastern portion of Plot 4. Waiahole Stream lies along the southeastern border of these sites and directly south there is lush natural vegetation without any inhabitants. Refer to Figure 1-2 to see the site plan.



Figure 1-1 Site Location. Waiahole Beach Park (Kaneohe, HI 1998, USGS).

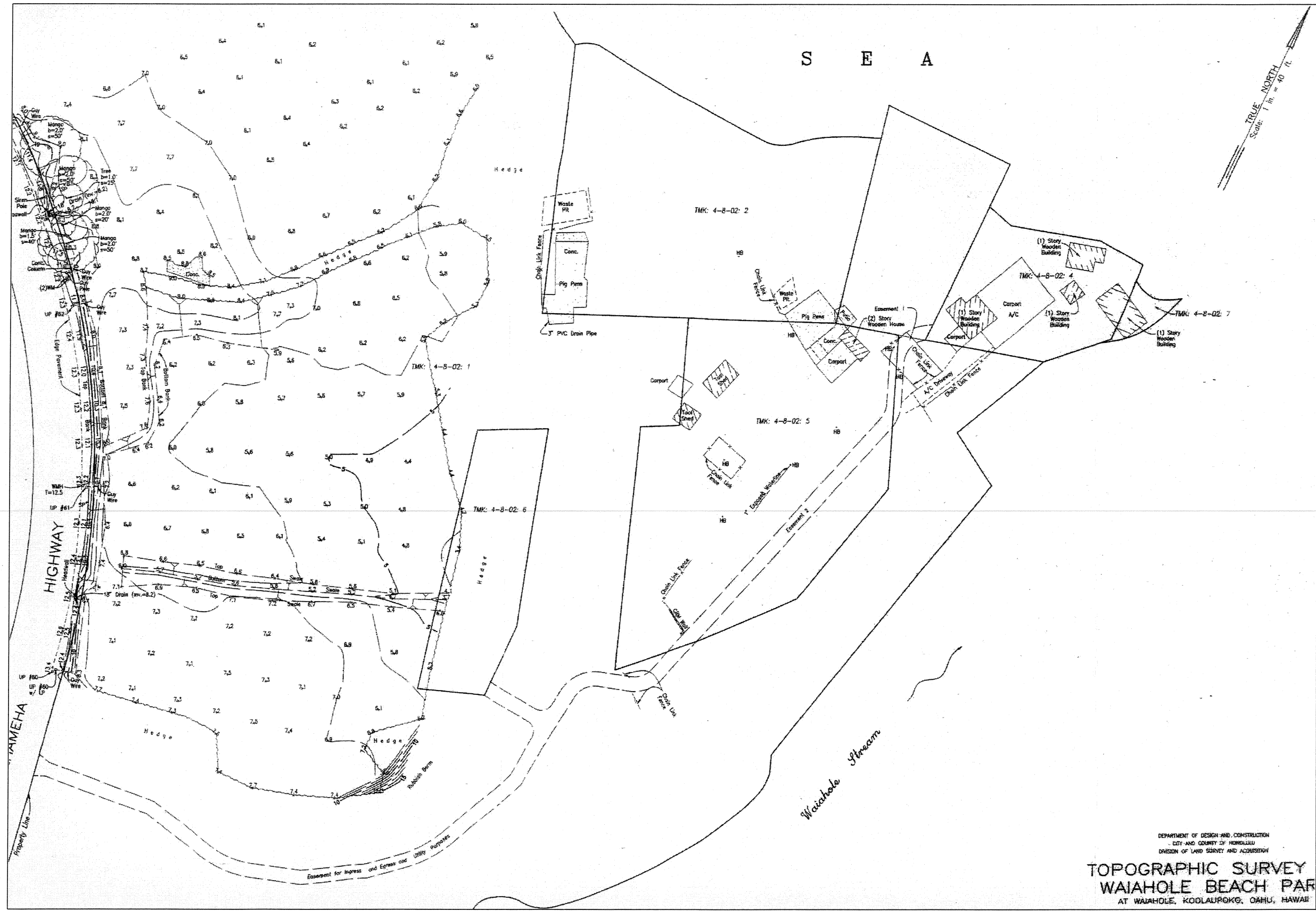


Figure 1-2 Site Plan.

## 2.0 SITE BACKGROUND

### 2.1 TITLE SEARCH

Property ownership was identified from 1939 to the present by conducting a title search at the City and County of Honolulu Tax Assessor's Office and at the Bureau of Land and Conveyances. Ownership for Plots 1, 2, 4, and 5 are summarized in Tables 1-1, 1-2, and 1-3 below. Ownerships for the remaining Plots that create Waiahole Beach Park were not researched in detail; however, Plots 3, 7, 8, 9, and 11 appear to have identical ownership to that of Plot 1. Plots 10 and 12 have been owned by the Territory of Hawaii since 1939 and jointly by the Board of Public Parks and Recreation, City and County of Honolulu, since 1953.

**Table 1-1 SITE OWNERSHIP, TMK 4-8-2:1**

<b>Date</b>	<b>Grantee ("New" Owner)</b>	<b>Grantor</b>	<b>Reference</b>
1939-1940	Elizabeth Loy McCandless	Unknown	Tax Assessor Records
1940-1949	Elizabeth Loy McCandless Estate (10/9/40)	Elizabeth Loy McCandless	Tax Assessor Records
1949-1974	Elizabeth Loy McCandless Trust Estate (8/10/49)	Elizabeth Loy McCandless Estate	Tax Assessor Records
1974-1995	Elizabeth Loy McCandless Marks, Trustee Under Revocable Living Trust Agreement (1/13/89)	Elizabeth Loy McCandless Trust Estate	Tax Assessor Records
1995-2002	City and County of Honolulu (7/27/95)	Elizabeth Loy McCandless Marks, Trustee Under Revocable Living Trust Agreement (1/13/89)	Tax Assessor Records

**Table 1-2 SITE OWNERSHIP, TMK 4-8-2:2**

<b>Date</b>	<b>Grantee ("New" Owner)</b>	<b>Grantor</b>	<b>Reference</b>
1939-1946	Magoon Trust Estate	Unknown	Tax Assessor Records
1946-2000	Magoon Estate, Ltd. (11/25/46)	Magoon Trust Estate	Tax Assessor Records
2000-2002	City and County of Honolulu (07/20/00)	Magoon Estate, Ltd.	Tax Assessor Records

**Table 1-3 SITE OWNERSHIP, TMK 4-8-2:4 and 4-8-2-5**

<b>Date</b>	<b>Grantee ("New" Owner)</b>	<b>Grantor</b>	<b>Reference</b>
1939-1965	Magoon Estate, Ltd. S.C. Harper Estate (joint owners)	Unknown	Tax Assessor Records
1965-1966	Magoon Estate, Ltd. S.C. Harper Estate Jessie R. Kupau (5/7/65) (joint owners)	Oliver H. Kupau (joint owner, part of S.C. Harper Estate)	Tax Assessors Office
1966-1990	Magoon Estate, Ltd. S.C. Harper Estate (3/18/66)	Jessie R. Kupau (joint owner)	Tax Assessor Records
1990-2000	Magoon Estate, Ltd. (3/8/90, by court decision)	S.C. Harper Estate (joint owner)	Tax Assessor Records
2000-2002	City and County of Honolulu (7/20/90)	Magoon Estate, Ltd.	Tax Assessor Records

## 2.2 HISTORICAL SIGNIFICANCE

Since the City and County of Honolulu hired Cultural Surveys Hawaii, Inc. to conduct a historical review of this area, for purposes of this report, the historical significance will not be discussed in detail. For further guidance on this subject matter, please read their report entitled, *A Hawaiian Traditional and Cultural Practices Assessment for the proposed Waiahole Beach Park, Ahupua'a of Waiahole and Waikane, Ko'olaupoko, O'ahu, Vol I and Vol II," Draft 2002*. According to this report, the area is rich in historical significance and contains several burial sites and artifacts, showing the land's cultural traditions (Figure 2-1). The following discussion from this draft report provides some background on the historical significance of the Waiahole Beach Park area.

Informants told many stories of *'uhane* and spirits which are part of Waiahole and Waikane. One area where there is a concentration of *'uhane* stories are at Waiahole Point, where the Waiahole Stream empties into the sea. Just *mauka* of the point is the burial ground (Site 50-80-10-1086) and the location of the inadvertent burial discovery (Interview w/J. Medeiros, 1/24/02). Also near this area is a *pohaku o kane* (Site 50-80-10-6396), also described as a *kuahu* or altar by one informant. A legendary *hau* grove is just across the stream from the burial ground. Some know the legend; some just believe the grove was a sacred place. One, possibly more paths associated with *po kane*, or night marchers, is known to pass through this area. Stone artifacts suggesting human habitation have been identified here. Undoubtedly an area rich in cultural traditions, many *kama aina* expressed concern over destruction or alteration of this special place (Vol I, p.122).

According to a former tenant of the land, Mr. James Medeiros, there are burial sites at two locations of the land he previously occupied (TMK 4-8-02-04).

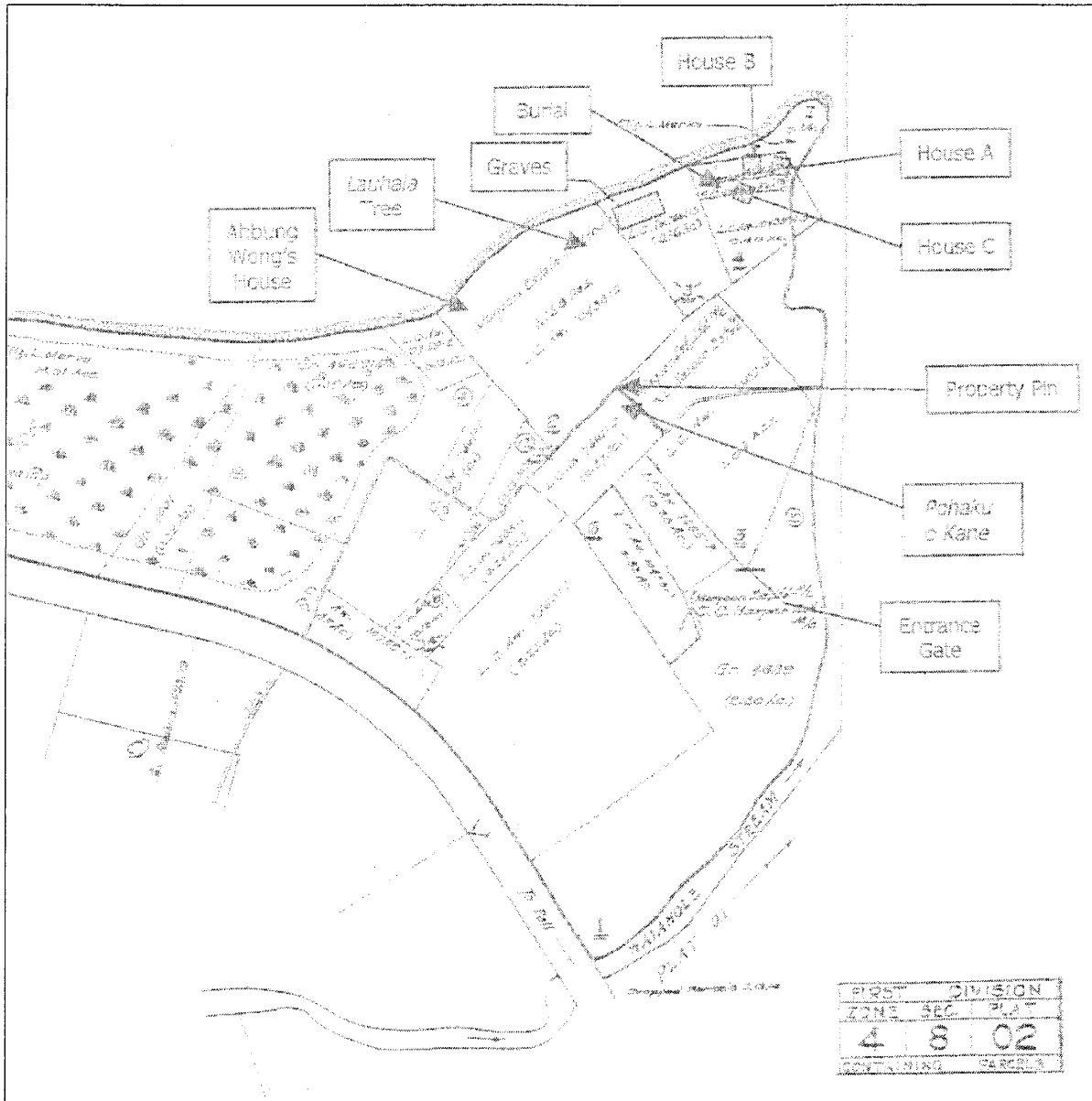


Figure 2-1 Burial Location. (Source: Cultural Surveys Hawaii, Inc., *A Hawaiian Traditional and Cultural Practices Assessment for the Waiahole Beach Park, Ahupua'a of Waiahole and Waikane, Vol. 1, Draft, 2002, [p.102]*).



## 2.3 HISTORICAL PROPERTY USES

Traditional property uses were also identified in the report prepared by Cultural Surveys Hawaii, and indicate a long history of residential and agricultural use in the Waiahole area. From the compilation of interviews included in the archaeology report, it has been determined that this land was once an ancient fishing village.

Archaeological sites identified within Waiahole and Waikane reflect many of the traditional activities associated with the utilization of these resources, including agriculture, habitation, tool manufacture, and religious observance. (Vol II, p.24).

The report went on to indicate that this area is characterized by rich alluvial soils, an equable climate, and abundant water supply, which all allowed for cultivation of traditional crops. According to Cultural Surveys Hawaii, rice cultivation began in the late 1860's and continued until the early 1900's. As rice cultivation declined, other agricultural crops were introduced, such as vegetable and coffee orchards. According to Richard Paglinawan, who was interviewed by Cultural Surveys Hawaii, taro production became dominant in the 1920's until it slowly trickled off in the late 1960's.

A thesis written by Michihiro Miyagi, "Land Use in Waiahole Valley, Oahu," indicates that agricultural use of the land began to deteriorate around this time period.

By 1961, the four major land uses at Waiahole were identified as diversified agriculture (consisting primarily of bananas, papaya, and taro), grazing (primarily dairy, but also beef cattle), residential use, and forest (including the Pali with no trees, wooded areas, waste land, and shrub land). Miyagi concluded that in the 1960's, land use was in a general state of decline in Waiahole and "will probably continue to follow its trend of decline while the area awaits the development of the future" (p. 163).

Mr. Miyagi's report was written in 1963 but his conclusions were correct. Land use in this area was still used by residents to grow crops to feed their families, but not in a large-scale sense, as in prior years.

Based on the surrounding area, City and County of Honolulu records (including building permits, use permits, tax assessment documents, and property deed records), topography maps, aerial photographs, and interviews, probable property land uses coincided with the views found in these reports. Appendix A provides a list of the agencies contacted.

Topographic maps were obtained for the years 1954, 1959, 1968, 1983, and 1998, and aerial photographs for the years 1933 and 1970 (Cultural Surveys Hawaii, Inc., May 2002). These maps have been reviewed and evaluated to determine historic use of the site and surrounding areas.

The topographic maps for these years show no indication of commercial activity, only a handful of residential units scattered along an area lush in vegetation. The 1983 map shows the first instance that Waiahole Beach Park is designated on the property, and

the 1998 map shows the first instance the Waiahole-Waikane Nature Preserve (not recognized as a nature preserve by the State of Hawaii) is designated on the map.

The area of Waiahole specifically encompassed by TMK 4-8-2:1, 2, 4, and 5 was owned by either the Magoon or McCandless families from 1939 until the City and County of Honolulu purchased the land. It appears that this land was only used for residential use during this time period. Mr. James Medeiros inhabited Plot 4 around 1973 and claims that the area was uninhabited upon his arrival, and included three houses on the land that needed to be rebuilt. Mr. Medeiros conducted several activities on this property, including pig farming, mechanical work out of his garage, and cattle grazing. Additionally, he told of a neighbor, Ahbung Wong, who conducted landscaping activities from the portion of land he leased.

Based on a review of permit applications, interviews, and topographic photographs, it appears that this land has only been used residentially, to include farming and grazing activities. Table 2-1 provides a chronological list of activity and land use at the site.

**Table 2-1 SITE HISTORICAL LAND USE**

<b>Year</b>	<b>Plot</b>	<b>Land Use</b>	<b>Source</b>
1860's-early 1900's	Waihole Area	Rice cultivation	Cultural Surveys Hawaii, Vol I
1920's-1960's	Waihole Area	Taro production	Cultural Surveys Hawaii, Vol I
1956	12	Renovate old store building into living quarters (Elizabeth Pelisarta)	Interview / Laurie Reppun City and County Dpt. of Planning and Permitting
1963	1	Addition of a bedroom to existing house (Elizabeth Pelisarta)	City and County Dpt. of Planning and Permitting
1973-2000	4	James Medeiros leases property, claims it was uninhabited with three houses that needed to be rebuilt. Activities conducted during his stay included: pig farming, mechanical work out of garage, and--cattle grazing.	Cultural Surveys Hawaii, Vol II Interview / Charlene Fablo Interview / Rick Towill
1995	1	Grading, grubbing, and stockpiling	City and County Dpt. of Planning and Permitting
1995	1	Land Permit Applications	City and County Dpt. of Planning and Permitting
1996	1	Grading, grubbing, and stockpiling	City and County Dpt. of Planning and Permitting
1998	1	PRIM Inspection Work Orders	City and County Dpt. of Planning and Permitting
1998	1	Grading, grubbing, and stockpiling	City and County Dpt. of Planning and Permitting
2002	4	Demolish two-story wooden house and four sheds	City and County Dpt. of Planning and Permitting

### **2.3 ADJACENT LAND PROPERTY AND USE**

Plot 1 borders Plots 4 and 5 to the south and west, which is itself bordered by the Waiahole Stream to the south and east, Kamehameha Highway to the west and the Pacific ocean to the north. To the northwest of Plot 1 is Plot 12, an unpaved parking area littered with trash. Plots 8, 9, 10, and 11 stretch along the ocean and are used as access to the beach. Plot 8 marks the end of the park property and appears to be inhabited by a local resident in a crude shelter. To the northwest of this plot is the start of a residential area along the waterfront.

### **2.4 TOPOGRAPHIC AND HYDROGEOLOGICAL REVIEW**

The site evaluated for this ESA is located on the northeast facing shoreline of Kaneohe Bay on the island of Oahu, Hawaii. It is demarcated to the south by a natural jetty, which is the natural outfall of Waiahole Stream and separates the Waiahole-Waikane Nature Preserve (USGS Map, Kaneohe Quadrangle, 1998) from the Waiahole Beach Park Site. Proceeding to the north, the coastline arcs westward as a natural bay inlet, toward Kamehameha Highway. Kamehameha Highway makes up the western boundary of the site.

The site is generally flat, with elevations ranging from approximately 7.5 feet mean sea level (msl) to 4 feet msl near the shoreline. Kamehameha Highway is elevated about 5 feet above the site and contains several drainage culverts, allowing water from the Waiahole Valley drainage basin to pass under the highway into manmade drainage channels and onto Kaneohe Bay. Figure 1-1 provides a high resolution topographic map of the site features.

According to the attached Environmental Data Resources, Inc. (EDR) Physical Setting Source Addendum located in Appendix D of this Report, the National Wetland Inventory lists several areas designated as wetlands within the study area. Efforts should be made to avoid filling in these areas or otherwise changing ecological capacity without sufficient assessment and evaluation. In addition, the entire site lies within the Federal Emergency Management Agency (FEMA) 100-year flood zone. Finally, soil associated with this area is of the Hanalei soil group, consisting mainly of silty clay and loam associated with wetlands and marshes. In general, surface water infiltration rates are slow.

Groundwater has not been directly evaluated on site; however, west to east movement can be inferred due to topographic and watershed assessments. Rainfall occurring inland in the western Koolau water basin generally moves eastward following the topography until it is released into Kaneohe Bay. According to *Aquifer Identification and Classification For Oahu: Groundwater Protection Strategy for Hawaii*, 1990 (Mink and Lau, 1990), the aquifer system underlying the site is the Oahu Windward Koolaupoko system, which is fresh water in contact with seawater, unconfined, and located in non-volcanic sedimentary lithology. The upper water body status is considered to be: currently used, ecologically important, with salinity between 250 and 1,000 milligrams per liter (mg/L), irreplaceable, and highly vulnerable to contamination. However, due to the close proximity of the site to the shoreline, the upper water body is expected to be brackish and unavailable for drinking.

### 3.0 SITE INVESTIGATION

#### 3.1 SITE VISIT

Four site visits were conducted to complete this ESA:

- Mr. James W. Frolich, REA, Senior Environmental Scientist, and Mrs. Sholeh Cox, Environmental Specialist (TEC), conducted a site visit on October 9, 2002;
- Mr. Rick Towill, Towill Trac-Tec Inc., accompanied Mr. Jeff Hart, Registered Geologist (TEC) during a site visit conducted on October 24, 2002 to delineate the areas of the former waste pits and pig pen;
- Mr. Marcelino Reyes, Environmental Engineer (TEC), was accompanied by ESN Pacific personnel at the site on October 25, 2002 to collect soil samples at the former waste pit located at the southwest corner of Plot 2 (WP1); and
- Mrs. Cox and Mr. Reyes conducted a fourth site visit on November 1, 2002. At this time, soil samples were collected at the former waste pit located at the southeast corner of Plot 2 (WP2).

The site investigation is described below in detail. Please refer to Appendix B, Site Photos, which are labeled as Figure 3-1, Loc# to coincide with the text.

The site visit was limited to Plots 1, 2, 4, and 5. These plots are bordered by Kamehameha Highway to the west, the ocean to the north, the Waiahole Stream to the southeast, and Waiahole-Waikane Nature Preserve to the south. There are telephone and electricity lines along Kamehameha Highway bordering Plot 1, a storm drain under Kamehameha Highway, leading into Plot 1, a Fire Hydrant, F33, along Kamehameha Highway, and exposed water pipes in the center of Plot 5. Other than these fixtures, there were no noticeable manhole covers, underground or aboveground storage tank, fill pipes, or water wells.

These sites were recently demolished and leveled, and are scattered with stockpiled debris. The demolition made the site investigation more difficult, as it was up to the investigators to approximate where previous structures were located and what activities took place at each location. In addition, fill material was used in many locations and topsoil was scraped off during the leveling process, making it difficult to notice soil discolorations.

The area designated as swampland at Plot 1 is flat and appears to have been leveled. The soil was fine and red with some crushed rock. There did not appear to be any soil discolorations at this area and the vegetation appeared to be thriving, although it was stressed due to the demolition activities recently conducted here.

Stockpiling activities began at the southern portion of Plot 1 (Figure 3-1, Loc. 1). Here, next to the property border was a small stockpile of tires, empty paint cans, plastic containers that appeared to have potentially hazardous chemicals, and miscellaneous household debris. The soil turned from fine and red to dark and coarse, with visible rock. Natural vegetation showed re-growth in the leveled areas.

A dirt access road began at this area, and intersects Plots 1, 4, and 5. The stream borders this area to the east, and on the other side of the stream, the investigators noticed evidence of occupancy on the land. The investigators did not go into this area but were able to interview Mrs. Charlene Fablo, who resides there, during the site visit conducted on November 1, 2002 (Figure 3-1, Loc. 2).

Directly west of this site, water pipes were noticed sticking out of the ground on the mauka side of the path at Plot 5, as indicated on the site location map. On a straightway of this path, in the eastern corner of Plot 5, trees were located on both sides of the easement, marking what appeared to be a driveway (Figure 3-1, Loc. 3). To the northwest of this plot, the investigators found a stockpile of trees and dirt that included tools, cleaner, roofing adhesive (full can), motor generators, roofing and ceiling tile (possible asbestos), piping, a bike, dishwasher, and car wreckage materials. Around the stockpile, the soil seemed to be disassociated, and is believed to be fill material potentially located where a carport once stood (Figure 3-1, Loc. 4). Slightly past this pile was an area of discolored soil. This marked the only area of discolored soil that the investigators found at the site. This is believed to be where the wooden building, carport, and asphalt/concrete (A/C) driveway were designated on the map. This may also be the carport location where mechanical work was conducted. In an interview with James Medeiros, he revealed that his son did bodywork on classic cars on this property (Cultural Surveys, Vol II, p. 83).

Following this path along to the east, into Plot 4, the investigators saw the remains of the A/C driveway noted in the maps. This plot marks the area where three wood buildings and two carports existed before demolition (see Figure 3-1, Loc. 5). Stockpiles noticed in this area included an oxygen tank, asphalt, automobile repair debris, metal waste bins, three 5-gallon unmarked buckets, and hauling equipment. To the northeast of this stockpile, investigators noticed another inhabited area. Ms. Fablo verified that the Bagio family reside at this location.

From here, the investigators turned back towards the road and headed west, into Plot 5 and what used to be Plot 3. At the southeastern corner of Plot 3, the investigators noticed chain link fencing around a stockpiled area encircled by asbestos hazard taping. In an interview with Mr. Rick Towill, who was responsible for the demolition activities, he indicated the tape was used to mark gravesite locations and did not indicate an asbestos hazard (Figure 3-1, Loc. 6). Mrs. Fablo directed the investigators to the former site of the pig pens and WP2. The pig pens were located at the southeastern corner of Plot 2 and the waste pits were located directly west of the pig pens. The soil in this area was disassociated and concurred with her direction. (Figure 3-1, Loc. 7).

Walking further west, towards the mountains, on the southwest corner of Plot 2, the investigators noticed an overgrown area with dissociated soil. According to Mr. Towill and Ms. Fablo, this is the site where WP1 was located. The stockpile located in this area included fencing, tires, and metal and piping debris. Ms. Fablo pointed out a single Jackfruit Tree, which she says stood directly over the area surrounding another pig pen (Figure 3-1, Loc. 8 and 9). According to Mrs. Fablo, one pig pen was used to raise commercial pigs and the other was used to raise wild pigs that were caught on the property. This area was once covered with concrete and the soil was not disassociated, as in the other area where the waste pits and pig pens were located (Figure 3-1, 10).

Further west, at Plot 2, scattered stockpiles were located throughout the area. More chain link fencing was discovered, along with what appears to be boat wreckage, among the debris.

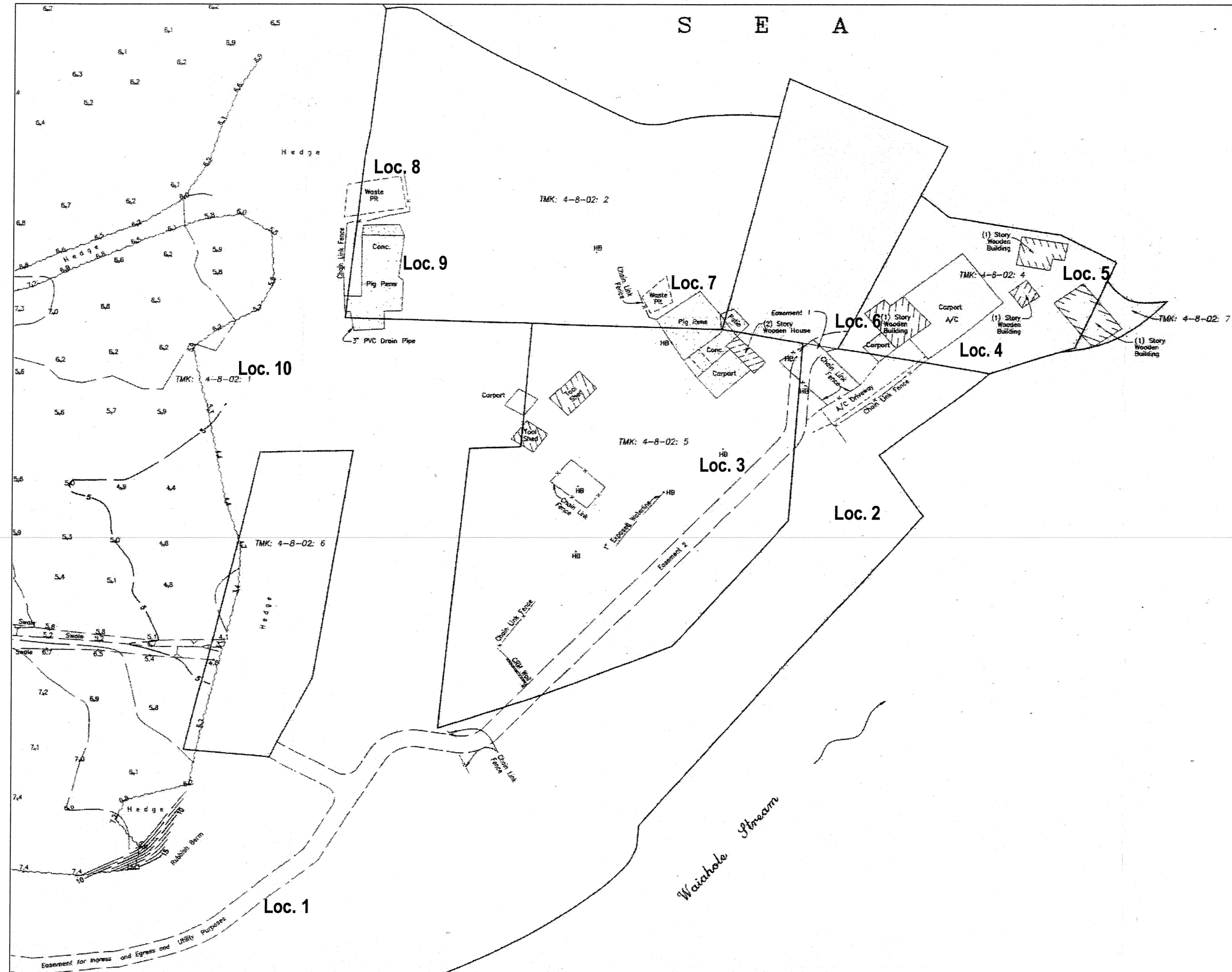


Figure 3-1 Site Investigation Guide. Location numbers indicate where site investigation photos were taken.

### 3.2 INTERVIEWS

A former tenant of the Magoon-owned property, Mr. James Medeiros was interviewed as part of the recent archaeological survey conducted by Cultural Surveys Hawaii. The narrative that follows reflects the accounts given by the interviewee (Vol. II, p. 73-87).

The Magoon family has owned the property on Plots 2, 4, and 5 since 1856. Mr. Medeiros worked for the Magoon family on the land before moving onto the property more than 28 years ago, at which point he claims it was uninhabited. During his stay on the property, Mr. Medeiros has conducted many activities, including raising pigs and dogs, mechanical work, grazing more than 100 cattle, and residential farming. He noted three neighbors, Mr. Ahbung Wong, Angel Pilago, and Cougat (no first name given). Pilago died shortly after Medeiros moved onto the property and upon his death, Mr. Medeiros took over Pilago's lease; Mr. Cougat was a transient that stayed on Mr. Medeiros's property for eighteen years; and Mr. Ahbung Wong lived next to Mr. Medeiros and raised plants for his landscaping business. Mr. Medeiros also took over Mr. Wong's lease after he left.

During the second site investigation conducted on November 1, 2002, the investigators met Ms. Charlene Fablo, who lives across from Plot 5, behind the stream. Ms. Fablo has lived at the site since 1987 and claims she has only seen residential activities conducted on the site since that time. She was very knowledgeable of the site, pointing out local vegetation and warning of wild boars on the property. Ms. Fablo was able to walk along the site with the investigators and delineate the locations of the former waste pits and pig pens.

Ms. Laurie Reppun and Ms. Violet Roberts were also interviewed on November 1, 2002. Both ladies work directly across from the site at *The Poi Factory* and have been local residents for approximately 25 years and 55 years, respectively. Ms. Reppun said the entire property in front of *The Poi Factory* was once taro fields. Both ladies told of the traditional use of the land and the agricultural activities conducted by local residents who lived off the land. Neither could remember any commercial activity taking place on the property.

Mr. Rick Towill, who was responsible for demolition activities at the site, accompanied Mr. Hart during a site visit conducted on October 24, 2002 and was interviewed by phone on November 4, 2002. In addition to conducting the demolition activities, he has also been a resident of the area for 44 years and stated that this area has only been used by residents who were small time farmers. However, he claims to have seen a 1948 aerial map that shows cattle grazing and taro fields in this area. This agrees with Ms. Reppun's statement.

Additionally, the Chair of the Waiahole Neighborhood Board Commission, Mr. David Bender, was interviewed on October 31, 2002 by phone. Mr. Bender has lived in the Waiahole area for fifteen years and agreed with the views expressed by the others interviewed. He stated that there have been no complaints made concerning the area.



### **3.3 REGULATORY REVIEW**

EDR was contracted to search Federal and State of Hawaii environmental databases for information indicating whether the subject property is located on or near landfills, hazardous waste disposal sites, treatment facilities, or operations that use or generate hazardous materials and/or waste. Additionally, the search was to identify any leaking and registered underground storage tanks (LUSTs and USTs), and registered ASTs. The ASTM standards require that the information below be gathered for facilities within specific search areas surrounding the site of the Phase I ESA and the number of occurrences, if any, be provided. The results of this survey identify none of the sites or features discussed above on the property site or within the surrounding area.

Table 3-1, below, is a compilation of the results of the search of Federal and State databases. The full EDR report, including lists of searched ASTM and non-ASTM databases, database descriptions, date of database updates, approximate minimum search distance, and maps, is included as Appendix D of this report.

**Table 3-1 EDR RESULTS FOR ASTM DATABASES**

<b>Federal</b>	<b>Last Updated</b>	<b>Total Plotted</b>
CERCLIS sites within 0.5 mile	06/24/02	0
ERNS generators at the target property	07/24/02	0
NPL sites within 1 mile	08/01/02	0
RCRIS TSD facilities within 0.5 mile	06/20/02	0
CORRACTS sites within 1 mile	09/09/02	0
<b>State of Hawaii</b>	<b>Last Updated</b>	<b>Total Plotted</b>
SHWS within 1 mile	06/24/02	0
Landfills within 0.5 mile	07/23/02	0
Registered USTs within 0.25 mile	07/03/02	0
LUST sites within 0.5 mile	07/03/02	0

CERCLIS Comprehensive Environmental Response, Compensation, and Liability Information System  
 ERNS Emergency Response Notification System  
 NPL National Priority List  
 RCRIS TSD Resource Conservation and Recovery Information System  
 CORRACTS Corrective Action Report  
 SHWS Sites List  
 UST Underground Storage Tank Database  
 LUST Leaking Underground Storage Tank Database

A Freedom of Information Act request for information was sent to the US EPA on November 12, 2002. Response from the US EPA was received and copies are included in Appendix E.

### **3.4 LIMITED SOIL AND GROUND WATER SAMPLING**

Soil sampling was limited to the two waste pits associated with the former pig pens owned by Mr. James Medeiros: WP1, located on the southwest corner of Plot 2, and WP2, located on the southeast corner of Plot 2. These waste pits were assumed to be no larger than 200 square feet in area and 3 feet deep. At the time of sampling, the waste pits were already demolished. The location of each waste pit was determined through site investigation and interviews.

TEC was tasked to collect limited soil samples at these waste pits to determine if they may have been used to dispose of regulated substances. Three soil samples were collected at WP1 on October 25, 2002. These samples were collected at 4 to 6 feet below the ground surface (bgs) with a Geoprobe, equipped with a 1.5-inch diameter stainless steel sleeve. The depth of the soil sample was dictated by the testimonial of Mr. Rick Towill who accounted that he back-filled the waste pit with 3 to 5 feet of dirt. Also, ground water was encountered at the sampling location at 1 to 2 feet bgs. Additional soil sampling was done on November 1, 2002, after the location of WP2 was positively identified by Ms. Fablo. These samples were collected at 0.5 feet bgs with a hand-auger.

Soil samples were analyzed at ESN-Pacific for total petroleum hydrocarbons in the gasoline range (TPH-GRO) and diesel range (TPH-DRO) by Environmental Protection Agency (EPA) Method 8015 modified; benzene, toluene, ethyl benzene, and xylenes (BTEX) by Method 8021B; polynuclear aromatic hydrocarbons (PAHs) by Method 8100; pesticides and polychlorinated byphenals (PCBs) by Method 8080; herbicides by Method 8151; and Resource Conservation and Recovery Act (RCRA) 8 Metals. Results were compared to the To-Be-Considered (TBC) Criteria defined under the Hawaii Department of Health (HDOH) Risk Based Corrective Action (RBCA) Tier I Soil Action Levels, and when not available, the U.S. EPA Region IX Preliminary Remediation Goals (PRGs) for Residential Areas. TBC criteria are non-promulgated advisories or guidance that generally are not enforceable and often are health-based.

HDOH developed a policy document on RBCA and decision making (HDOH, 1995). An addendum was issued in 1996. The policy presents a tiered approach for the evaluation of sites with contaminated soil. Tier I action levels for soil are designed to serve as a guide to determining remedial requirements, and not as strict cleanup requirements. Tier I soil levels are set to be protective of direct residential exposure and leaching to groundwater.

U.S. EPA Region IX PRGs are risk-based concentrations that are intended to assist risk assessors and others in initial screening level evaluations of environmental measurements. PRGs should be viewed as Agency guidelines, not legally enforceable standards. They are used for site "screening" and as initial cleanup goals, if applicable.

The results of the soil analyses shows that small levels of lead, chromium, dieldrin, and TPH-GRO were detected at WP1 while small levels of lead and chromium were detected at WP2 (See Table 4-1). The laboratory chain-of-custody form and analytical reports are provided in Appendix F.

Table 3-2

**ANALYTICAL SAMPLE RESULTS OF SAMPLES COLLECTED  
AT WP1 AND WP2**

Compounds	WP1	WP1	WP1	WP2	WP2	HDOH Action Level / EPA PRG
	1WBP-SO-5 mg/kg	3WBP-SO-4 mg/kg	4WBP-SO-4 mg/kg	5WBP-SO-0.5 mg/kg	6WBP-SO-0.5 mg/kg	
<b>Petroleum Hydrocarbons</b>						
TPH-GRO	< 20.0	<b>33</b>	< 20.0	< 20.0	< 20.0	2,000
TPH-DRO	< 20.0	< 20.0	< 20.0	< 20.0	< 20.0	5,000
<b>VOC's</b>						
Benzene	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	1.7
Toluene	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	34.0
Ethylbenzene	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	0.50
Xylenes	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	23.0
<b>PAHs</b>	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	N/A
<b>Pesticides</b>						
Dieldrin	< .001	<b>.0025</b>	<b>.0067</b>	< .001	< .001	<b>30.0</b>
<b>PCBs</b>	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	1.0
<b>Herbicides</b>	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	N/A
<b>Metals</b>						
Lead	<b>14.0</b>	< 5.0	< 5.0	<b>46.2</b>	<b>151.0</b>	<b>400.0</b>
Chromium	<b>92.0</b>	<b>56.0</b>	<b>92.0</b>	<b>85.3</b>	<b>104.0</b>	<b>120.0</b>

mg/kg            milligram of compound per kilogram of soil (part per million)  
 WP1             waste pit located at the southwest corner of Plot 2  
 WP2             waste pit located at the southeast corner of Plot 2

## 4.0 CONCLUSIONS

The primary concern of the investigation was to determine whether regulated substances were disposed of at the waste pits. The results of the limited soil sampling analyses shows that the metals, lead and chromium, were detected well below screening levels at both WP1 and WP2. In addition, the pesticide, Dieldrin, and the petroleum hydrocarbon, TPH-GRO, were detected at WP1, also below screening levels. These results indicate that there is no evidence of current or past contamination found at the site.

The review of property ownership and public records also led to no new concerns at this site. There was no evidence that current or past land uses could result in contamination or evidence uncovered to conclude that the site was contaminated as a result of on-site activities, currently or in the past.

No further investigation is recommended in light of information uncovered during this ESA. From the results of the limited soil sampling analyses, it appears that the material sampled does not represent a significant environmental risk to human-health or the environment. However, the site is still littered with trash and unmarked containers and TEC recommends that these materials be treated as hazardous waste and disposed of accordingly. In accordance with Chapter 128D, The Hawaii Environmental Response Law (HERL) and Title 11, Chapter 451, State Contingency Plan (SCP), as documented in subsection 1.5 of the Hawaii State Contingency Plan Technical Guidance Manual (TGM), No Further Action is required if:

The site is adequately characterized, and

- a) no hazardous substances remain on site; or
- b) no significant threat to human health or the environment exists.

**APPENDIX A**  
**CONTACTS AND REFERENCES**

## CONTACTS AND REFERENCES

### PERSONAL CONTACTS AND INTERVIEWS

Bender, David, Chair of the Waiahole Neighborhood Association (interview by phone)

Fablo, Charlene, Waiahole Resident living on the property site (interviewed on site)

Hawaii, State of

- Department of Land and Natural Resources, Bureau of Conveyences (ownership information)

Hildebrand, Terry, City and County Department of Design and Construction (contact)

Honolulu, City and County of

- Department of Planning and Permitting, Bonnie Ventula and Counter Staff (zoning and permit information)
- Building Department, Counter Staff
- Honolulu Real Property Assessment Office, Counter Staff (ownership information)

Kimura, Nathan, T. IIDA Constructing, Ltd. (contact)

Murata, Dianne, City and County Budget and Fiscal Services (contact)

Pacific Design Center, (current topographic map)

Towill, Rick, Towill Trac-Tec Inc. (interview by phone)

Reppun, Laurie, Waiahole Resident and worker at the Poi Factory (interview)

Roberts, Violet, Waiahole Resident and worker at the Poi Factory (interview)

Shideler, David, Cultural Surveys Hawaii, Inc. (contact)

### REFERENCES

Cultural Surveys Hawaii, Inc. May 2002, *A Hawaiian Traditional and Cultural Practices Assessment for the Proposed Waiahole Beach Park, Ahupua'a of Waiahole and Waikane, Ko'olaupoko, O'ahu, Volumes I and II, Draft.*

HDOH, (Hawaii Department of Health). 1995a. *Risk Based Corrective Action and Decision Making at Sites with Contaminated Soil and Groundwater, Honolulu, Hawaii.* State of Hawaii, Department of Health, Environmental Management Division. Revised June 1996.

Mink, J. F. and Lau, L.S. 1990. *Aquifer Identification and Classification for O'ahu: Groundwater Protection Strategy for Hawai'i*, Technical Report No. 179, Water Resources Research Center.

Miyagi, Michihiro. 1963. *Land Use in Waiahole Valley, Oahu*. M.A. Thesis, University of Hawaii.

USEPA, 1999. Region IX Preliminary Remediation Goals (PRGs) Tables. U.S. EPA Region 9 website <http://www.epa.gov/region09/waste/sfund/prg/>.



**APPENDIX B**  
**PHOTO DOCUMENTATION**



**Fig. 3-1, Loc 1.** A small stockpile of tires and other debris was discovered at the southern portion of Plot 1.



**Fig. 3-1, Loc 2.** A makeshift bridge at the north end of Waiahole stream, where Ms. Charlene Fablo is currently residing.



**Fig. 3-1, Loc. 3** The driveway leading to the former Medeiros residence, located at the northeastern section of Plot 4.



**Fig. 3-1, Loc. 4a** Northwest of the driveway, a stockpile was found including mechanic tools, cleaning compound, roofing materials, adhesive, motor generators, ceiling tiles, bikes, dishwasher, etc.



**Fig. 3-1, Loc. 4b** A closer look at the stockpile.



**Fig.3-1, Loc. 4c** More dirt behind the stockpile above.



**Fig. 3-1, Loc. 5** Remains of the asphalt driveway leading to the three wooden-story buildings and two carports, prior to demolition.



**Fig. 3-1, Loc. 6** According to Rick Towill, this area marked by Asbestos Hazard taping is where a gravesite is located.



**Fig. 3-1, Loc. 7** Site of the former carport, pigpen, and waste pit, located at the southeastern corner of Plot 2.



**Fig. 3-1, Loc. 8** Site of the former pigpen (beside the jackfruit tree), located at the southwestern corner of Plot 2 on the mauka side.



**Fig. 3-1, Loc. 9** Site of the former waste pit (underneath a monkey pod tree), located at the southeastern section of Plot 2 on the ewa side.



**Fig. 3-1, Loc. 10** Site of the former pigpen and waste pit, as viewed from Plot 1 near Kamehameha Highway.

**APPENDIX C**  
**PHOTO DOCUMENTATION PRIOR TO DEMOLITION ACTIVITIES**

*Taken by T. IIDA, Inc.*





Main gate to the Medeiros residence.



One of the two pig pens on site prior to demolition.



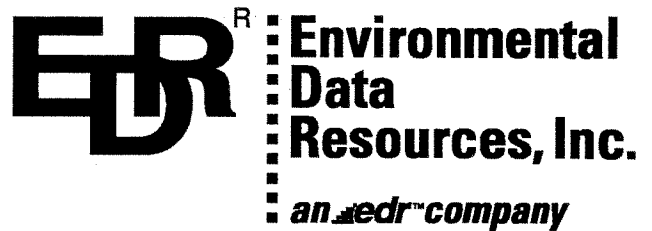
One of the several carports on site prior to demolition.



Site photo of the possible waste pit prior to clearing the area.

Appendix D  
**EDR REPORT**

RECEIVED OCT - 1 2002



**The EDR-Historical  
Topographic Map  
Report**

**Waiahole Beach Park  
48-181 Kamehameha Hwy  
Kaneohe, HI 96744**

**September 27, 2002**

**Inquiry Number: 853330-5**

***The Source  
For Environmental  
Risk Management  
Data***

3530 Post Road  
Southport, Connecticut 06490

**Nationwide Customer Service**

Telephone: 1-800-352-0050  
Fax: 1-800-231-6802

# Environmental Data Resources, Inc.

## Historical Topographic Map Report

Environmental Data Resources, Inc.'s (EDR) Historical Topographic Map Report is designed to assist professionals in evaluating potential liability on a target property, and its surrounding area, resulting from past activities. ASTM E 1527-00, Section 7.3 on Historical Use Information, identifies the prior use requirements for a Phase I environmental site assessment. The ASTM standard requires a review of *reasonably ascertainable standard historical sources*. *Reasonably ascertainable is defined as information that is publicly available, obtainable from a source with reasonable time and cost constraints, and practically reviewable.*

To meet the prior use requirements of ASTM E 1527-00, Section 7.3.2, the following *standard historical sources* may be used: aerial photographs, city directories, fire insurance maps, topographic maps, property tax files, land title records (although these cannot be the sole historical source consulted), building department records, or zoning/and use records. ASTM E 1527-00 requires "*All obvious uses of the property shall be identified from the present, back to the property's obvious first developed use, or back to 1940, whichever is earlier. This task requires reviewing only as many of the standard historical sources as are necessary, and that are reasonably ascertainable and likely to be useful.*" (ASTM E 1527-00, Section 7.3.2 page 11.)

EDR's Historical Topographic Map Report includes a search of available public and private color historical topographic map collections.

### Topographic Maps

A topographic map (topo) is a color coded line-and-symbol representation of natural and selected artificial features plotted to a scale. Topos show the shape, elevation, and development of the terrain in precise detail by using contour lines and color coded symbols. Many features are shown by lines that may be straight, curved, solid, dashed, dotted, or in any combination. The colors of the lines usually indicate similar classes of information. For example, topographic contours (brown); lakes, streams, irrigation ditches, etc. (blue); land grids and important roads (red); secondary roads and trails, railroads, boundaries, etc. (black); and features that have been updated using aerial photography, but not field verified, such as disturbed land areas (e.g., gravel pits) and newly developed water bodies (purple).

For more than a century, the USGS has been creating and revising topographic maps for the entire country at a variety of scales. There are about 60,000 U.S. Geological Survey (USGS) produced topo maps covering the United States. Each map covers a specific quadrangle (quad) defined as a four-sided area bounded by latitude and longitude. Historical topographic maps are a valuable historical resource for documenting the prior use of a property and its surrounding area, and due to their frequent availability can be particularly helpful when other standard historical sources (such as city directories, fire insurance maps, or aerial photographs) are not reasonably ascertainable.

Please call EDR Nationwide Customer Service at  
1-800-352-0050 (8am-8pm ET)  
with questions or comments about your report.  
*Thank you for your business!*

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Inquiry Number: 853330-5  
TP Quad  Adj Quad  ↑N

Quad KANE'ONE

Minute Series  7.5  15  30  30x60

Year 1998  Provisional Edition  Revised

Photorevised  Inspected from N/A

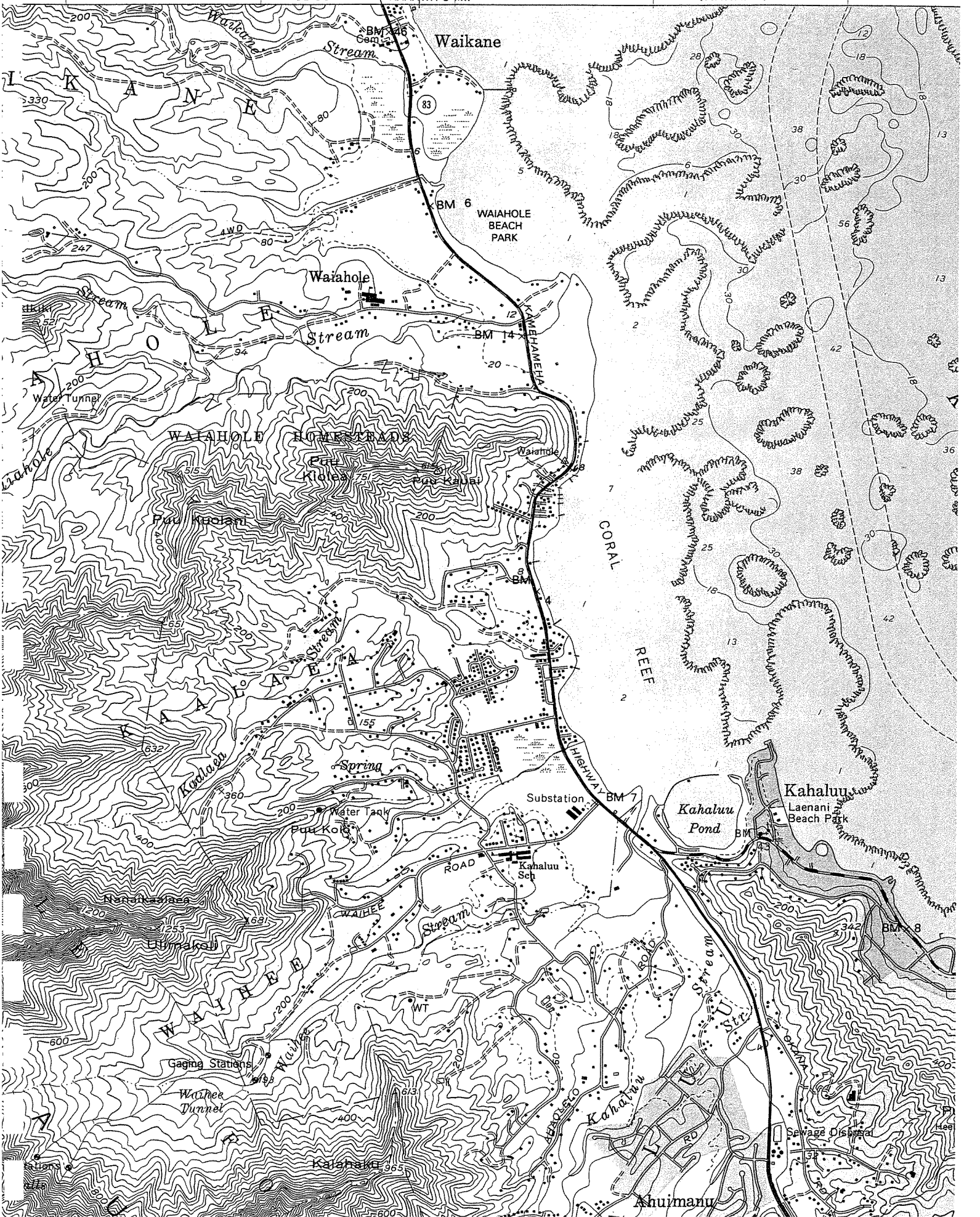
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51°30' KAHUKU 17 MI. KAAHAWA 5 MI.

(KAHANA)



Inquiry Number: 853 330-5  
TP Quad  Adj Quad  ↑N

Quad KANEOTE

Minute Series  7.5  15  30  30x60

Year 1983  Provisional Edition  Revised

Photorevised  Inspected from N/A

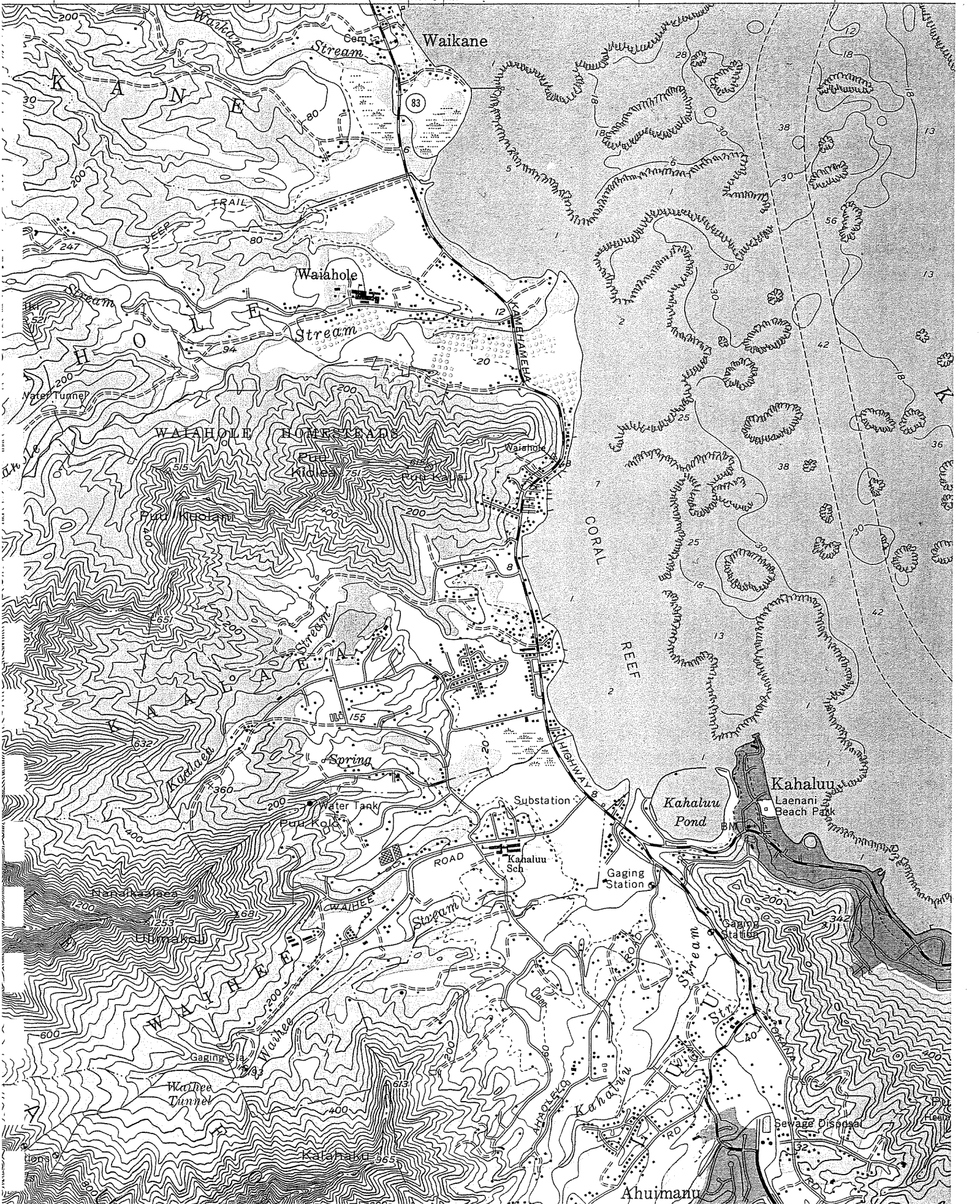
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51°30'

KAHUKU 17 MI.  
KAAIWA 5 MI.

(KAHANA)



Inquiry Number: 853330-S

TP Quad  Adj Quad  ↑N

Quad KANEOTE

Minute Series  7.5  15  30  30x60

Year 1968  Provisional Edition  Revised

Photorevised  Inspected from N/A

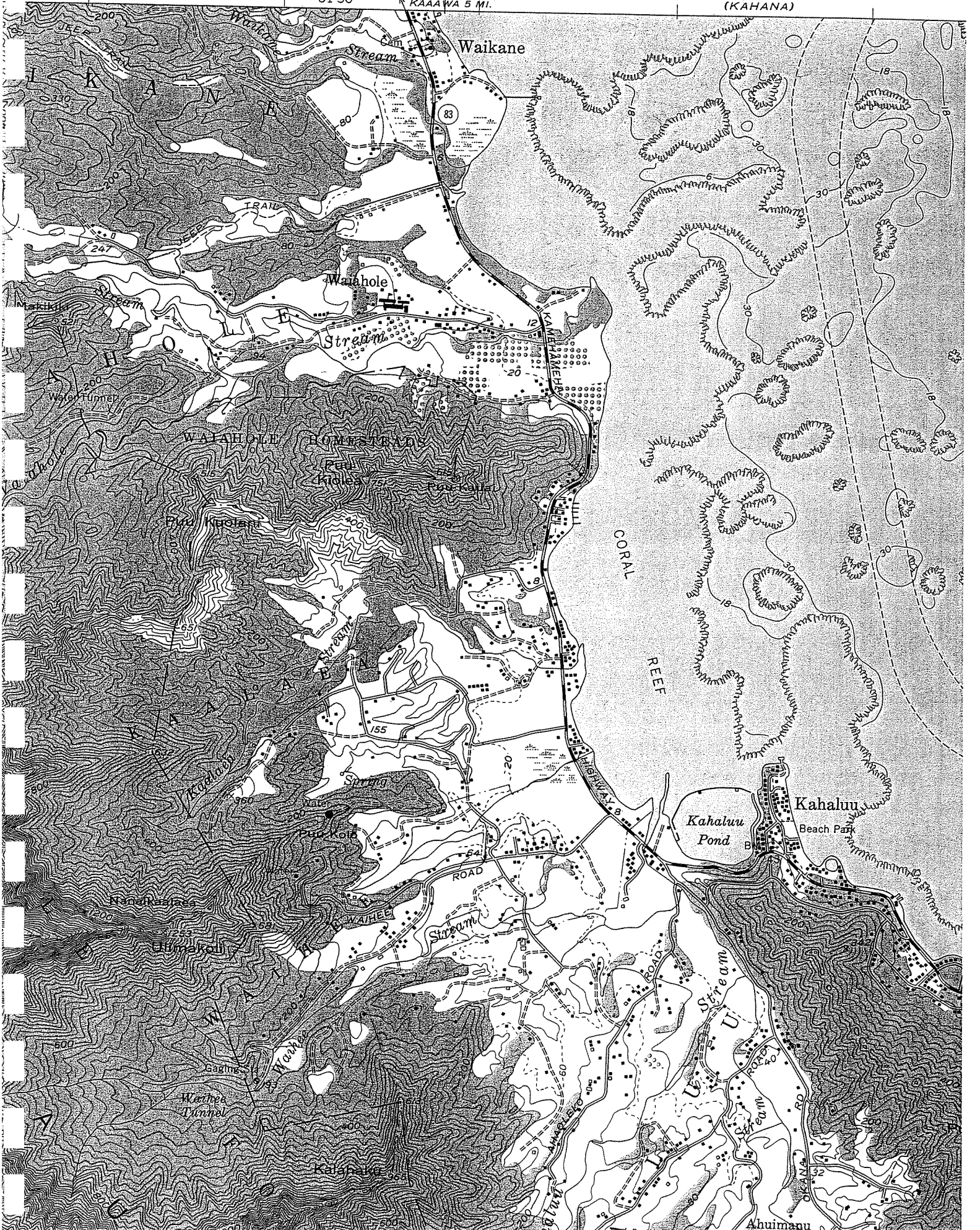
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1:62,500  1:100,000  1:125,000

51°30'

KAHUKU 17 MI.  
KAAHAWA 5 MI.

(KAHANA)



Inquiry Number: 8S3330-5  
TP Quad  Adj Quad  ↑N

Quad KANEOTE

Minute Series  7.5  15  30  30x60

Year 1959  Provisional Edition  Revised

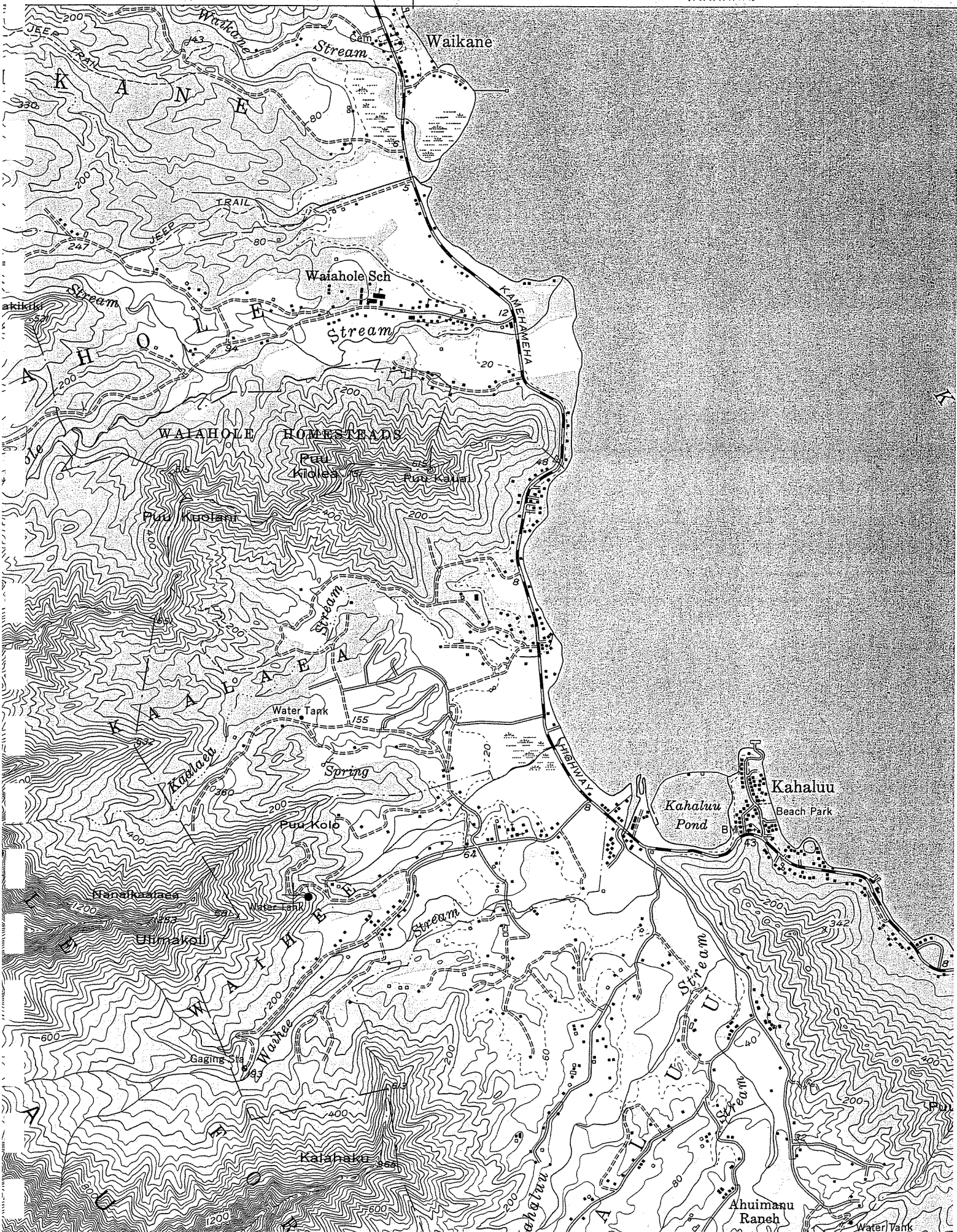
Photorevised  Inspected from N/A

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 1:62,500  1:100,000  1:125,000

51°30'

KAHUKU 17 MI.  
KAAWA 5 MI.

(KAHANA)



Inquiry Number: 853330-5  
TP Quad  Adj Quad  ↑N

Quad KANEOTE

Minute Series  7.5  15  30  30x60

Year 1954  Provisional Edition  Revised

Photorevised  Inspected from N/A

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1:62,500  1:100,000  1:125,000





## **The EDR Radius Map with GeoCheck<sup>®</sup>**

**Waiahole Beach Park  
48-181 Kamehameha Hwy  
Kaneohe, HI 96744**

**Inquiry Number: 853330.3s**

**September 27, 2002**

## ***The Source For Environmental Risk Management Data***

3530 Post Road  
Southport, Connecticut 06890

### **Nationwide Customer Service**

Telephone: 1-800-352-0050  
Fax: 1-800-231-6802  
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## EXECUTIVE SUMMARY

A search of available environmental records was conducted by Environmental Data Resources, Inc. (EDR). The report meets the government records search requirements of ASTM Standard Practice for Environmental Site Assessments, E 1527-00. Search distances are per ASTM standard or custom distances requested by the user.

### TARGET PROPERTY INFORMATION

#### ADDRESS

48-181 KAMEHAMEHA HWY  
KANEHOA, HI 96744

#### COORDINATES

Latitude (North): 21.484640 - 21° 29' 4.7"  
Longitude (West): 157.847390 - 157° 50' 50.6"  
Universal Transverse Mercator: Zone 4  
UTM X (Meters): 619406.2  
UTM Y (Meters): 2376085.8

### USGS TOPOGRAPHIC MAP ASSOCIATED WITH TARGET PROPERTY

Target Property: 2421157-D7 KANEOHE, HI  
Source: USGS 7.5 min quad index

### TARGET PROPERTY SEARCH RESULTS

The target property was not listed in any of the databases searched by EDR.

### DATABASES WITH NO MAPPED SITES

No mapped sites were found in EDR's search of available ( "reasonably ascertainable ") government records either on the target property or within the ASTM E 1527-00 search radius around the target property for the following databases:

### FEDERAL ASTM STANDARD

NPL..... National Priority List  
Proposed NPL..... Proposed National Priority List Sites  
CERCLIS..... Comprehensive Environmental Response, Compensation, and Liability Information System  
CERC-NFRAP..... CERCLIS No Further Remedial Action Planned  
CORRACTS..... Corrective Action Report  
RCRIS-TSD..... Resource Conservation and Recovery Information System  
RCRIS-LQG..... Resource Conservation and Recovery Information System  
RCRIS-SQG..... Resource Conservation and Recovery Information System  
ERNS..... Emergency Response Notification System

### STATE ASTM STANDARD

SHWS..... Sites List  
SWF/LF..... Permitted Landfills in the State of Hawaii  
LUST..... Leaking Underground Storage Tank Database  
UST..... Underground Storage Tank Database

## EXECUTIVE SUMMARY

### FEDERAL ASTM SUPPLEMENTAL

CONSENT.....	Superfund (CERCLA) Consent Decrees
ROD.....	Records Of Decision
Delisted NPL.....	National Priority List Deletions
FINDS.....	Facility Index System/Facility Identification Initiative Program Summary Report
HMIRS.....	Hazardous Materials Information Reporting System
MLTS.....	Material Licensing Tracking System
MINES.....	Mines Master Index File
NPL Liens.....	Federal Superfund Liens
PADS.....	PCB Activity Database System
RAATS.....	RCRA Administrative Action Tracking System
TRIS.....	Toxic Chemical Release Inventory System
TSCA.....	Toxic Substances Control Act
SSTS.....	Section 7 Tracking Systems
FTTS.....	FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

### STATE OR LOCAL ASTM SUPPLEMENTAL

SPILLS..... Release Notifications

### EDR PROPRIETARY HISTORICAL DATABASES

Coal Gas..... Former Manufactured Gas (Coal Gas) Sites

### SURROUNDING SITES: SEARCH RESULTS

Surrounding sites were not identified.

## EXECUTIVE SUMMARY

Due to poor or inadequate address information, the following sites were not mapped:

<u>Site Name</u>	<u>Database(s)</u>
U.S. COAST GUARD OMEGA STATION	SHWS
MCAS KANEOHE LDFL	SHWS
USMC - MCBH KANEOHE BAY	UST, SHWS
WAIMANALO GULCH SANITARY LANDFIL	UST, SWF/LF
MCAS KANEOHE LF (KMCAS LF-0041-95)	SWF/LF, SPILLS
OLD MILILANI LANDFILL	SWF/LF
NEW MILILANI LANDFILL	SWF/LF
HANK'S UNION SERVICE L-6434	UST, LUST
AHUIMANU WASTEWATER PRELIMINARY TREATMENT FACILITY	UST
TEXACO SERVICE STATION	RCRIS-SQG
WINDWARD TOYOTA SERVICE	RCRIS-SQG
SEARS AUTO CTR	RCRIS-SQG
MACYS WEST WINDWARD MALL	RCRIS-SQG
LONGS DRUG STORES 62	RCRIS-SQG
KUALOA PARK COMPRESSED GAS CYLINDER	SPILLS
AIKAHI PARK SHOPPING CENTER	SPILLS
NORTH BEACH CYLINDER	SPILLS
40 GALLONS OF PAINT, KAHALUU BEACH	SPILLS
KATLIN PARK HOUSING BACKYARD	SPILLS
HAWAIIAN MEMORIAL PARK	SPILLS
CYLINDER--FORT HASE BEACH	SPILLS
AMMONIA CYLINDER ON NORTH BEACH KAN	SPILLS
WAIKANE VALLEY BEACH PARK CYLINDER	SPILLS

## MAP FINDINGS SUMMARY

Database	Target Property	Search Distance (Miles)	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
<b><u>FEDERAL ASTM STANDARD</u></b>								
NPL		1.000	0	0	0	0	NR	0
Proposed NPL		1.000	0	0	0	0	NR	0
CERCLIS		0.500	0	0	0	NR	NR	0
CERC-NFRAP		0.250	0	0	NR	NR	NR	0
CORRACTS		1.000	0	0	0	0	NR	0
RCRIS-TSD		0.500	0	0	0	NR	NR	0
RCRIS Lg. Quan. Gen.		0.250	0	0	NR	NR	NR	0
RCRIS Sm. Quan. Gen.		0.250	0	0	NR	NR	NR	0
ERNS		TP	NR	NR	NR	NR	NR	0
<b><u>STATE ASTM STANDARD</u></b>								
SHWS		1.000	0	0	0	0	NR	0
State Landfill		0.500	0	0	0	NR	NR	0
LUST		0.500	0	0	0	NR	NR	0
UST		0.250	0	0	NR	NR	NR	0
<b><u>FEDERAL ASTM SUPPLEMENTAL</u></b>								
CONSENT		1.000	0	0	0	0	NR	0
ROD		1.000	0	0	0	0	NR	0
Delisted NPL		1.000	0	0	0	0	NR	0
FINDS		TP	NR	NR	NR	NR	NR	0
HMIRS		TP	NR	NR	NR	NR	NR	0
MLTS		TP	NR	NR	NR	NR	NR	0
MINES		0.250	0	0	NR	NR	NR	0
NPL Liens		TP	NR	NR	NR	NR	NR	0
PADS		TP	NR	NR	NR	NR	NR	0
RAATS		TP	NR	NR	NR	NR	NR	0
TRIS		TP	NR	NR	NR	NR	NR	0
TSCA		TP	NR	NR	NR	NR	NR	0
SSTS		TP	NR	NR	NR	NR	NR	0
FTTS		TP	NR	NR	NR	NR	NR	0
<b><u>STATE OR LOCAL ASTM SUPPLEMENTAL</u></b>								
SPILLS		TP	NR	NR	NR	NR	NR	0
<b><u>EDR PROPRIETARY HISTORICAL DATABASES</u></b>								
Coal Gas		1.000	0	0	0	0	NR	0
AQUIFLOW - see EDR Physical Setting Source Addendum								

TP = Target Property

NR = Not Requested at this Search Distance

\* Sites may be listed in more than one database

Map ID  
Direction  
Distance  
Distance (ft.)  
Elevation

MAP FINDINGS

Site Database(s) EDR ID Number  
EPA ID Number

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**Coal Gas Site Search: No site was found in a search of Real Property Scan's ENVIROHAZ database.**

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NO SITES FOUND

ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
HONOLULU	S105264378	KUALOA PARK COMPRESSED GAS CYLINDER	KUALOA PARK	96744	SPILLS
HONOLULU COUNTY	U003221669	WAIMANALO GULCH SANITARY LANDFIL	92-460 FARRINGTON HWY		UST, SWF/LF
HONOLULU COUNTY	S103763651	MCAS KANEOHE LF (KMCAS LF-0041-95)	KANEOHE BAY		SWF/LF, SPILLS
HONOLULU COUNTY	S103763648	OLD MILILANI LANDFILL	WAIPIO		SWF/LF
HONOLULU COUNTY	S103763647	NEW MILILANI LANDFILL	WAIPIO		SWF/LF
KAHALUU	U003402870	AHIJIMANU WASTEWATER PRELIMINARY TREATMEN FACILITY	47-305 KAHEKILI HWY	96744	UST
KANEOHE	S105261550	AIKAHI PARK SHOPPING CENTER	AIKAHI PK. SHOPPING CENTER.	96744	SPILLS
KANEOHE	S105264149	NORTH BEACH CYLINDER	NORTH BEACH	96744	SPILLS
KANEOHE	S105264859	40 GALLONS OF PAINT, KAHALUU BEACH	KAHALUU BEACH PARK	96744	SPILLS
KANEOHE	S105262979	KATLIN PARK HOUSING BACKYARD	2213A KALALI ST.	96744	SPILLS
KANEOHE	S105263607	HAWAIIAN MEMORIAL PARK	45-425 KAM HWY	96744	SPILLS
KANEOHE	1004689063	TEXACO SERVICE STATION	46 004 KAM HWY	96744	RCRIS-SQG
KANEOHE	1004688794	WINDWARD TOYOTA SERVICE	45-655 KAM HWY	96744	RCRIS-SQG
KANEOHE	1004688786	SEARS AUTO CTR	46056 KAM HWY	96744	RCRIS-SQG
KANEOHE	U003154883	HANK'S UNION SERVICE L-6434	46-047 KAMEHAMEHA HWY	96744	UST, LUST
KANEOHE	1005415833	MACYS WEST WINDWARD MALL	46 056 KAMEHAMEHA HWY BLDG R	96744	RCRIS-SQG
KANEOHE	1004688749	LONGS DRUG STORES 82	46 047 KAMEHAMEHA HWY LOCATION	96744	RCRIS-SQG
KANEOHE	S104534402	U.S. COAST GUARD OMEGA STATION	KANEOHE	96744	SHWS
KANEOHE	S105264427	CYLINDER--FORT HASE BEACH	MARINE CORP BASE HAWAII	96744	SPILLS
KANEOHE	S104534294	MCAS KANEOHE LDFL	MCAS KANEOHE BASE, MOKAPU PENIN	96744	SHWS
KANEOHE	S105264128	AMMONIA CYLINDER ON NORTH BEACH KAN	MCBH KANEOHE BAY	96744	SPILLS
KANEOHE MARINE CORP:	U003402862	USMC - MCBH KANEOHE BAY	BLDG 505 KB-6081	96744	UST, SHWS
WAIKANI	S105264331	WAIKANE VALLEY BEACH PARK CYLINDER	CYLINDER CURBSIDE WAIKANE BEACH PAR	96744	SPILLS



# GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

To maintain currency of the following federal and state databases, EDR contacts the appropriate governmental agency on a monthly or quarterly basis, as required.

**Elapsed ASTM days:** Provides confirmation that this EDR report meets or exceeds the 90-day updating requirement of the ASTM standard.

## FEDERAL ASTM STANDARD RECORDS

### **NPL: National Priority List**

Source: EPA

Telephone: N/A

National Priorities List (Superfund). The NPL is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund Program. NPL sites may encompass relatively large areas. As such, EDR provides polygon coverage for over 1,000 NPL site boundaries produced by EPA's Environmental Photographic Interpretation Center (EPIC) and regional EPA offices.

Date of Government Version: 07/18/02

Date Made Active at EDR: 09/20/02

Database Release Frequency: Semi-Annually

Date of Data Arrival at EDR: 08/01/02

Elapsed ASTM days: 50

Date of Last EDR Contact: 08/01/02

### **NPL Site Boundaries**

Sources:

EPA's Environmental Photographic Interpretation Center (EPIC)

Telephone: 202-564-7333

EPA Region 1

Telephone 617-918-1143

EPA Region 3

Telephone 215-814-5418

EPA Region 4

Telephone 404-562-8033

EPA Region 6

Telephone: 214-655-6659

EPA Region 8

Telephone: 303-312-6774

### **Proposed NPL: Proposed National Priority List Sites**

Source: EPA

Telephone: N/A

Date of Government Version: 05/29/02

Date Made Active at EDR: 09/20/02

Database Release Frequency: Semi-Annually

Date of Data Arrival at EDR: 08/01/02

Elapsed ASTM days: 50

Date of Last EDR Contact: 08/01/02

### **CERCLIS: Comprehensive Environmental Response, Compensation, and Liability Information System**

Source: EPA

Telephone: 703-413-0223

CERCLIS contains data on potentially hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies and private persons, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). CERCLIS contains sites which are either proposed to or on the National Priorities List (NPL) and sites which are in the screening and assessment phase for possible inclusion on the NPL.

Date of Government Version: 05/15/02

Date Made Active at EDR: 08/08/02

Database Release Frequency: Quarterly

Date of Data Arrival at EDR: 06/24/02

Elapsed ASTM days: 45

Date of Last EDR Contact: 06/24/02

### **CERCLIS-NFRAP: CERCLIS No Further Remedial Action Planned**

Source: EPA

Telephone: 703-413-0223

As of February 1995, CERCLIS sites designated "No Further Remedial Action Planned" (NFRAP) have been removed from CERCLIS. NFRAP sites may be sites where, following an initial investigation, no contamination was found, contamination was removed quickly without the need for the site to be placed on the NPL, or the contamination was not serious enough to require Federal Superfund action or NPL consideration. EPA has removed approximately 25,000 NFRAP sites to lift the unintended barriers to the redevelopment of these properties and has archived them as historical records so EPA does not needlessly repeat the investigations in the future. This policy change is part of the EPA's Brownfields Redevelopment Program to help cities, states, private investors and affected citizens to promote economic redevelopment of unproductive urban sites.

# GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Date of Government Version: 05/15/02  
Date Made Active at EDR: 08/08/02  
Database Release Frequency: Quarterly

Date of Data Arrival at EDR: 06/24/02  
Elapsed ASTM days: 45  
Date of Last EDR Contact: 06/24/02

**CORRACTS:** Corrective Action Report

Source: EPA  
Telephone: 800-424-9346

CORRACTS identifies hazardous waste handlers with RCRA corrective action activity.

Date of Government Version: 05/02/02  
Date Made Active at EDR: 07/15/02  
Database Release Frequency: Semi-Annually

Date of Data Arrival at EDR: 05/06/02  
Elapsed ASTM days: 70  
Date of Last EDR Contact: 09/09/02

**RCRIS:** Resource Conservation and Recovery Information System

Source: EPA/NTIS  
Telephone: 800-424-9346

Resource Conservation and Recovery Information System. RCRIS includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA).

Date of Government Version: 07/10/02  
Date Made Active at EDR: 09/20/02  
Database Release Frequency: Varies

Date of Data Arrival at EDR: 07/26/02  
Elapsed ASTM days: 56  
Date of Last EDR Contact: 06/20/02

**ERNS:** Emergency Response Notification System

Source: EPA/NTIS  
Telephone: 202-260-2342

Emergency Response Notification System. ERNS records and stores information on reported releases of oil and hazardous substances.

Date of Government Version: 12/31/01  
Date Made Active at EDR: 07/15/02  
Database Release Frequency: Varies

Date of Data Arrival at EDR: 07/02/02  
Elapsed ASTM days: 13  
Date of Last EDR Contact: 07/24/02

## FEDERAL ASTM SUPPLEMENTAL RECORDS

**BRS:** Biennial Reporting System

Source: EPA/NTIS  
Telephone: 800-424-9346

The Biennial Reporting System is a national system administered by the EPA that collects data on the generation and management of hazardous waste. BRS captures detailed data from two groups: Large Quantity Generators (LQG) and Treatment, Storage, and Disposal Facilities.

Date of Government Version: 12/31/99  
Database Release Frequency: Biennially

Date of Last EDR Contact: 09/16/02  
Date of Next Scheduled EDR Contact: 12/16/02

**CONSENT:** Superfund (CERCLA) Consent Decrees

Source: EPA Regional Offices  
Telephone: Varies

Major legal settlements that establish responsibility and standards for cleanup at NPL (Superfund) sites. Released periodically by United States District Courts after settlement by parties to litigation matters.

Date of Government Version: N/A  
Database Release Frequency: Varies

Date of Last EDR Contact: N/A  
Date of Next Scheduled EDR Contact: N/A

**ROD:** Records Of Decision

Source: EPA  
Telephone: 703-416-0223

Record of Decision. ROD documents mandate a permanent remedy at an NPL (Superfund) site containing technical and health information to aid in the cleanup.

# GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Date of Government Version: 12/21/01  
Database Release Frequency: Annually

Date of Last EDR Contact: 07/09/02  
Date of Next Scheduled EDR Contact: 10/07/02

**DELISTED NPL:** National Priority List Deletions

Source: EPA  
Telephone: N/A

The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establishes the criteria that the EPA uses to delete sites from the NPL. In accordance with 40 CFR 300.425.(e), sites may be deleted from the NPL where no further response is appropriate.

Date of Government Version: 07/18/02  
Database Release Frequency: Quarterly

Date of Last EDR Contact: 08/01/02  
Date of Next Scheduled EDR Contact: 11/04/02

**FINDS:** Facility Index System/Facility Identification Initiative Program Summary Report

Source: EPA  
Telephone: N/A

Facility Index System. FINDS contains both facility information and 'pointers' to other sources that contain more detail. EDR includes the following FINDS databases in this report: PCS (Permit Compliance System), AIRS (Aerometric Information Retrieval System), DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes), FURS (Federal Underground Injection Control), C-DOCKET (Criminal Docket System used to track criminal enforcement actions for all environmental statutes), FFIS (Federal Facilities Information System), STATE (State Environmental Laws and Statutes), and PADS (PCB Activity Data System).

Date of Government Version: 03/21/02  
Database Release Frequency: Quarterly

Date of Last EDR Contact: 07/08/02  
Date of Next Scheduled EDR Contact: 10/07/02

**HMIRS:** Hazardous Materials Information Reporting System

Source: U.S. Department of Transportation  
Telephone: 202-366-4555

Hazardous Materials Incident Report System. HMIRS contains hazardous material spill incidents reported to DOT.

Date of Government Version: 05/31/02  
Database Release Frequency: Annually

Date of Last EDR Contact: 07/22/02  
Date of Next Scheduled EDR Contact: 10/21/02

**MLTS:** Material Licensing Tracking System

Source: Nuclear Regulatory Commission  
Telephone: 301-415-7169

MLTS is maintained by the Nuclear Regulatory Commission and contains a list of approximately 8,100 sites which possess or use radioactive materials and which are subject to NRC licensing requirements. To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 04/12/02  
Database Release Frequency: Quarterly

Date of Last EDR Contact: 07/08/02  
Date of Next Scheduled EDR Contact: 10/07/02

**MINES:** Mines Master Index File

Source: Department of Labor, Mine Safety and Health Administration  
Telephone: 303-231-5959

Date of Government Version: 06/05/02  
Database Release Frequency: Semi-Annually

Date of Last EDR Contact: 07/01/02  
Date of Next Scheduled EDR Contact: 09/30/02

**NPL LIENS:** Federal Superfund Liens

Source: EPA  
Telephone: 205-564-4267

Federal Superfund Liens. Under the authority granted the USEPA by the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980, the USEPA has the authority to file liens against real property in order to recover remedial action expenditures or when the property owner receives notification of potential liability. USEPA compiles a listing of filed notices of Superfund Liens.

# GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Date of Government Version: 10/15/91  
Database Release Frequency: No Update Planned

Date of Last EDR Contact: 08/26/02  
Date of Next Scheduled EDR Contact: 11/25/02

**PADS:** PCB Activity Database System

Source: EPA  
Telephone: 202-564-3887

PCB Activity Database. PADS Identifies generators, transporters, commercial storers and/or brokers and disposers of PCB's who are required to notify the EPA of such activities.

Date of Government Version: 03/01/02  
Database Release Frequency: Annually

Date of Last EDR Contact: 08/02/02  
Date of Next Scheduled EDR Contact: 11/11/02

**RAATS:** RCRA Administrative Action Tracking System

Source: EPA  
Telephone: 202-564-4104

RCRA Administration Action Tracking System. RAATS contains records based on enforcement actions issued under RCRA pertaining to major violators and includes administrative and civil actions brought by the EPA. For administration actions after September 30, 1995, data entry in the RAATS database was discontinued. EPA will retain a copy of the database for historical records. It was necessary to terminate RAATS because a decrease in agency resources made it impossible to continue to update the information contained in the database.

Date of Government Version: 04/17/95  
Database Release Frequency: No Update Planned

Date of Last EDR Contact: 09/10/02  
Date of Next Scheduled EDR Contact: 12/09/02

**TRIS:** Toxic Chemical Release Inventory System

Source: EPA  
Telephone: 202-260-1531

Toxic Release Inventory System. TRIS identifies facilities which release toxic chemicals to the air, water and land in reportable quantities under SARA Title III Section 313.

Date of Government Version: 12/31/00  
Database Release Frequency: Annually

Date of Last EDR Contact: 06/24/02  
Date of Next Scheduled EDR Contact: 09/23/02

**TSCA:** Toxic Substances Control Act

Source: EPA  
Telephone: 202-260-5521

Toxic Substances Control Act. TSCA identifies manufacturers and importers of chemical substances included on the TSCA Chemical Substance Inventory list. It includes data on the production volume of these substances by plant site.

Date of Government Version: 12/31/98  
Database Release Frequency: Every 4 Years

Date of Last EDR Contact: 09/09/02  
Date of Next Scheduled EDR Contact: 12/09/02

**FTTS INSP:** FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

Source: EPA  
Telephone: 202-564-2501

Date of Government Version: 04/25/02  
Database Release Frequency: Quarterly

Date of Last EDR Contact: 07/03/02  
Date of Next Scheduled EDR Contact: 09/23/02

**SSTS:** Section 7 Tracking Systems

Source: EPA  
Telephone: 202-564-5008

Section 7 of the Federal Insecticide, Fungicide and Rodenticide Act, as amended (92 Stat. 829) requires all registered pesticide-producing establishments to submit a report to the Environmental Protection Agency by March 1st each year. Each establishment must report the types and amounts of pesticides, active ingredients and devices being produced, and those having been produced and sold or distributed in the past year.

Date of Government Version: 12/31/00  
Database Release Frequency: Annually

Date of Last EDR Contact: 07/19/02  
Date of Next Scheduled EDR Contact: 10/21/02

# GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

## **FTTS:** FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

Source: EPA/Office of Prevention, Pesticides and Toxic Substances

Telephone: 202-564-2501

FTTS tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-Know Act). To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 04/25/02  
Database Release Frequency: Quarterly

Date of Last EDR Contact: 07/03/02  
Date of Next Scheduled EDR Contact: 09/23/02

## **STATE OF HAWAII ASTM STANDARD RECORDS**

### **SHWS:** Sites List

Source: Department of Health

Telephone: 808-586-4249

Facilities, sites or areas in which the Office of Hazard Evaluation and Emergency Response has an interest, has investigated or may investigate under HRS 128D (includes CERCLIS sites).

Date of Government Version: 07/12/01  
Date Made Active at EDR: 10/16/01  
Database Release Frequency: Semi-Annually

Date of Data Arrival at EDR: 09/24/01  
Elapsed ASTM days: 22  
Date of Last EDR Contact: 06/24/02

### **SWF/LF:** Permitted Landfills in the State of Hawaii

Source: Department of Health

Telephone: 808-586-4245

Solid Waste Facilities/Landfill Sites. SWF/LF type records typically contain an inventory of solid waste disposal facilities or landfills in a particular state. Depending on the state, these may be active or inactive facilities or open dumps that failed to meet RCRA Subtitle D Section 4004 criteria for solid waste landfills or disposal sites.

Date of Government Version: 05/03/99  
Date Made Active at EDR: 05/25/99  
Database Release Frequency: Varies

Date of Data Arrival at EDR: 05/10/99  
Elapsed ASTM days: 15  
Date of Last EDR Contact: 07/23/02

### **LUST:** Leaking Underground Storage Tank Database

Source: Department of Health

Telephone: 808-586-4228

Leaking Underground Storage Tank Incident Reports. LUST records contain an inventory of reported leaking underground storage tank incidents. Not all states maintain these records, and the information stored varies by state.

Date of Government Version: 07/01/02  
Date Made Active at EDR: 07/31/02  
Database Release Frequency: Semi-Annually

Date of Data Arrival at EDR: 07/15/02  
Elapsed ASTM days: 16  
Date of Last EDR Contact: 07/03/02

### **UST:** Underground Storage Tank Database

Source: Department of Health

Telephone: 808-586-4228

Registered Underground Storage Tanks. UST's are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA) and must be registered with the state department responsible for administering the UST program. Available information varies by state program.

Date of Government Version: 07/01/02  
Date Made Active at EDR: 07/30/02  
Database Release Frequency: Semi-Annually

Date of Data Arrival at EDR: 07/15/02  
Elapsed ASTM days: 15  
Date of Last EDR Contact: 07/03/02

## **STATE OF HAWAII ASTM SUPPLEMENTAL RECORDS**

### **SPILLS:** Release Notifications

Source: Department of Health

Telephone: 808-586-4249

Releases of hazardous substances to the environment reported to the Office of Hazard Evaluation and Emergency Response since 1988.

# GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Date of Government Version: 09/01/00  
Database Release Frequency: Varies

Date of Last EDR Contact: 06/24/02  
Date of Next Scheduled EDR Contact: 09/23/02

## EDR PROPRIETARY HISTORICAL DATABASES

**Former Manufactured Gas (Coal Gas) Sites:** The existence and location of Coal Gas sites is provided exclusively to EDR by Real Property Scan, Inc. ©Copyright 1993 Real Property Scan, Inc. For a technical description of the types of hazards which may be found at such sites, contact your EDR customer service representative.

### **Disclaimer Provided by Real Property Scan, Inc.**

The information contained in this report has predominantly been obtained from publicly available sources produced by entities other than Real Property Scan. While reasonable steps have been taken to insure the accuracy of this report, Real Property Scan does not guarantee the accuracy of this report. Any liability on the part of Real Property Scan is strictly limited to a refund of the amount paid. No claim is made for the actual existence of toxins at any site. This report does not constitute a legal opinion.

## OTHER DATABASE(S)

Depending on the geographic area covered by this report, the data provided in these specialty databases may or may not be complete. For example, the existence of wetlands information data in a specific report does not mean that all wetlands in the area covered by the report are included. Moreover, the absence of any reported wetlands information does not necessarily mean that wetlands do not exist in the area covered by the report.

**Oil/Gas Pipelines/Electrical Transmission Lines:** This data was obtained by EDR from the USGS in 1994. It is referred to by USGS as GeoData Digital Line Graphs from 1:100,000-Scale Maps. It was extracted from the transportation category including some oil, but primarily gas pipelines and electrical transmission lines.

**Sensitive Receptors:** There are individuals deemed sensitive receptors due to their fragile immune systems and special sensitivity to environmental discharges. These sensitive receptors typically include the elderly, the sick, and children. While the location of all sensitive receptors cannot be determined, EDR indicates those buildings and facilities - schools, daycares, hospitals, medical centers, and nursing homes - where individuals who are sensitive receptors are likely to be located.

**Flood Zone Data:** This data, available in select counties across the country, was obtained by EDR in 1999 from the Federal Emergency Management Agency (FEMA). Data depicts 100-year and 500-year flood zones as defined by FEMA.

**NWI:** National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002 from the U.S. Fish and Wildlife Service.

## STREET AND ADDRESS INFORMATION

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## GEOCHECK<sup>®</sup> - PHYSICAL SETTING SOURCE ADDENDUM

### TARGET PROPERTY ADDRESS

WAI AHOLE BEACH PARK  
48-181 KAMEHAMEHA HWY  
KANE OHA, HI 96744

### TARGET PROPERTY COORDINATES

Latitude (North):	21.484640 - 21° 29' 4.7"
Longitude (West):	157.847397 - 157° 50' 50.6"
Universal Tranverse Mercator:	Zone 4
UTM X (Meters):	619406.2
UTM Y (Meters):	2376085.8

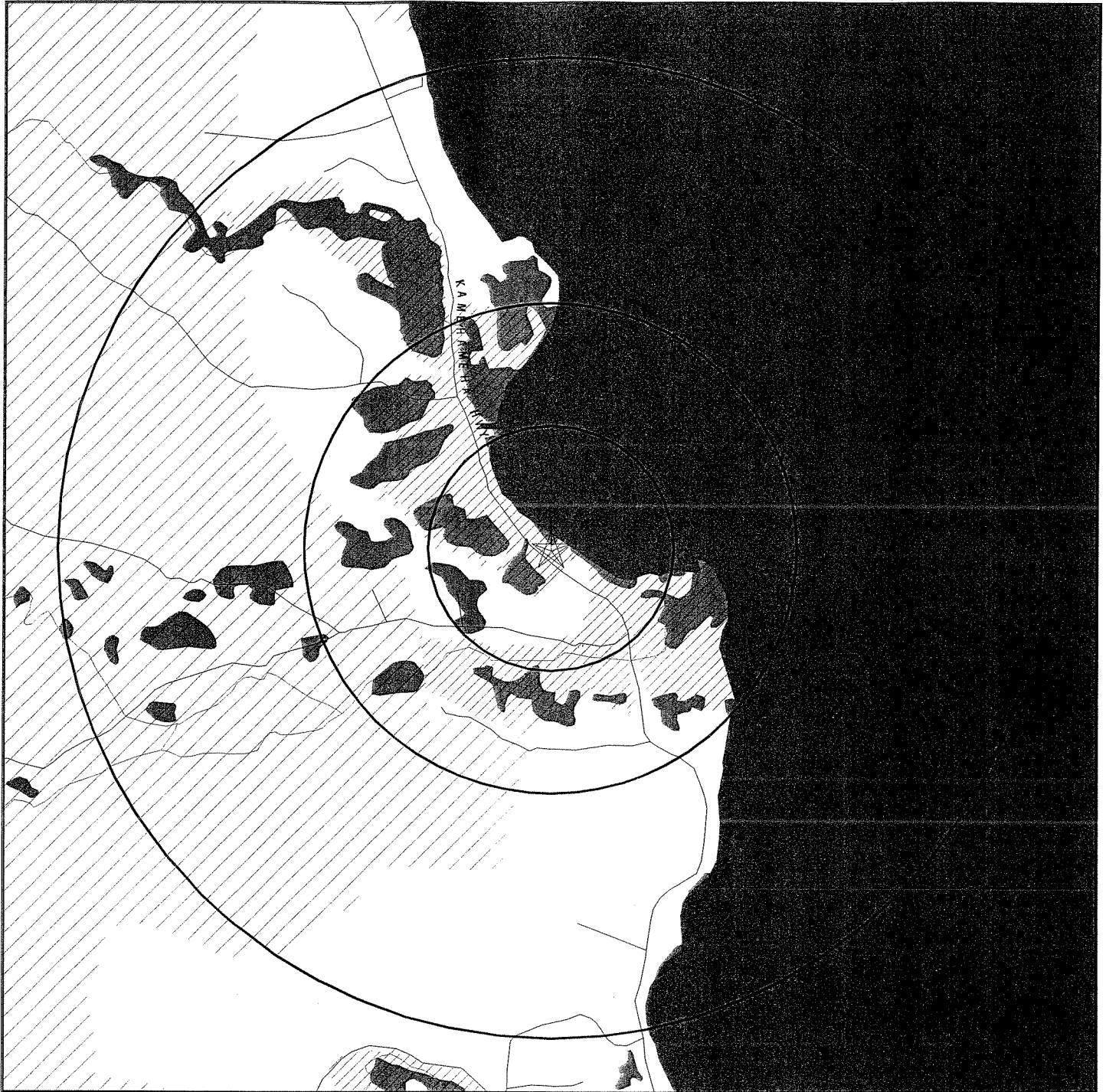
EDR's GeoCheck Physical Setting Source Addendum has been developed to assist the environmental professional with the collection of physical setting source information in accordance with ASTM 1527-00, Section 7.2.3. Section 7.2.3 requires that a current USGS 7.5 Minute Topographic Map (or equivalent, such as the USGS Digital Elevation Model) be reviewed. It also requires that one or more additional physical setting sources be sought when (1) conditions have been identified in which hazardous substances or petroleum products are likely to migrate to or from the property, and (2) more information than is provided in the current USGS 7.5 Minute Topographic Map (or equivalent) is generally obtained, pursuant to local good commercial or customary practice, to assess the impact of migration of recognized environmental conditions in connection with the property. Such additional physical setting sources generally include information about the topographic, hydrologic, hydrogeologic, and geologic characteristics of a site, and wells in the area.

Assessment of the impact of contaminant migration generally has two principle investigative components:

1. Groundwater flow direction, and
2. Groundwater flow velocity.

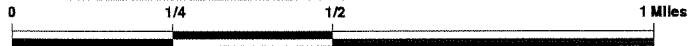
Groundwater flow direction may be impacted by surface topography, hydrology, hydrogeology, characteristics of the soil, and nearby wells. Groundwater flow velocity is generally impacted by the nature of the geologic strata. EDR's GeoCheck Physical Setting Source Addendum is provided to assist the environmental professional in forming an opinion about the impact of potential contaminant migration.

# OVERVIEW MAP - 853330.3s - The Environmental Company



- ★ Target Property
- ▲ Sites at elevations higher than or equal to the target property
- ◆ Sites at elevations lower than the target property
- ▲ Coal Gasification Sites
- ▨ National Priority List Sites
- ▧ Landfill Sites

- ⚡ Power transmission lines
- ⚡ Oil & Gas pipelines
- ▨ 100-year flood zone
- ▧ 500-year flood zone
- Wetlands



**TARGET PROPERTY:** Waiahole Beach Park  
**ADDRESS:** 48-181 Kamehameha Hwy  
**CITY/STATE/ZIP:** Kaneohe HI 96744  
**LAT/LONG:** 21.4846 / 157.8474

**CUSTOMER:** The Environmental Company  
**CONTACT:** Achie Reyes  
**INQUIRY #:** 853330.3s  
**DATE:** September 27, 2002 9:44 am



# DETAIL MAP - 853330.3s - The Environmental Company



- ★ Target Property
- ▲ Sites at elevations higher than or equal to the target property
- ◆ Sites at elevations lower than the target property
- ▲ Coal Gasification Sites
- Sensitive Receptors
- ▨ National Priority List Sites
- ▨ Landfill Sites

- ⚡ Power transmission lines
- ⚡ Oil & Gas pipelines
- ▨ 100-year flood zone
- ▨ 500-year flood zone
- Wetlands



<b>TARGET PROPERTY:</b>	Waiahole Beach Park	<b>CUSTOMER:</b>	The Environmental Company
<b>ADDRESS:</b>	48-181 Kamehameha Hwy	<b>CONTACT:</b>	Achie Reyes
<b>CITY/STATE/ZIP:</b>	Kaneohe HI 96744	<b>INQUIRY #:</b>	853330.3s
<b>LAT/LONG:</b>	21.4846 / 157.8474	<b>DATE:</b>	September 27, 2002 9:44 am

# GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

## GROUNDWATER FLOW DIRECTION INFORMATION

Groundwater flow direction for a particular site is best determined by a qualified environmental professional using site-specific well data. If such data is not reasonably ascertainable, it may be necessary to rely on other sources of information, such as surface topographic information, hydrologic information, hydrogeologic data collected on nearby properties, and regional groundwater flow information (from deep aquifers).

## TOPOGRAPHIC INFORMATION

Surface topography may be indicative of the direction of surficial groundwater flow. This information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

## USGS TOPOGRAPHIC MAP ASSOCIATED WITH THIS SITE

Target Property: 2421157-D7 KANEOHE, HI  
Source: USGS 7.5 min quad index

## GENERAL TOPOGRAPHIC GRADIENT AT TARGET PROPERTY

Target Property: General NE

Source: General Topographic Gradient has been determined from the USGS 1 Degree Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified.

## HYDROLOGIC INFORMATION

Surface water can act as a hydrologic barrier to groundwater flow. Such hydrologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

Refer to the Physical Setting Source Map following this summary for hydrologic information (major waterways and bodies of water).

## FEMA FLOOD ZONE

<u>Target Property County</u> HONOLULU, HI	FEMA Flood <u>Electronic Data</u> YES - refer to the Overview Map and Detail Map
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Flood Plain Panel at Target Property: 1500010055B

Additional Panels in search area: 1500010031B

## NATIONAL WETLAND INVENTORY

<u>NWI Quad at Target Property</u> KANEOHE	NWI Electronic <u>Data Coverage</u> YES - refer to the Overview Map and Detail Map
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## HYDROGEOLOGIC INFORMATION

Hydrogeologic information obtained by installation of wells on a specific site can often be an indicator of groundwater flow direction in the immediate area. Such hydrogeologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

# GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

## AQUIFLOW®

Search Radius: 2.000 Miles.

EDR has developed the AQUIFLOW Information System to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted by environmental professionals to regulatory authorities at select sites and has extracted the date of the report, groundwater flow direction as determined hydrogeologically, and the depth to water table.

<u>MAP ID</u>	<u>LOCATION FROM TP</u>	<u>GENERAL DIRECTION GROUNDWATER FLOW</u>
Not Reported		

## GROUNDWATER FLOW VELOCITY INFORMATION

Groundwater flow velocity information for a particular site is best determined by a qualified environmental professional using site specific geologic and soil strata data. If such data are not reasonably ascertainable, it may be necessary to rely on other sources of information, including geologic age identification, rock stratigraphic unit and soil characteristics data collected on nearby properties and regional soil information. In general, contaminant plumes move more quickly through sandy-gravelly types of soils than silty-clayey types of soils.

## GEOLOGIC INFORMATION IN GENERAL AREA OF TARGET PROPERTY

Geologic information can be used by the environmental professional in forming an opinion about the relative speed at which contaminant migration may be occurring.

### ROCK STRATIGRAPHIC UNIT

### GEOLOGIC AGE IDENTIFICATION

Era:	-	Category:	-
System:	-		
Series:	-		
Code:	N/A (decoded above as Era, System & Series)		

Geologic Age and Rock Stratigraphic Unit Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - a digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

## DOMINANT SOIL COMPOSITION IN GENERAL AREA OF TARGET PROPERTY

The U.S. Department of Agriculture's (USDA) Soil Conservation Service (SCS) leads the National Cooperative Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. Soil maps for STATSGO are compiled by generalizing more detailed (SSURGO) soil survey maps. The following information is based on Soil Conservation Service STATSGO data.

Soil Component Name:	HANALEI
Soil Surface Texture:	silty clay
Hydrologic Group:	Class C - Slow infiltration rates. Soils with layers impeding downward movement of water, or soils with moderately fine or fine textures.
Soil Drainage Class:	Not reported

## GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

Hydric Status: Soil does not meet the requirements for a hydric soil.

Corrosion Potential - Uncoated Steel: HIGH

Depth to Bedrock Min: > 60 inches

Depth to Bedrock Max: > 60 inches

Soil Layer Information							
Layer	Boundary		Soil Texture Class	Classification		Permeability Rate (in/hr)	Soil Reaction (pH)
	Upper	Lower		AASHTO Group	Unified Soil		
1	0 inches	13 inches	silty clay	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	Oxidic suffix for MH	Max: 2.00 Min: 0.60	Max: 6.50 Min: 4.50
2	13 inches	26 inches	silty clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	Oxidic suffix for MH	Max: 2.00 Min: 0.60	Max: 7.30 Min: 6.10
3	26 inches	36 inches	stratified	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	Oxidic suffix for MH	Max: 2.00 Min: 0.60	Max: 7.30 Min: 6.10

### OTHER SOIL TYPES IN AREA

Based on Soil Conservation Service STATSGO data, the following additional subordinant soil types may appear within the general area of target property.

Soil Surface Textures: clay  
mucky-peat  
stony - silty clay  
stony - clay

Surficial Soil Types: clay  
mucky-peat  
stony - silty clay  
stony - clay

Shallow Soil Types: No Other Soil Types

Deeper Soil Types: muck  
mucky-peat  
sand  
silty clay  
clay

# GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

## ADDITIONAL ENVIRONMENTAL RECORD SOURCES

According to ASTM E 1527-00, Section 7.2.2, "one or more additional state or local sources of environmental records may be checked, in the discretion of the environmental professional, to enhance and supplement federal and state sources... Factors to consider in determining which local or additional state records, if any, should be checked include (1) whether they are reasonably ascertainable, (2) whether they are sufficiently useful, accurate, and complete in light of the objective of the records review (see 7.1.1), and (3) whether they are obtained, pursuant to local, good commercial or customary practice." One of the record sources listed in Section 7.2.2 is water well information. Water well information can be used to assist the environmental professional in assessing sources that may impact groundwater flow direction, and in forming an opinion about the impact of contaminant migration on nearby drinking water wells.

## WELL SEARCH DISTANCE INFORMATION

<u>DATABASE</u>	<u>SEARCH DISTANCE (miles)</u>
Federal USGS	1.000
Federal FRDS PWS	Nearest PWS within 1 mile
State Database	1.000

## FEDERAL USGS WELL INFORMATION

<u>MAP ID</u>	<u>WELL ID</u>	<u>LOCATION FROM TP</u>
B4	212838157504801	1/2 - 1 Mile SSE
B5	212830157505201	1/2 - 1 Mile South

## FEDERAL FRDS PUBLIC WATER SUPPLY SYSTEM INFORMATION

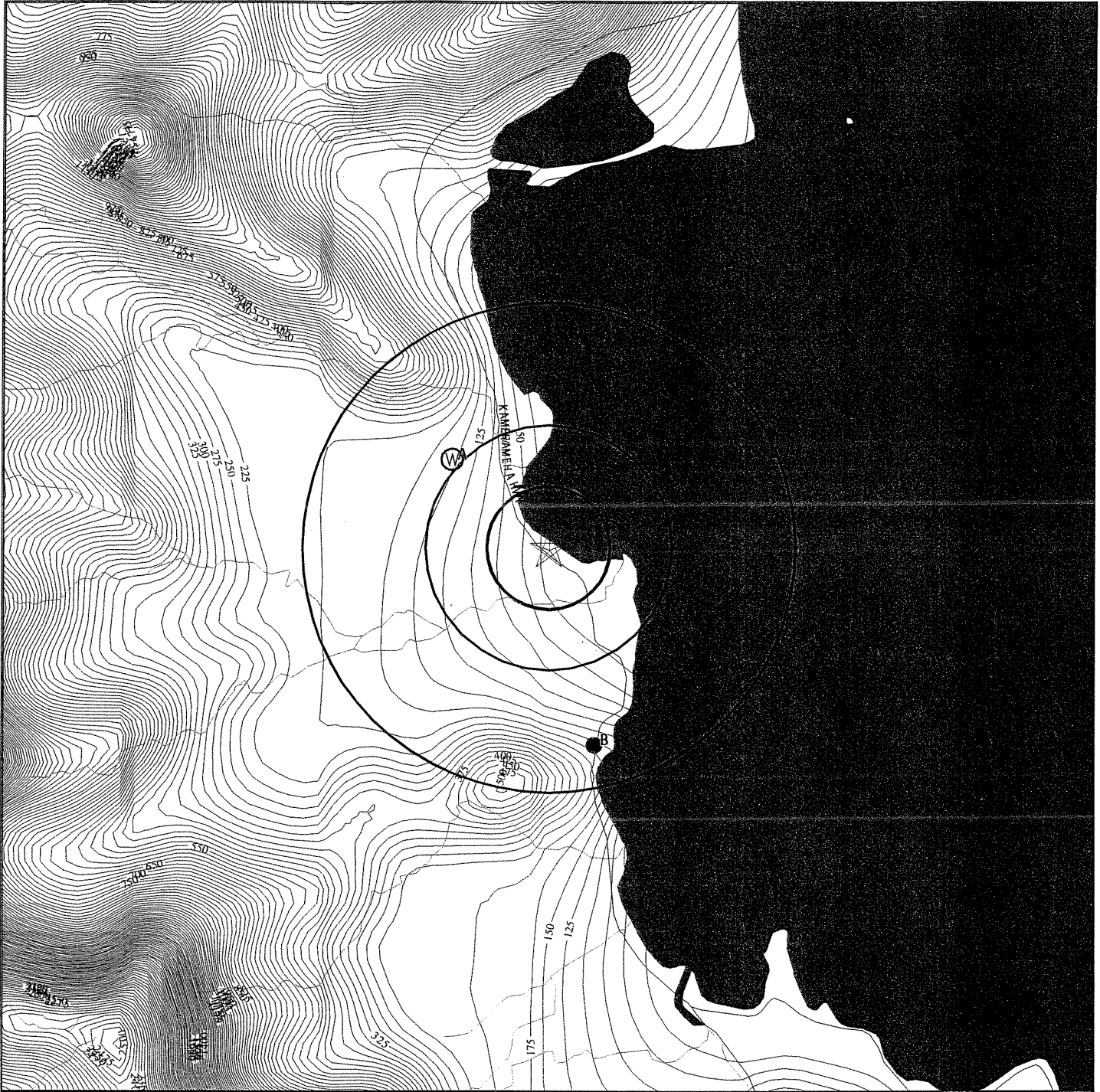
<u>MAP ID</u>	<u>WELL ID</u>	<u>LOCATION FROM TP</u>
No PWS System Found		

Note: PWS System location is not always the same as well location.

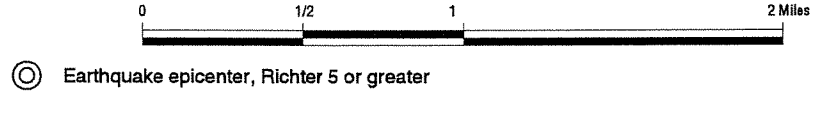
## STATE DATABASE WELL INFORMATION

<u>MAP ID</u>	<u>WELL ID</u>	<u>LOCATION FROM TP</u>
A1	3-2951-005	1/2 - 1 Mile NW
A2	3-2951-004	1/2 - 1 Mile NW
B3	3-2850-002	1/2 - 1 Mile SSE
B6	3-2850-001	1/2 - 1 Mile South

**PHYSICAL SETTING SOURCE MAP - 853330.3s**



- ↘ Major Roads
- ↘ Contour Lines
- Ⓜ Water Wells
- Ⓟ Public Water Supply Wells
- ↑ Groundwater Flow Direction
- ⓐ Indeterminate Groundwater Flow at Location
- ⓖ Groundwater Flow Varies at Location
- Cluster of Multiple Icons



⊙ Earthquake epicenter, Richter 5 or greater

<b>TARGET PROPERTY:</b>	Waiahole Beach Park	<b>CUSTOMER:</b>	The Environmental Company
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<b>CITY/STATE/ZIP:</b>	Kaneohe HI 96744	<b>INQUIRY #:</b>	853330.3s
<b>LAT/LONG:</b>	21.4846 / 157.8474	<b>DATE:</b>	September 27, 2002 9:44 am

## GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID  
 Direction  
 Distance  
 Elevation

Database      EDR ID Number

**A1**  
**NW**  
**1/2 - 1 Mile**  
**Higher**

**HI WELLS      3-2951-005**

Wid:	3-2951-005	Island Code:	3
Island Name:	Oahu	Well no:	2951-05
Well name:	Waikane-Roberts	Old name:	Not Reported
Yr drilled:	1990	Driller:	Not Reported
Quad_map:	12	Latitude:	212935
Longitude:	1575121	UTM:	Y
Gps:	N	Owner/user:	Roberts H
Old number:	Not Reported	Well_type:	Not Reported
Type:	Not Reported	Casing dia:	4
Ground Elev:	Not Reported	Well depth:	15
Solid casing Depth:	5	Perf casing Depth:	10
Use:	OTH	Use Desc:	Other
Use year:	90	Water Top Elev:	0
Chloride value:	0	Test date:	Not Reported
Pumping Test rate:	Not Reported	Drop in water Lvl:	Not Reported
Chloride Test:	Not Reported	Temperature:	Not Reported
Units:	Not Reported	Pump Capacity:	30
Annual Draft:	Not Reported	Static Water Lvl:	Not Reported
Geology:	Not Reported	Geology desc:	Not Reported
Installed:	90	Last Measured:	Not Reported
Max chlorides:	Not Reported	Max Cl year:	0
Min chlorides:	Not Reported	Min Cl year:	0
Bot_hole depth:	Not Reported	bot_solid depth:	Not Reported
Bot_perf depth:	Not Reported	Well Capacity:	Not Reported
Pump Capacity:	.043	Draft (mgd):	Not Reported
Tax map key:	4-8-004:016	Aquifer code:	30603
Latest head mmt:	0	Cur head mmt:	Not Reported
Current Cl mmt:	Not Reported	Const. Date:	01/01/1990 00:00:00
Pump Inst. Date:	Not Reported	Surveyor:	Not Reported
Transmissivity:	0	Pump intake elev:	Not Reported
Pump depth:	Not Reported		

**A2**  
**NW**  
**1/2 - 1 Mile**  
**Higher**

**HI WELLS      3-2951-004**

Wid:	3-2951-004	Island Code:	3
Island Name:	Oahu	Well no:	2951-04
Well name:	Waikane-Roberts	Old name:	Not Reported
Yr drilled:	Not Reported	Driller:	Not Reported
Quad_map:	12	Latitude:	212935
Longitude:	1575124	UTM:	Y
Gps:	N	Owner/user:	Roberts H
Old number:	Not Reported	Well_type:	DUG
Type:	Dug Well	Casing dia:	Not Reported
Ground Elev:	Not Reported	Well depth:	Not Reported

## GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Solid casing Depth:	Not Reported	Perf casing Depth:	Not Reported
Use:	OTH	Use Desc:	Other
Use year:	90	Water Top Elev:	0
Chloride value:	0	Test date:	Not Reported
Pumping Test rate:	Not Reported	Drop in water Lvl:	Not Reported
Chloride Test:	Not Reported	Temperature:	Not Reported
Units:	Not Reported	Pump Capacity:	0
Annual Draft:	Not Reported	Static Water Lvl:	Not Reported
Geology:	Not Reported	Geology desc:	Not Reported
Installed:	Not Reported	Last Measured:	Not Reported
Max chlorides:	Not Reported	Max CI year:	Not Reported
Min chlorides:	Not Reported	Min CI year:	Not Reported
Bot_hole depth:	Not Reported	bot_solid depth:	Not Reported
Bot_perf depth:	Not Reported	Well Capacity:	Not Reported
Pump Capacity:	Not Reported	Draft (mgd):	Not Reported
Tax map key:	4-8-004:016	Aquifer code:	30603
Latest head mmt:	0	Cur head mmt:	Not Reported
Current CI mmt:	Not Reported	Const. Date:	Not Reported
Pump Inst. Date:	Not Reported	Surveyor:	Not Reported
Transmissivity:	0	Pump intake elev:	Not Reported
Pump depth:	Not Reported		

**B3**  
**SSE**  
**1/2 - 1 Mile**  
**Higher**

**HI WELLS 3-2850-002**

Wid:	3-2850-002	Island Code:	3
Island Name:	Oahu	Well no:	2850-02
Well name:	Kaalaea	Old name:	Not Reported
Yr drilled:	1947	Driller:	MULLIN
Quad_map:	12	Latitude:	212838
Longitude:	1575048	UTM:	Y
Gps:	N	Owner/user:	Yee & Ching
Old number:	407-10	Well_type:	Not Reported
Type:	Not Reported	Casing dia:	8
Ground Elev:	30	Well depth:	60
Solid casing Depth:	48	Perf casing Depth:	Not Reported
Use:	DOM	Use Desc:	Domestic
Use year:	74	Water Top Elev:	0
Chloride value:	120	Test date:	Not Reported
Pumping Test rate:	Not Reported	Drop in water Lvl:	Not Reported
Chloride Test:	Not Reported	Temperature:	Not Reported
Units:	Not Reported	Pump Capacity:	0
Annual Draft:	Not Reported	Static Water Lvl:	Not Reported
Geology:	TKDC	Geology desc:	Tertiary Koolau dike complex
Installed:	Not Reported	Last Measured:	Not Reported
Max chlorides:	Not Reported	Max CI year:	0
Min chlorides:	Not Reported	Min CI year:	0
Bot_hole depth:	-30	bot_solid depth:	-18
Bot_perf depth:	Not Reported	Well Capacity:	Not Reported
Pump Capacity:	Not Reported	Draft (mgd):	Not Reported
Tax map key:	4-7-024:007	Aquifer code:	30603
Latest head mmt:	0	Cur head mmt:	Not Reported
Current CI mmt:	Not Reported	Const. Date:	01/01/1947 00:00:00
Pump Inst. Date:	Not Reported	Surveyor:	Not Reported
Transmissivity:	0	Pump intake elev:	Not Reported
Pump depth:	Not Reported		



## GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID  
 Direction  
 Distance  
 Elevation

Database      EDR ID Number

**B4**  
**SSE**  
**1/2 - 1 Mile**  
**Higher**

FED USGS      212838157504801

**BASIC WELL DATA**

Site Type:	Single well, other than collector or Ranney type		
Year Constructed:	1947	County:	Honolulu
Altitude:	30.00 ft.	State:	Hawaii
Well Depth:	60.00 ft.	Topographic Setting:	Not Reported
Depth to Water Table:	Not Reported	Prim. Use of Site:	Withdrawal of water
Date Measured:	Not Reported	Prim. Use of Water:	Domestic

**B5**  
**South**  
**1/2 - 1 Mile**  
**Higher**

FED USGS      212830157505201

**BASIC WELL DATA**

Site Type:	Single well, other than collector or Ranney type		
Year Constructed:	1943	County:	Honolulu
Altitude:	27.00 ft.	State:	Hawaii
Well Depth:	40.00 ft.	Topographic Setting:	Not Reported
Depth to Water Table:	Not Reported	Prim. Use of Site:	Destroyed
Date Measured:	Not Reported	Prim. Use of Water:	Not Reported

**B6**  
**South**  
**1/2 - 1 Mile**  
**Higher**

HI WELLS      3-2850-001

Wid:	3-2850-001	Island Code:	3
Island Name:	Oahu	Well no:	2850-01
Well name:	Kaalaea	Old name:	Not Reported
Yr drilled:	1943	Driller:	NAT WHITON
Quad_map:	12	Latitude:	212830
Longitude:	1575052	UTM:	Y
Gps:	N	Owner/user:	Lee E
Old number:	407-2	Well_type:	Not Reported
Type:	Not Reported	Casing dia:	10
Ground Elev:	27	Well depth:	40
Solid casing Depth:	6	Perf casing Depth:	Not Reported
Use:	SLD	Use Desc:	Sealed
Use year:	74	Water Top Elev:	0
Chloride value:	0	Test date:	Not Reported
Pumping Test rate:	Not Reported	Drop in water Lvl:	Not Reported
Chloride Test:	Not Reported	Temperature:	Not Reported
Units:	Not Reported	Pump Capacity:	0
Annual Draft:	Not Reported	Static Water Lvl:	Not Reported
Geology:	TKDC	Geology desc:	Tertiary Koolau dike complex
Installed:	Not Reported	Last Measured:	Not Reported

## GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Max chlorides:	Not Reported
Min chlorides:	Not Reported
Bot_hole depth:	-13
Bot_perf depth:	Not Reported
Pump Capacity:	Not Reported
Tax map key:	Not Reported
Latest head mmt:	0
Current CI mmt:	Not Reported
Pump Inst. Date:	Not Reported
Transmissivity:	0
Pump depth:	Not Reported

Max CI year:	Not Reported
Min CI year:	Not Reported
bot_solid depth:	21
Well Capacity:	Not Reported
Draft (mgd):	Not Reported
Aquifer code:	30603
Cur head mmt:	Not Reported
Const. Date:	01/01/1943 00:00:00
Surveyor:	Not Reported
Pump intake elev:	Not Reported

# GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS RADON

## AREA RADON INFORMATION

Federal EPA Radon Zone for HONOLULU County: 3

Note: Zone 1 indoor average level > 4 pCi/L.  
 : Zone 2 indoor average level >= 2 pCi/L and <= 4 pCi/L.  
 : Zone 3 indoor average level < 2 pCi/L.

Federal Area Radon Information for Zip Code: 96744

Number of sites tested: 22

Area	Average Activity	% <4 pCi/L	% 4-20 pCi/L	% >20 pCi/L
Living Area - 1st Floor	0.091 pCi/L	100%	0%	0%
Living Area - 2nd Floor	Not Reported	Not Reported	Not Reported	Not Reported
Basement	Not Reported	Not Reported	Not Reported	Not Reported

# PHYSICAL SETTING SOURCE RECORDS SEARCHED

## HYDROLOGIC INFORMATION

**Flood Zone Data:** This data, available in select counties across the country, was obtained by EDR in 1999 from the Federal Emergency Management Agency (FEMA). Data depicts 100-year and 500-year flood zones as defined by FEMA.

**NWI:** National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002 from the U.S. Fish and Wildlife Service.

## HYDROGEOLOGIC INFORMATION

### **AQUIFLOW<sup>®</sup> Information System**

Source: EDR proprietary database of groundwater flow information

EDR has developed the AQUIFLOW Information System (AIS) to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted to regulatory authorities at select sites and has extracted the date of the report, hydrogeologically determined groundwater flow direction and depth to water table information.

## GEOLOGIC INFORMATION

### **Geologic Age and Rock Stratigraphic Unit**

Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - A digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

### **STATSGO: State Soil Geographic Database**

The U.S. Department of Agriculture's (USDA) Soil Conservation Service (SCS) leads the national Cooperative Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. Soil maps for STATSGO are compiled by generalizing more detailed (SSURGO) soil survey maps.

## ADDITIONAL ENVIRONMENTAL RECORD SOURCES

### **FEDERAL WATER WELLS**

#### **PWS: Public Water Systems**

Source: EPA/Office of Drinking Water

Telephone: 202-260-2805

Public Water System data from the Federal Reporting Data System. A PWS is any water system which provides water to at least 25 people for at least 60 days annually. PWSs provide water from wells, rivers and other sources.

#### **PWS ENF: Public Water Systems Violation and Enforcement Data**

Source: EPA/Office of Drinking Water

Telephone: 202-260-2805

Violation and Enforcement data for Public Water Systems from the Safe Drinking Water Information System (SDWIS) after August 1995. Prior to August 1995, the data came from the Federal Reporting Data System (FRDS).

**USGS Water Wells:** In November 1971 the United States Geological Survey (USGS) implemented a national water resource information tracking system. This database contains descriptive information on sites where the USGS collects or has collected data on surface water and/or groundwater. The groundwater data includes information on more than 900,000 wells, springs, and other sources of groundwater.

# PHYSICAL SETTING SOURCE RECORDS SEARCHED

## STATE RECORDS

### Ground Water Wells

Source: Department of Land and Natural Resources  
Telephone: 808-587-0242

## RADON

### Area Radon Information

Source: EPA  
Telephone: 303-236-1525

The National Radon Database has been developed by the U.S. Environmental Protection Agency (USEPA) and is a compilation of the EPA/State Residential Radon Survey and the National Residential Radon Survey. The study covers the years 1986 - 1992. Where necessary data has been supplemented by information collected at private sources such as universities and research institutions.

### EPA Radon Zones

Source: EPA  
Telephone: 202-564-9370

Sections 307 & 309 of IRAA directed EPA to list and identify areas of U.S. with the potential for elevated indoor radon levels.

## OTHER

### Epicenters: World earthquake epicenters, Richter 5 or greater

Source: Department of Commerce, National Oceanic and Atmospheric Administration

**APPENDIX E**

**FREEDOM OF INFORMATION ACT LETTERS**



1001 Bishop Street, Suite 1240  
Paahi Tower  
Honolulu, Hawaii 96813  
(808) 528-1445 FAX (808) 528-0768  
Internet: www.tecinc.com

Attn: Freedom of Information Officer  
U.S. Environmental Protection Agency  
401 M. Street, SW  
Washington, DC 20460

November 12, 2002

Re: Phase I Environmental Site Assessment of Waiahole Beach Park

Dear Sir/Ms:

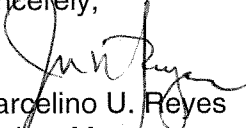
The Environmental Company, Inc. (TEC) is performing a Phase I Environmental Site Assessment of the property described as follows:

Current Owner:	City and County of Honolulu
Name of Property:	Waiahole Beach Park
Property Address:	48-181 Kamehameha Hwy, HI 96744
Legal Identification:	Hawaii County Tax Map Key 4-8-02
EPA ID Number:	None Known

TEC is submitting this Freedom of Information Act request to ascertain whether your office maintains any records concerning the above described property, including documentation of inspections by your agency, outstanding notices of violation, references to current and past hazardous waste management practices, or any other information that would assist in assessing the environmental condition of the property.

Please respond in writing to the letterhead address above, and contact me at (808) 528-1445 if you have any questions or require additional information. Thank you for your time and assistance.

Sincerely,

  
Marcelino U. Reyes  
Project Manager



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
75 Hawthorne Street  
SAN FRANCISCO, CA 94105

Request Acknowledgment

November 26, 2002

Ms. Marcelino Rayes  
The Environmental Company Inc  
1001 Bishop Street  
Pauahi Tower, Suite 701  
Honolulu, HI 96813

RE: Freedom of Information Act (FOIA), 5 U.S.C. 552  
Request No. **09-RIN-00099-03**

Dear Ms. Rayes:

Thank you for your FOIA request, dated November 12, 2002, and received in this office on November 26, 2002, for records related to WAI AHOLE BEACH PARK, 48-181 KAMEHAMEHA HWY, HI 96744. The Agency has twenty (20) working days to respond to your request, except when unusual circumstances exist that would require an extension of time under 5 U.S.C. 552(a)(6)(B). We hope to respond to you soon. In the interim, please contact us if you have any questions about your request. Please cite your FOIA request number in all communications.

Sincerely,

Freedom of Information Officer OPA-3-1  
Office: (415)947-4251  
Fax: (415)947-3591





UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
 REGION IX  
 75 Hawthorne Street  
 San Francisco, CA 94105

NOV 26 2002

OPTIONAL FORM 95 (7-80) # of pages: 1

**FAX TRANSMITTAL**

To: <i>Marcelino Reyes</i>	From: <i>Joan Simmons</i>
Dept./Agency:	Phone #:
Fax #: <i>808/528-0768</i>	Fax #: <i>EPA</i>

NSM 7-80-01-317-7500 R499-101 GENERAL SERVICES ADMINISTRATION

FREEDOM OF INFORMATION ACT (RIN# 99-03)

CERCLIS is a database used by EPA to track activities conducted under its SUPERFUND Program. Specific information is tracked for each individual site. CERCLIS contains only those potential hazardous waste sites that have been brought to EPA's attention. We cannot claim that CERCLIS contains all the potential hazardous sites that exist.

The information you have requested is not in the EPA Region 9 CERCLIS database or hardcopy files.

If you consider this response to be a denial, you may appeal it by addressing your written appeal to the Freedom of Information Officer (A-101), United States Environmental Protection Agency, 401 M Street, S.W., Washington, D.C. 20460.

If you have any additional questions regarding your request, please contact Joan Simmons at 415/972-3091.

Sincerely,

*Betsy Cumow*

Betsy Cumow, Chief  
 States, Tribes & Site Assessment Section  
 Superfund Division

RE: *Watahole Beach Pond*  
*Our WASTE Division, also, received your request and may be more helpful!*

**APPENDIX F**

**CHAIN-OF-CUSTODY AND ANALYTICAL RESULTS**



# CHAIN-OF-CUSTODY RECORD

TURNAROUND TIME: 5 Days

CLIENT: The Environmental Co., Inc. DATE: 11/1 PAGE 1 OF 1  
 ADDRESS: 1001 Bishop St. P.O. Box 1240, Honolulu, HI 96813 ESN PROJECT #: D10010557  
 PHONE: (808) 228-1445 FAX: (808) 528-0768 LOCATION: Waikoloa Beach Park  
 CLIENT PROJECT #: 5524 PROJECT MANAGER: Aime Reyes COLLECTOR: Aime Reyes DATE OF COLLECTION: 11/01

Sample Number	Depth	Time	Sample Type	Container Type	ANALYSES										FIELD NOTES	Total Number Of Containers	Laboratory Note Number		
					80218 HOC	80219 BTEX	80219 MBE	8015 GASOLINE	8015 DIESEL	8015 OIL	418.1 TPH	8082 PCB	8100 PAH	TOTAL LEAD				TOTAL CADMIUM	TOTAL CHROMIUM
5001	0.5	11:55	SO	GLASS JAR	X	X	X	X	X	X	X	X	X	X	X	X	X	1	1
5002	0.5	11:55	SO	GLASS JAR	X	X	X	X	X	X	X	X	X	X	X	X	X	1	1

RELINQUISHED BY: (Signature) [Signature] DATE/TIME 11-01-02/1400 RECEIVED BY (Signature) [Signature] DATE/TIME 11-01-02/1400  
 RELINQUISHED BY: (Signature) [Signature] DATE/TIME 11-01-02/1400 RECEIVED BY (Signature) [Signature] DATE/TIME 11-01-02/1400

SAMPLE RECEIPT  
 TOTAL NUMBER OF CONTAINERS 2  
 CHAIN OF CUSTODY SEALS Y/N/A NA  
 SEALS INTACT? Y/N/A NA  
 RECEIVED GOOD COND./COLD Y

LABORATORY NOTES:  
11-01-02/1400

ESN DISPOSAL @ \$2.00 each   
  Return   
  Pickup

TPH SOILS

**PRELIMINARY DATA**  
**The Environmental Company PROJECT #5534**  
 Waiahole Beach Park

ESN Project #F21025

**TPH ANALYSES OF SOILS BY EPA 8015-MOD.**

SAMPLE NUMBER	DATE ANALYZED	TPH-GAS C5-C12 (mg/kg)	TPH-DIESEL C12-C24 (mg/kg)	SURROGATE RECOVERY (%)	FLAGS
Blank	10/28/2002	nd	nd	111%	
1WBP-SO-5.6	10/28/2002	nd	nd	90%	
3WBP-SO-4.5	10/28/2002	33	nd	90%	
4WBP-SO-4.5	10/28/2002	nd	nd	89%	
<b>DETECTION LIMITS</b>		<b>20</b>	<b>20</b>		

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE (2-FBP):65% TO 135%

**QA/QC DATA - MATRIX SPIKE ANALYSES**

Spike Added	500	500
Measured Conc.	598	404
% Recovery	119.7%	80.7%
Spike Added	500	500
Measured Conc.	631	435
% Recovery	126.2%	87.0%
RPD	5.3%	7.4%

ACCEPTABLE RECOVERY LIMITS:65% TO 135%

CA-DOHS-ELAP CERTIFICATION #1887A  
 ANALYSES PERFORMED BY : B. Capps

PAH SOILS

**PRELIMINARY DATA**

The Environmental Company PROJECT #5534  
Waialeale Beach Park

ESN Project #F21025

**PAH ANALYSES OF SOILS BY EPA 8100**

SAMPLE NUMBER	DATE ANALYZED	DETECTION LIMIT (mg/kg)				SURROGATE RECOVERY (%)	FLAGS
		NAPHTHALENE (mg/kg)	ACENAPHTHENE (mg/kg)	FLUORANTHENE (mg/kg)	BENZO(a)PYRENE (mg/kg)		
Blank	10/28/2002	nd	nd	nd	1.00	103%	
1WBP-SO-5.6	10/28/2002	nd	nd	nd	1.00	104%	
3WBP-SO-4.5	10/28/2002	nd	nd	nd	1.00	101%	
4WBP-SO-4.5	10/28/2002	nd	nd	nd	1.00	109%	

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE (2-FBP): 65% TO 135%

QA/QC DATA - MATRIX SPIKE ANALYSES

Spike Added	10.00	10.00	10.00	10.00	10.00	
Measured Conc.	9.18	9.29	9.34	9.36	9.88	
% Recovery	91.6%	92.9%	93.4%	93.6%	98.6%	
Spike Added	10.00	10.00	10.00	10.00	10.00	
Measured Conc.	11.31	10.27	9.12	9.12	9.88	
% Recovery	113.1%	102.7%	91.2%	91.2%	98.6%	
RPD	21.0%	10.0%	2.3%	5.2%		

ACCEPTABLE RECOVERY LIMITS: 65% TO 135%

CA-DOHS-ELAP CERTIFICATION #1887A  
ANALYSES PERFORMED BY : B. Capps

BTEX SOILS

# PRELIMINARY DATA

The Environmental Company PROJECT #5534

Waiahole Beach Park

ESN Project #F21025

## BTEX ANALYSES OF SOILS BY EPA 8021B

SAMPLE NUMBER	DATE ANALYZED	BENZENE (mg/kg)	TOLUENE (mg/kg)	ETHYLBENZENE (mg/kg)	XYLENES (mg/kg)	DETECTION	
						LIMIT (mg/kg)	SURROGATE RECOVERY (%)
Blank	10/28/2002	nd	nd	nd	nd	0.050	70%
1WBP-SO-5.6	10/28/2002	nd	nd	nd	nd	0.050	127%
3WBP-SO-4.5	10/28/2002	nd	nd	nd	nd	0.050	135%
4WBP-SO-4.5	10/28/2002	nd	nd	nd	nd	0.050	99%

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE (4-BFB): 65% TO 135%

## QA/QC DATA - MATRIX SPIKE ANALYSES

Spike Added	1.000	1.000	1.000	3.000
Measured Conc.	0.655	0.951	1.149	3.627
% Recovery	65.5%	95.1%	114.9%	120.9%
Spike Added	1.000	1.000	1.000	3.000
Measured Conc.	0.724	1.009	1.210	3.788
% Recovery	72.4%	100.9%	121.0%	126.3%
RPD	10.0%	5.9%	5.2%	4.4%

ACCEPTABLE RECOVERY LIMITS: 65% TO 135%

CA-DOHS-ELAP CERTIFICATION #1887A  
ANALYSES PERFORMED BY : B. Capps

The Environmental Company PROJECT #5534  
 Waihole Beach Park

ESM Project #F21025

TOTAL METAL ANALYSES OF SOILS

SAMPLE NUMBER	DATE ANALYZED	Lead (Pb) EPA 7420 (mg/kg)	Cadmium (Cd) EPA 7130 (mg/kg)	Chromium (Cr) EPA 7190 (mg/kg)	Arsenic (As) EPA 7061 (mg/kg)	Silver (Ag) EPA 7760 (mg/kg)	Barium (Ba) EPA 7080 (mg/kg)	Selenium (Se) EPA 7741 (mg/kg)	FLAIES
Blank		nd	nd	nd	nd	nd	nd	nd	
1/WBP-SO-5.6	10/29/2002	14.0	nd	92.0	nd	nd	nd	nd	
3/WBP-SO-4.5	10/29/2002	nd	nd	58.0	nd	nd	nd	nd	
4/WBP-SO-4.5	10/29/2002	nd	nd	92.0	nd	nd	nd	nd	
4/WBP-SO-4.5 Dup.	10/29/2002	nd	nd	92.0	nd	nd	nd	nd	
DETECTION LIMITS		5.00	1.00	20.0	5.00	10.0	250	50.0	

QA/QC DATA - MATRIX SPIKE ANALYSES

Spike Added	125	12.5	62.5	62.5	62.5	12.5	1250	
Measured Conc.	130	12.6	64.0	63.6	63.6	12.4	1171	
% Recovery	104.0%	100.8%	102.4%	101.8%	101.8%	99.0%	93.7%	
Spike Added	125	12.5	62.5	62.5	62.5	12.5	1250	
Measured Conc.	128	12.6	64.0	59.7	59.7	12.5	1048	
% Recovery	102.4%	100.8%	102.4%	95.5%	95.5%	99.8%	83.8%	
RPD	1.6%	0.0%	0.0%	6.5%	6.5%	0.8%	11.1%	

ACCEPTABLE RECOVERY LIMITS: 65% TO 135%

CA-DOHS-ELAP CERTIFICATION #1837A  
 ANALYSES PERFORMED BY: K. Combs / B. Capps  
 D



ESN SEATTLE CHEMISTRY LABORATORY  
 (425) 957-9872, fax (425) 957-9904

ESN Job Number: S21030-2  
 Client: ESN PACIFIC  
 Client Job Name: TEC - WAIHOLE BEACH PARK  
 Client Job Number: F21025  
 Printed: 11/7/2002 14:30

Analytical Results

8081(PEST), µg/kg	MTH BLK		LCS	1WBP-50-5-6	3WBP-50-4-5	4WBP-50-4-5
Matrix	Soil	Soil	Soil	Soil	Soil	Soil
Date extracted	Reporting	11/04/02	11/04/02	11/04/02	11/04/02	11/04/02
Date analyzed	Limits	11/04/02	11/04/02	11/04/02	11/04/02	11/04/02
Aldrin	1.0	nd	106%	nd	nd	nd
α-BHC	1.0	nd		nd	nd	nd
β-BHC	1.0	nd		nd	nd	nd
γ-BHC (Lindane)	1.0	nd	121%	nd	nd	nd
δ-BHC	1.0	nd		nd	nd	nd
4,4'-DDD	1.0	nd		nd	nd	nd
4,4'-DDE	1.0	nd		nd	nd	nd
4,4'-DDT	1.0	nd		nd	nd	nd
Dieldrin	1.0	nd		nd	2.6	6.7
Endosulfan I	1.0	nd		nd	nd	nd
Endosulfan II	1.0	nd		nd	nd	nd
Endosulfan Sulfate	1.0	nd		nd	nd	nd
Endrin	1.0	nd	108%	nd	nd	nd
Endrin Aldehyde	1.0	nd		nd	nd	nd
Heptachlor	1.0	nd		nd	nd	nd
Heptachlor Epoxide	1.0	nd	106%	nd	nd	nd
Methoxychlor	1.0	nd		nd	nd	nd
Chlordane (tech.)	200	nd		nd	nd	nd
Toxaphene	500	nd		nd	nd	nd

Surrogate recoveries:

Tetrachloro-mxylyene	110%	104%	99%	105%	103%
Decachlorobiphenyl	80%	83%	84%	90%	77%

Data Qualifiers and Analytical Comments

nd - not detected at listed reporting limits  
 na - not analyzed  
 C - coelution with sample peaks  
 M - matrix interference  
 J - estimated value  
 Results reported on dry-weight basis  
 Acceptable Recovery limits: 65% TO 135%  
 Acceptable RPD limit: 35%

Post-it* Fax Note	7671	Date	11-7-02	# of pages	7
To	Achie Reyes	From	Karen Combs		
Co./Dept.	TEC	Co.	ESN		
Phone #		Phone #	957-00707		
Fax #		Fax #			

ESN SEATTLE CHEMISTRY LABORATORY  
 (425) 857-9872, fax (425) 857-9904

ESN Job Number: 321030-2  
 Client: ESN PACIFIC  
 Client Job Name: TEC - WAIHOLE E  
 Client Job Number: F21025  
 Printed: 11/7/2002 14:30

Analytical Results	MS		MSD	RPD
	4WBP-50-4-5	4WBP-50-4-5	4WBP-50-4-5	
8081(PEST), µg/kg	Soil	Soil	Soil	%
Date extracted	Reporting	11/04/02	11/04/02	
Date analyzed	Limits	11/04/02	11/04/02	
Aldrin	1.0	112%	112%	0%
α-BHC	1.0			
β-BHC	1.0			
γ-BHC (Lindane)	1.0	130%	129%	1%
δ-BHC	1.0			
4,4'-DDD	1.0			
4,4'-DDE	1.0			
4,4'-DDT	1.0			
Dieldrin	1.0			
Endosulfan I	1.0			
Endosulfan II	1.0			
Endosulfan Sulfate	1.0			
Endrin	1.0	117%	115%	2%
Endrin Aldehyde	1.0			
Heptachlor	1.0			
Heptachlor Epoxide	1.0	112%	113%	1%
Methoxychlor	1.0			
Chlordane (tech.)	200			
Toxaphene	500			
Surrogate recoveries:				
Tetrachloro-m-xylene		111%	111%	
Decachlorobiphenyl		88%	88%	

Data Qualifiers and Analytical Comments

nd - not detected at listed reporting limits  
 na - not analyzed  
 C - co-elution with sample peaks  
 M - matrix interference  
 J - estimated value  
 Results reported on dry-weight basis  
 Acceptable Recovery limits: 65% TO 135%  
 Acceptable RPD limit: 35%

ESN SEATTLE CHEMISTRY LABORATORY  
 (425) 957-9872, fax (425) 957-9804

ESN Job Number: S21030-2  
 Client: ESN PACIFIC  
 Client Job Name: TEC - WAIHOLE BEACH PARK  
 Client Job Number: F21025  
 Printed: 11/7/2002 14:30

Analytical Results

8082(PCBs), mg/kg	MTH BLK		LCS	1WBP-50-5-8	3WBP-50-4-5	4WBP-60-4-8
Matrix	Soil	Soil	Soil	Soil	Soil	Soil
Date extracted	Reporting	11/04/02	11/04/02	11/04/02	11/04/02	11/04/02
Date analyzed	Limits	11/04/02	11/04/02	11/04/02	11/04/02	11/04/02
A1221	0.20	nd		nd	nd	nd
A1232	0.20	nd		nd	nd	nd
A1242 (A1016)	0.20	nd		nd	nd	nd
A1248	0.20	nd		nd	nd	nd
A1254	0.20	nd		nd	nd	nd
A1260	0.20	nd	91%	nd	nd	nd

Surrogate recoveries:

Tetrachloro-m-xylene	134%	106%	106%	108%	102%
Decachlorobiphenyl	108%	106%	84%	80%	90%

Data Qualifiers and Analytical Comments

nd - not detected at listed reporting limits  
 na - not analyzed  
 C - coelution with sample peaks  
 M - matrix interference  
 J - estimated value  
 Results reported on dry-weight basis  
 Acceptable Recovery limits: 65% TO 135%  
 Acceptable RPD limit: 35%

ESN SEATTLE CHEMISTRY LABORATORY  
 (425) 957-9872, fax (425) 957-9904

ESN Job Number: 921030-2  
 Client: ESN PACIFIC  
 Client Job Name: TEC - WAIHAOLE E  
 Client Job Number: F21025  
 Printed: 11/7/2002 14:30

Analytical Results		MS	MSD	
8082(PCBs), mg/kg		4WBP-50-4-5	4WBP-50-4-5	RPD
Matrix	Soil	Soil	Soil	%
Date extracted	Reporting	11/04/02	11/04/02	
Date analyzed	Limits	11/04/02	11/04/02	
A1221	0.20			
A1232	0.20			
A1242 (A1016)	0.20			
A1248	0.20			
A1254	0.20			
A1280	0.20	107%	115%	7%
Surrogate recoveries:				
Tetrachloro-m-xylene		117%	89%	
Decachlorobiphenyl		125%	103%	

Data Qualifiers and Analytical Comments

nd - not detected at listed reporting limits

na - not analyzed

C - coelution with sample peaks

M - matrix interference

J - estimated value

Results reported on dry-weight basis

Acceptable Recovery limits: 65% TO 135%

Acceptable RPD limit: 35%

Preliminary Results for STL Project Number 109628

STL Sample #	Client Sample ID	Date Received	Date Prepared	Date Analyzed	Matrix	% Solids	Parameter	Result	PQL	Units
109628-01	1WBP-50-5-6	10/30/02	11/1/02	11/2/02	solid	69.4	Dalapon	ND	9.01	ug/kg
109628-01	1WBP-50-5-6	10/30/02	11/1/02	11/2/02	solid	69.4	4-Nitrophenol	ND	9.01	ug/kg
109628-01	1WBP-50-5-6	10/30/02	11/1/02	11/2/02	solid	68.4	Dicamba	ND	9.01	ug/kg
109628-01	1WBP-50-5-6	10/30/02	11/1/02	11/2/02	solid	69.4	MCPp	ND	9.01	ug/kg
109628-01	1WBP-50-5-6	10/30/02	11/1/02	11/2/02	solid	69.4	MCPA	ND	9.01	ug/kg
109628-01	1WBP-50-5-6	10/30/02	11/1/02	11/2/02	solid	69.4	Dichloroprop	ND	9.01	ug/kg
109628-01	1WBP-50-5-6	10/30/02	11/1/02	11/2/02	solid	69.4	2,4-D	ND	9.01	ug/kg
109628-01	1WBP-50-5-6	10/30/02	11/1/02	11/2/02	solid	69.4	Pentachlorophenol	ND	9.01	ug/kg
109628-01	1WBP-50-5-6	10/30/02	11/1/02	11/2/02	solid	69.4	Silvex (2,4,5-TP)	ND	13.5	ug/kg
109628-01	1WBP-50-5-6	10/30/02	11/1/02	11/2/02	solid	69.4	2,4,5-T	ND	13.5	ug/kg
109628-01	1WBP-50-5-6	10/30/02	11/1/02	11/2/02	solid	69.4	Dinoseb	ND	9.01	ug/kg
109628-01	1WBP-50-5-6	10/30/02	11/1/02	11/2/02	solid	69.4	2,4-DB	ND	9.01	ug/kg
109628-02	3WBP-50-4-5	10/30/02	11/1/02	11/2/02	solid	83.9	Dalapon	ND	6.44	ug/kg
109628-02	3WBP-50-4-5	10/30/02	11/1/02	11/2/02	solid	83.9	4-Nitrophenol	ND	6.44	ug/kg
109628-02	3WBP-50-4-5	10/30/02	11/1/02	11/2/02	solid	83.9	Dicamba	ND	6.44	ug/kg
109628-02	3WBP-50-4-5	10/30/02	11/1/02	11/2/02	solid	83.9	MCPp	ND	6.44	ug/kg
109628-02	3WBP-50-4-5	10/30/02	11/1/02	11/2/02	solid	83.9	MCPA	ND	6.44	ug/kg
109628-02	3WBP-50-4-5	10/30/02	11/1/02	11/2/02	solid	83.9	Dichloroprop	ND	6.44	ug/kg
109628-02	3WBP-50-4-5	10/30/02	11/1/02	11/2/02	solid	83.9	2,4-D	ND	6.44	ug/kg
109628-02	3WBP-50-4-5	10/30/02	11/1/02	11/2/02	solid	83.9	Pentachlorophenol	ND	6.44	ug/kg
109628-02	3WBP-50-4-5	10/30/02	11/1/02	11/2/02	solid	83.9	Silvex (2,4,5-TP)	ND	9.66	ug/kg
109628-02	3WBP-50-4-5	10/30/02	11/1/02	11/2/02	solid	83.9	2,4,5-T	ND	9.66	ug/kg
109628-02	3WBP-50-4-5	10/30/02	11/1/02	11/2/02	solid	83.9	Dinoseb	ND	6.44	ug/kg
109628-02	3WBP-50-4-5	10/30/02	11/1/02	11/2/02	solid	83.9	2,4-DB	ND	6.44	ug/kg
109628-03	4WBP-50-4-5	10/30/02	11/1/02	11/2/02	solid	57.48	Dalapon	ND	10.2	ug/kg
109628-03	4WBP-50-4-5	10/30/02	11/1/02	11/2/02	solid	57.48	4-Nitrophenol	ND	10.2	ug/kg
109628-03	4WBP-50-4-5	10/30/02	11/1/02	11/2/02	solid	57.48	Dicamba	ND	10.2	ug/kg
109628-03	4WBP-50-4-5	10/30/02	11/1/02	11/2/02	solid	57.48	MCPp	ND	10.2	ug/kg

109628-03	4WBP-50-4-5	10/30/02	11/1/02	11/2/02	solid	57.48	MCPA	ND	10.2	ug/kg
109628-03	4WBP-50-4-5	10/30/02	11/1/02	11/2/02	solid	57.48	Dichloroprop	ND	10.2	ug/kg
109628-03	4WBP-50-4-5	10/30/02	11/1/02	11/2/02	solid	57.48	2,4-D	ND	10.2	ug/kg
109628-03	4WBP-50-4-5	10/30/02	11/1/02	11/2/02	solid	57.48	Pentachlorophenol	ND	10.2	ug/kg
109628-03	4WBP-50-4-5	10/30/02	11/1/02	11/2/02	solid	57.48	Styax (2,4,5-TP)	ND	15.4	ug/kg
109628-03	4WBP-50-4-5	10/30/02	11/1/02	11/2/02	solid	57.48	2,4,5-T	ND	15.4	ug/kg
109628-03	4WBP-50-4-5	10/30/02	11/1/02	11/2/02	solid	57.48	Dinoseb	ND	10.2	ug/kg
109628-03	4WBP-50-4-5	10/30/02	11/1/02	11/2/02	solid	57.48	2,4-DB	ND	10.2	ug/kg

# ESN PACIFIC

The Environmental Company PROJECT #5534  
Walahole Beach Park

ESN Project #D211010557

TPH ANALYSES OF SOILS BY EPA 8016-MOD.

SAMPLE NUMBER	DATE ANALYZED	TPH-GAS C5-C12 (mg/kg)	TPH-DIESEL C12-C24 (mg/kg)	TPH-OIL C20-C40 (mg/kg)	SURROGATE RECOVERY (%)	FLAGS
Blank	11/5/2002	nd	nd	nd	100%	
5WBP-SO-0.5	11/5/2002	nd	nd	nd	111%	
6WBP-SO-0.5	11/5/2002	nd	nd	31	66%	
DETECTION LIMITS		20	20	20		

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE (2-FBP):65% TO 135%

QA/QC DATA - MATRIX SPIKE ANALYSES

Spike Added	500	500	500
Measured Conc.	496	535	493
% Recovery	99.2%	106.9%	98.6%
Spike Added	500	500	500
Measured Conc.	558	496	470
% Recovery	111.5%	99.2%	93.9%
RPD	11.7%	7.5%	4.9%

ACCEPTABLE RECOVERY LIMITS:65% TO 135%

CA-DOHS-ELAP CERTIFICATION #1887A

ANALYSES PERFORMED BY : B. Capps

DATA REVIEWED BY: K. Combs

KC

Post-It® Fax Note	7671	Date	11-7-02	# of pages	8
To:	Achie Reyes	From:	Karen Combs		
Co./Dept.	TEC	Co.	ESN		
Phone #		Phone #	8470067		
Fax #		Fax #			

The Environmental Company PROJECT #5534  
Waihole Beach Park

ESN Project #D211010557

PAH ANALYSES OF SOILS BY EPA 8100

SAMPLE NUMBER	DATE ANALYZED	NAPHTHALENE (mg/kg)	ACENAPHTHENE (mg/kg)	FLUORANTHENE (mg/kg)	BENZO(a)PYRENE (mg/kg)	DETECTION LIMIT (mg/kg)	SURROGATE RECOVERY (%)	FLAGS
Blank	11/5/2002	nd	nd	nd	nd	1.00	86%	
5WBP-SO-0.5	11/5/2002	nd	nd	nd	nd	1.00	119%	
6WBP-SO-0.5	11/5/2002	nd	nd	nd	nd	1.00	109%	

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE (2-FBP): 65% TO 135%

QA/QC DATA - MATRIX SPIKE ANALYSES

Spike Added	10.00	10.00	10.00	10.00	10.00	10.00	
Measured Conc.	8.76	8.85	9.17	9.50	11.12	11.12	
% Recovery	87.6%	88.6%	91.7%	95.0%	111.2%	111.2%	
Spike Added	10.00	10.00	10.00	10.00	10.00	10.00	
Measured Conc.	8.89	9.87	9.08	9.08	11.12	11.12	
% Recovery	88.9%	98.7%	90.8%	90.8%	111.2%	111.2%	
RPD	1.4%	10.8%	1.0%	1.0%	15.8%	15.8%	

ACCEPTABLE RECOVERY LIMITS: 65% TO 135%

CA-DOHS-ELAP CERTIFICATION #1887A

ANALYSES PERFORMED BY : B. Capps

DATA REVIEWED BY: K. Combs





# ESN PACIFIC

The Environmental Company PROJECT #5534  
Waiholo Beach Park

ESN Project #0211010537

## BTEX ANALYSES OF SOILS BY EPA 821-B

SAMPLE NUMBER	DATE ANALYZED	MIBE (mg/kg)	BENZENE (mg/kg)	TOLUENE (mg/kg)	ETHYLBENZENE (mg/kg)	XYLENES (mg/kg)	DETECTION	
							LIMIT (mg/kg)	FLAGS
Blank	11/4/2002	nd	nd	nd	nd	nd	0.050	76%
5WBP-SO-0.5	11/4/2002	nd	nd	nd	nd	nd	0.050	94%
6WBP-SO-0.5	11/4/2002	nd	nd	nd	nd	nd	0.050	67%

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE (4-BFB): 65% TO 135%

## QA/QC DATA - MATRIX SPIKE ANALYSES

Spike Added	1,000	1,000	1,000	1,000	1,000	3,000	1,000	3,000
Measured Conc.	1,217	1,251	1,231	1,074	959	3,130	959	3,130
% Recovery	121.7%	125.1%	123.1%	107.4%	95.9%	104.3%	95.9%	104.3%
Spike Added	1,000	1,000	1,000	1,000	1,000	3,000	1,000	3,000
Measured Conc.	1,052	1,081	1,074	1,074	959	3,130	959	3,130
% Recovery	105.2%	108.1%	107.4%	107.4%	95.9%	104.3%	95.9%	104.3%
RPD	14.5%	14.6%	13.6%	13.6%	2.0%	11.4%	2.0%	11.4%

ACCEPTABLE RECOVERY LIMITS: 65% TO 135%

CA-DOHS-ELAP CERTIFICATION #1867A

ANALYSES PERFORMED BY: B. Capps

DATA REVIEWED BY: K. Combs

KC

Environmental Services Network

The Environmental Company PROJECT #5534

Waialeale Beach Park

ESN Project #D211010557

TOTAL METAL ANALYSES OF SOILS

SAMPLE NUMBER	DATE ANALYZED	Lead (Pb) EPA 7420 (mg/kg)	Cadmium (Cd) EPA 7130 (mg/kg)	Chromium (Cr) EPA 7180 (mg/kg)	Arsenic (As) EPA 7081 (mg/kg)	Silver (Ag) EPA 7760 (mg/kg)	Barium (Ba) EPA 7080 (mg/kg)	Selenium (Se) EPA 7741 (mg/kg)	Mercury (Hg) EPA 7471 (mg/kg)	FLAGS
Blank	11/5/02*	nd	nd	nd	nd	nd	nd	nd	nd	
SWBP-SO-0.5	11/5/02*	46.2	nd	nd	nd	nd	nd	nd	nd	
SWBP-SO-0.5	11/5/02*	151	nd	nd	nd	nd	nd	nd	nd	
DETECTION LIMITS		5.00	1.00	20.0	5.00	20.0	150	50.0	0.50	

\*Mercury analyzed 11/5/02, all others 1/5/02

QA/QC DATA - MATRIX SPIKE ANALYSES

Spike Added	250	62.5	62.5	62.5	62.5	62.5	625	625	0.50
Measured Conc.	248	13.0	69.1	63.2	53.2	13.3	639	639	0.60
% Recovery	99.2%	104.0%	110.6%	85.1%	85.1%	106.4%	102.2%	102.2%	120.2%
Spike Added	250	12.5	82.5	62.5	62.5	12.5	1250	625	0.50
Measured Conc.	242	12.8	73.4	49.7	49.7	13.4	1110	632	0.64
% Recovery	96.8%	102.4%	117.4%	79.6%	79.6%	107.2%	89.0%	101.1%	128.2%
RPD	2.4%	1.6%	6.0%	6.9%	6.9%	0.7%	4.2%	6.4%	6.4%

ACCEPTABLE RECOVERY LIMITS: 65% TO 135%

CA-DOHSELAP CERTIFICATION #1827A

ANALYSES PERFORMED BY: K. Combs

DATA REVIEWED BY: B. Capps

BL

ESN SEATTLE CHEMISTRY LABORATORY  
 (425) 957-9872, fax (425) 957-9904

ESN Job Number: S21105-2  
 Client: ESN PACIFIC  
 Client Job Name: TEC - WAIKOLE E  
 Client Job Number: D211010657  
 Printed: 11/7/2002 12:08

Analytical Results		MS		MSD	
8081(PEST), µg/kg		5WBSP-50-0.5		5WBSP-50-0.5	RPD
Matrix	Soil	Soil	Soil	Soil	%
Date extracted	Reporting	11/05/02	11/05/02		
Date analyzed	Limits	11/05/02	11/05/02		
Aldrin	1.0	131%	115%		13%
a-BHC	1.0				
b-BHC	1.0				
β-BHC (Lindane)	1.0	135%	112%		17%
d-BHC	1.0				
4,4'-DOD	1.0				
4,4'-DDE	1.0				
4,4'-DDT	1.0				
Dieldrin	1.0				
Endosulfan I	1.0				
Endosulfan II	1.0				
Endosulfan Sulfate	1.0				
Endrin	1.0	116%	97%		18%
Endrin Aldehyde	1.0				
Heptachlor	1.0				
Heptachlor Epoxide	1.0	130%	116%		16%
Methoxychlor	1.0				
Chlordane (tech.)	200				
Toxaphene	500				
<b>Surrogate recoveries:</b>					
Tetrachloro-m-xylene		132%	113%		
Decachlorobiphenyl		104%	89%		

Data Qualifiers and Analytical Comments

nd - not detected at listed reporting limits  
 na - not analyzed  
 C - co-elution with sample peaks  
 M - matrix interference  
 J - estimated value  
 Results reported on dry-weight basis  
 Acceptable Recovery limits: 65% TO 135%  
 Acceptable RPD limit: 35%

ESN SEATTLE CHEMISTRY LABORATORY  
 (425) 957-9872, fax (425) 957-9904

ESN Job Number: S21105-2  
 Client: ESN PACIFIC  
 Client Job Name: TEC - WAIAHOLE BEACH PARK  
 Client Job Number: D211010557  
 Printed: 11/7/2002 12:09

Analytical Results

8081(PEST), ug/kg	MTH BLK		LCS 5WBP-50-0.5		6WBP-50-0.5	
	Soil	Soil	Soil	Soil	Soil	Soil
Date extracted	Reporting	11/05/02	11/05/02	11/05/02	11/05/02	11/05/02
Date analyzed	Limits	11/05/02	11/05/02	11/05/02	11/05/02	11/05/02
Abrin	1.0	nd	116%	nd	nd	nd
a-BHC	1.0	nd		nd	nd	nd
b-BHC	1.0	nd		nd	nd	nd
g-BHC (Lindane)	1.0	nd	118%	nd	nd	nd
d-BHC	1.0	nd		nd	nd	nd
4,4'-DDO	1.0	nd		nd	nd	nd
4,4'-DDE	1.0	nd		nd	nd	nd
4,4'-DDT	1.0	nd		nd	nd	nd
Dieldrin	1.0	nd		nd	nd	nd
Endosulfan I	1.0	nd		nd	nd	nd
Endosulfan II	1.0	nd		nd	nd	nd
Endosulfan Sulfate	1.0	nd		nd	nd	nd
Endrin	1.0	nd	100%	nd	nd	nd
Endrin Aldehyde	1.0	nd		nd	nd	nd
Heptachlor	1.0	nd		nd	nd	nd
Heptachlor Epoxide	1.0	nd	120%	nd	nd	nd
Methoxychlor	1.0	nd		nd	nd	nd
Chlordane (tech.)	200	nd		nd	nd	nd
Toxaphene	500	nd		nd	nd	nd

Surrogate recoveries:

Tetrachloro-m-xylene	110%	124%	123%	112%
Decachlorobiphenyl	80%	92%	93%	86%

Data Qualifiers and Analytical Comments

nd - not detected at listed reporting limits

na - not analyzed

C - co-elution with sample peaks

M - matrix interference

J - estimated value

Results reported on dry-weight basis

Acceptable Recovery limits: 66% TO 135%

Acceptable RPD limit: 35%

ESN SEATTLE CHEMISTRY LABORATORY  
 (425) 957-9072, fax (425) 957-9904

ESN Job Number: 321105-2  
 Client: ESN PACIFIC  
 Client Job Name: TEC - WAIKOLE E  
 Client Job Number: D211010557  
 Printed: 11/7/2002 12:09

Analytical Results	MS		MSD	
	5WBWP-50-0.5	5WBWP-50-0.5	5WBWP-50-0.5	RPD
8082(PCBs), mg/kg				
Matrix	Soil	Soil	Soil	%
Date extracted	Reporting	11/05/02	11/05/02	
Date analyzed	Limits	11/05/02	11/05/02	
A1221	0.20			
A1232	0.20			
A1242 (A1016)	0.20			
A1248	0.20			
A1254	0.20			
A1250	0.20	131%	118%	11%

Surrogate recoveries:

Tetrachloro-m-xylene	128%	118%
Decachlorobiphenyl	93%	88%

Data Qualifiers and Analytical Comments

nd - not detected at listed reporting limits

na - not analyzed

C - co-elution with sample peaks

M - matrix interference

J - estimated value

Results reported on dry-weight basis

Acceptable Recovery limits: 85% TO 130%

Acceptable RPD limit: 30%

ESN SEATTLE CHEMISTRY LABORATORY  
 (425) 957-9872, fax (425) 957-9904

ESN Job Number: 621105-2  
 Client: ESN PACIFIC  
 Client Job Name: TEC - WAIHOLE BEACH PARK  
 Client Job Number: D211010557  
 Printed: 11/7/2002 12:09

Analytical Results

6082(PCBs), mg/kg		MTH BLK	LCS	SWBP-50-0.5	6WBP-50-0.5
Matrix	Soil	Soil	Soil	Soil	Soil
Date extracted	Reporting	11/05/02	11/05/02	11/05/02	11/05/02
Date analyzed	Limits	11/05/02	11/05/02	11/05/02	11/05/02
A1221	0.20	nd		nd	nd
A1232	0.20	nd		nd	nd
A1242 (A1016)	0.20	nd		nd	nd
A1248	0.20	nd		nd	nd
A1254	0.20	nd		nd	nd
A1260	0.20	nd	127%	nd	nd

Surrogate recoveries:

Tetrachloro-m-xylene	109%	124%	134%	122%
Decachlorobiphenyl	79%	89%	94%	87%

Data Qualifiers and Analytical Comments

nd - not detected at listed reporting limits

na - not analyzed

C - coelution with sample peaks

M - matrix interference

J - estimated value

Results reported on dry-weight basis

Acceptable Recovery limits: 65% TO 135%

Acceptable RPD limit: 35%

# STL Seattle

Client Name	ESN Pacific, Inc.
Client ID:	1WBP-50-5-6
Lab ID:	109628-01
Date Received:	10/30/02
Date Prepared:	11/1/02
Date Analyzed:	11/2/02
% Solids	69.4
Dilution Factor	10

## Chlorinated Herbicides by USEPA Method 8151 GC/MS Modified

Surrogate	% Recovery	Flags	Recovery Limits	
			Low	High
2,4-Dichlorophenylacetic acid	57.5		48	128

Sample results are on a dry weight basis.

Analyte	Result (ug/kg)	PQL	MDL	Flags
Dalapon	ND	9.01	2.03	
4-Nitrophenol	ND	9.01	2.51	
Dicamba	ND	9.01	2.07	
MCPP	ND	9.01	1.76	
MCPA	ND	9.01	3.86	
Dichloroprop	ND	9.01	3.34	
2,4-D	ND	9.01	3.51	
Pentachlorophenol	ND	9.01	2.59	
Silvex (2,4,5-TP)	ND	13.5	3.38	
2,4,5-T	ND	13.5	4.13	
Dinoseb	ND	9.01	2.9	
2,4-DB	ND	9.01	2.53	

# STL Seattle

Client Name	ESN Pacific, Inc.
Client ID:	3WBP-50-4-5
Lab ID:	109028-02
Date Received:	10/30/02
Date Prepared:	11/1/02
Date Analyzed:	11/2/02
% Solids	83.9
Dilution Factor	10

**Chlorinated Herbicides by USEPA Method 8151 GC/MS Modified**

Surrogate	% Recovery	Flags	Recovery Limits	
			Low	High
2,4-Dichlorophenylacetic acid	84.2		48	128

Sample results are on a dry weight basis.

Analyte	Result (ug/kg)	PQL	MDL	Flags
Delapon	ND	6.44	1.45	
4-Nitrophenol	ND	6.44	1.44	
Dicamba	ND	6.44	1.48	
MCPP	ND	6.44	1.26	
MCPA	ND	6.44	2.83	
Dichloroprop	ND	6.44	2.39	
2,4-D	ND	6.44	2.51	
Pentachlorophenol	ND	6.44	1.85	
Silvex (2,4,5-TP)	ND	9.66	2.41	
2,4,5-T	ND	9.66	2.95	
Dinoseb	ND	6.44	2.07	
2,4-DB	ND	6.44	1.81	

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# STL Seattle

Client Name	ESN Pacific, Inc.
Client ID:	4WBP-50-4-5
Lab ID:	109628-03
Date Received:	10/30/02
Date Prepared:	11/1/02
Date Analyzed:	11/2/02
% Solids	57.48
Dilution Factor	10

## Chlorinated Herbicides by USEPA Method 8151 GC/MS Modified

Surrogate	% Recovery	Flags	Recovery Limits	
			Low	High
2,4-Dichlorophenylacetic acid	79.9		48	128

Sample results are on a dry weight basis.

Analyte	Result (ug/kg)	PQL	MDL	Flags
Dalapon	ND	10.2	2.3	
4-Nitrophenol	ND	10.2	2.28	
Dicamba	ND	10.2	2.35	
MCPP	ND	10.2	2	
MCPA	ND	10.2	4.5	
Dichloroprop	ND	10.2	3.79	
2,4-D	ND	10.2	3.98	
Pentachlorophenol	ND	10.2	2.94	
Silvex (2,4,5-TP)	ND	15.4	3.84	
2,4,5-T	ND	15.4	4.7	
Dinoseb	ND	10.2	3.29	
2,4-DB	ND	10.2	2.87	

# STL Seattle

Client Name	ESN Pacific, Inc.
Client ID:	5WBP-50-0.5
Lab ID:	109745-01
Date Received:	11/5/02
Date Prepared:	11/6/02
Date Analyzed:	11/6/02
% Solids	69.33
Dilution Factor	10

## Chlorinated Herbicides by USEPA Method 8151 GC/MS Modified

Surrogate	% Recovery	Flags	Recovery Limits	
			Low	High
2,4-Dichlorophenylacetic acid	74.9		48	128

Sample results are on a dry weight basis.

Analyte	Result (ug/kg)	PQL	MDL	Flags
Dalapon	ND	9.43	2.12	
4-Nitrophenol	ND	9.43	2.1	
Dicamba	ND	9.43	2.17	
MCPP	ND	9.43	1.85	
MCPA	ND	9.43	4.14	
Dichloroprop	ND	9.43	3.49	
2,4-D	ND	9.43	3.67	
Pentachlorophenol	ND	9.43	2.71	
Silvex (2,4,5-TP)	ND	14.1	3.53	
2,4,5-T	ND	14.1	4.32	
Dinoseb	ND	9.43	3.03	
2,4-DB	ND	9.43	2.65	

# STL Seattle

Client Name	ESN Pacific, Inc.
Client ID:	6WBP-50-0.5
Lab ID:	109745-02
Date Received:	11/5/02
Date Prepared:	11/6/02
Date Analyzed:	11/6/02
% Solids	70.58
Dilution Factor	10

## Chlorinated Herbicides by USEPA Method 8151 GC/MS Modified

Surrogate	% Recovery	Flags	Recovery Limits	
			Low	High
2,4-Dichlorophenylacetic acid	64.3		48	128

Sample results are on a dry weight basis.

Analyte	Result (ug/kg)	PQL	MDL	Flags
Delapon	ND	8.74	1.96	
4-Nitrophenol	ND	8.74	1.95	
Dicamba	ND	8.74	2.01	
MCPP	ND	8.74	1.71	
MCPA	ND	8.74	3.84	
Dichloroprop	ND	8.74	3.24	
2,4-D	ND	8.74	3.4	
Pentachlorophenol	ND	8.74	2.51	
Silvex (2,4,5-TP)	ND	13.1	3.27	
2,4,5-T	ND	13.1	4.01	
Dinoseb	ND	8.74	2.81	
2,4-DB	ND	8.74	2.45	

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# Julian Ng, Incorporated

Transportation Engineering Consultant

P.O. Box 816 Kaneohe, Hawaii 96744-0816

phone: (808) 236-4325

fax: (808) 235-8869

email: jngpe@lava.net

September 4, 2002

Mr. Alvin Zane  
Alvin Zane & Associates, Inc.  
1314 South King Street, Suite 605  
Honolulu, Hawaii 96814

Subject: Waiahole Beach Park – Traffic Assessment

Dear Mr. Zane:

The proposed project is located between Kamehameha Highway and Kaneohe Bay along the windward coast of Oahu. A master plan has been developed and vehicular access to the project site will be from several driveways from the highway (see below). The project will be constructed in several phases; the first phase will include two driveway connections and related improvements. This letter is a short report on the potential impact of the proposed project on the highway and includes recommendations for the improvements at the project's driveway connections to the highway.

This report includes analyses of peak hour conditions on the highway and at unsignalized intersections. Operating conditions are described by Levels of Service (LOS), which are determined using analyses methods described in the *Highway Capacity Manual*<sup>1</sup>. On highway segments, levels of service are related to traffic densities; since only a short segment of two-lane highway is being evaluated, the criteria for multilane highways were used. At unsignalized intersections, the volumes of the uncontrolled movements affect the capacity available for the other movements that must yield or stop. The analyses of unsignalized intersections used the procedure from the *Highway Capacity Manual (2000)* to identify average delays and levels of service for each controlled movement. These Levels of Service (LOS) are defined using the letters A through F:

<u>LOS</u>	<u>General Description</u>	<u>Highway density</u>	<u>Intersection delay</u>
A	Little or no delay	≤ 11 cars/mile/lane	≤ 10 seconds
B	Short traffic delays	≤ 18 cars/mile/lane	> 10 and ≤ 15 seconds
C	Average traffic delays	≤ 26 cars/mile/lane	> 15 and ≤ 25 seconds
D	Long traffic delays	≤ 35 cars/mile/lane	> 25 and ≤ 35 seconds
E	Very long traffic delays	≤ 45 cars/mile/lane	> 35 and ≤ 50 seconds
F	Very long traffic delays	> 45 cars/mile/lane	> 50 seconds

<sup>1</sup> Transportation Research Board, National Research Council, *Highway Capacity Manual*, Washington, D.C., 2000.

# Julian Ng, Incorporated

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Mr. Alvin Zane  
September 4, 2002  
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## Existing Traffic Conditions

The project site is located east of Kamehameha Highway. Fronting the project site, Kamehameha Highway is a part of State Route 83 and is an undivided State highway that provides the only roadway link along the windward side of Oahu. The project is located just north of Waiahole Stream and the intersection with Waiahole Valley Road. The posted speed limit is 35 miles per hour.

The *Traffic Summary, Island of Oahu 2000* report published by the State Department of Transportation shows an average daily traffic (ADT) in 2000 of 10,897 vehicles per day (vpd) on Kamehameha Highway in the 6+ mile segment north of Waiahole Valley Road. Based on reported factors for peak hour traffic and directional distribution, the traffic volumes during the AM Peak Hour (morning commute) peak hour are 425 vehicles per hour in the peak direction and 285 vehicles per hour in the opposite direction. PM Peak Hour (afternoon commute) peak hour traffic volumes are 450 vehicles per hour and 370 vehicles per hour. The average daily traffic has remained nearly the same in recent years, as shown in Table 1.

Table 1  
AVERAGE DAILY TRAFFIC  
Kamehameha Highway, Polinalina Road (Kaaawa) to Waiahole Valley Road

<u>1996</u>	<u>1997</u>	<u>1998</u>	<u>1999</u>	<u>2000</u>
10,089	9,289	10,933	10,807	10,897

Source: State of Hawaii, Department of Transportation, Highways Division

Traffic counts are taken biannually by the State Highways Division at the intersection of Kamehameha Highway and Waiahole Valley Road. Daily and peak hourly volumes on the north leg of the intersection from the latest count (August 2000) are shown in Table 2.

Table 2  
STATE TRAFFIC COUNT DATA  
Kamehameha Highway north of Waiahole Valley Road (Station 30)

	<u>southbound</u>	<u>northbound</u>	<u>total</u>
August 2001	6,462	6,291	12,753
AM Peak Hour (7:00-8:00 AM)	496	231	727
Midday (11:15 AM-12:15 PM)	380	450	830
Early afternoon (2:00-3:00 PM)	484	458	942
PM Peak Hour (4:00-5:00 PM)	448	541	989

Source: State of Hawaii, Department of Transportation, Highways Division

As indicated in Table 2, the highest morning volumes occur near midday and the highest afternoon volumes in the area occur in the normal commuter period.

# Julian Ng, Incorporated

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Mr. Alvin Zane  
September 4, 2002  
Page 3 of 5

## Future Traffic Conditions

The recent estimates of average daily traffic from the State Highways Division indicate no growth in highway volumes in the area. Some growth, however, could occur over time. The project driveway connections to the highway has been evaluated for an estimated ten percent increase in highway traffic.

## Project Traffic

The proposed project is the improvement of beach park facilities at Waiahole Beach Park. As part of the first phase of development, picnic and passive recreation areas will be improved in the northern and middle portions of the site. The park will also be used for the People's Open Market. A driveway serving Parking Lot "A" (about 60 parking stalls) will be constructed near the middle of the site; a second driveway serving Parking Lot "B" (about 20 parking stalls) will be constructed to the north. Parking Lot "C" (about 60 stalls) will be also constructed and a roadway to Parking Lot "A" will provide vehicular access. Future development includes additional picnic areas, an open field for active recreation, additional parking, and a third connection to the highway. Left turn storage lanes on the highway are indicated on the master plan at all of the driveways.

Traffic generated by the proposed project has been estimated from the number of parking stalls. Traffic estimates were made for the first phase of development with only two connections to the highway. The highest traffic generated in the morning is expected to occur when the open market is held. Total peak hour volume is estimated to be 150% of the number of parking stalls, with a distribution of 50% entering and 50% exiting. Peak traffic generated in the afternoon is estimated to be 90% of the number of stalls, with 50% entering and 50% exiting. Table 3 summarizes the project traffic generation.

Table 3  
PROJECT TRAFFIC GENERATION

	<u>Trip generation factor, %In</u>		<u>AM Pk. Hr.</u>		<u>PM Pk. Hr.</u>			
	<u>AM Pk. Hr.</u>	<u>PM Pk. Hr.</u>	<u>enter</u>	<u>exit</u>	<u>enter</u>	<u>exit</u>		
North Driveway 20 parking stalls	1.50	50%	0.90	50%	15	15	9	9
Middle driveway 120 parking stalls	1.50	50%	0.90	50%	90	90	54	54

The project traffic includes new traffic as well as traffic that may already be on the highway. Of the trips in or out of the site, 60% is estimated to be new traffic. The project traffic would arrive from and depart to both the north and south. Estimated distribution is 50% in each direction.

**Traffic assignments and capacity analyses:** The project traffic estimates were combined with the future baseline traffic projections. The future with project traffic assignments are shown in Exhibit 2. Each driveway connection was analyzed as an unsignalized intersection and Table 4 shows the results.

# Julian Ng, Incorporated

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Mr. Alvin Zane  
 September 4, 2002  
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Table 4  
 FUTURE WITH PROJECT INTERSECTION CONDITIONS

	<u>AM Peak Hour</u>		<u>PM Peak Hour</u>	
	<u>Delay *</u>	<u>LOS</u>	<u>Delay *</u>	<u>LOS</u>
Southbound left turns from highway				
North driveway	8.8	A	9.0	A
Middle driveway	9.1	A	9.3	A
Westbound, exiting site (shared lane)				
North driveway	17.9	C	19.6	C
Middle Driveway	40.3	E	31.1	D
(with median lane on highway)	21.9	C	19.2	C

\* average delay per vehicle, in seconds

The analyses indicate acceptable delays (LOS C or better) at the north driveway (parking Lot "B") during future peak hours. At the middle driveway, traffic leaving the site may experience long (LOS D) and very long (LOS E) delays during future peak hours. If a median lane is provided on the highway for left turns, left turns from the site would be able to execute the movement in two stages and the average delay for traffic leaving the site would be reduced to acceptable LOS C levels.

The two-lane Kamehameha Highway fronting the site will continue to be adequate as indicated by the highway levels of service shown in Table 5.

Table 5  
 FUTURE HIGHWAY CONDITIONS

Direction of Travel:	<u>AM Peak Hour</u>		<u>PM Peak Hour</u>	
	<u>south</u>	<u>north</u>	<u>south</u>	<u>north</u>
Density * (LOS)	17.0 (B)	19.6 (C)	18.6 (C)	22.2 (C)

\* average traffic density at 30 miles per hour, in passenger cars/mile/lane

## Separate Left Turn Lanes

Separate left turn lanes are provided on high-speed (greater than 45 miles per hour) facilities to minimize the probability that a through vehicle will come upon another vehicle waiting for a gap in oncoming traffic before making a left turn. The capacity analysis provides a "probability of queue-free state" for the left turns from the highway. Table 6 shows these probabilities for layouts with a separate left turn lane and for a single lane shared by through traffic and left turns. These probabilities compare with a suggested criterion of less than 0.98 for warranting a separate left turn lane on a two-lane roadway with an operating speed of 40 miles per hour<sup>2</sup>. A separate left turn at the north driveway would not be warranted while a left turn lane at the middle driveway would be warranted.

<sup>2</sup> M. D. Harmelink, "Volume Warrants for Left-Turn Storage Lanes at Unsignalized Grade Intersections." Highway Research Record No. 211, 1967.

# Julian Ng, Incorporated

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Mr. Alvin Zane  
September 4, 2002  
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Table 6  
PROBABILITY OF QUEUING, SOUTHBOUND LEFT TURNS

	<u>North Driveway</u>		<u>Middle Driveway</u>	
	<u>AM</u>	<u>PM</u>	<u>AM</u>	<u>PM</u>
Peak hour:				
Separate left turn lane	0.98	0.99	0.90	0.94
Shared lane for left and through	0.98	0.98	0.87	0.91

The *Hawaii Statewide Design Manual for Streets and Highways* (§6-06.3, ¶2.) recommends that “the storage length, exclusive of taper, may be based on the number of turning vehicles likely to arrive in an average 2 minute period within the peak hour” for unsignalized intersections. Further, “(a)s a minimum requirement, space for at least 2 passenger cars should be provided.” Based on the future traffic assignments shown in Exhibit 2, storage for 3 cars (75 feet) should be provided in the left turn lane into the middle driveway (Parking Lot “A”). If a left turn lane were provided at the north driveway, the minimum storage requirement for 2 cars (50 feet) would suffice. A similar analysis of the future south driveway indicates a storage requirement of 2 cars for a parking lot of up to 80 stalls.

## Conclusions and Recommendations

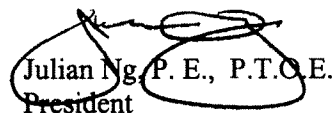
The proposed project is not expected to have a significant impact to traffic conditions. The analyses have shown that there would be only minimal delays to traffic on the highway due to traffic waiting to turn into the site driveways. Traffic leaving the site’s north driveway would have acceptable delays in finding a gap in highway traffic, with peak hour conditions being described as Level of Service C. At the middle driveway, however, longer delays can be expected (Level of Service D and Level of Service E) as turning volume would be higher. The provision of a median lane so that left turns can be made in two steps (first across the northbound lane, then merging into the southbound lane) will decrease delay and improve conditions to Level of Service C. If left turn lanes are provided for southbound traffic, they should include a taper and the following storage lengths:

north driveway (Parking Lot “B”)	50 feet
middle driveway Lots “A” & “C”)	75 feet
future south driveway	50 feet (assuming no more than 80 parking stalls)

Plans for the improvements to the project roadways will need the approval of the State Highways Division. In addition, the improvements should be coordinated with any improvements being undertaken by the Highways Division. Should there be any questions, please contact me at phone 236-4325 or via facsimile at 235-8869.

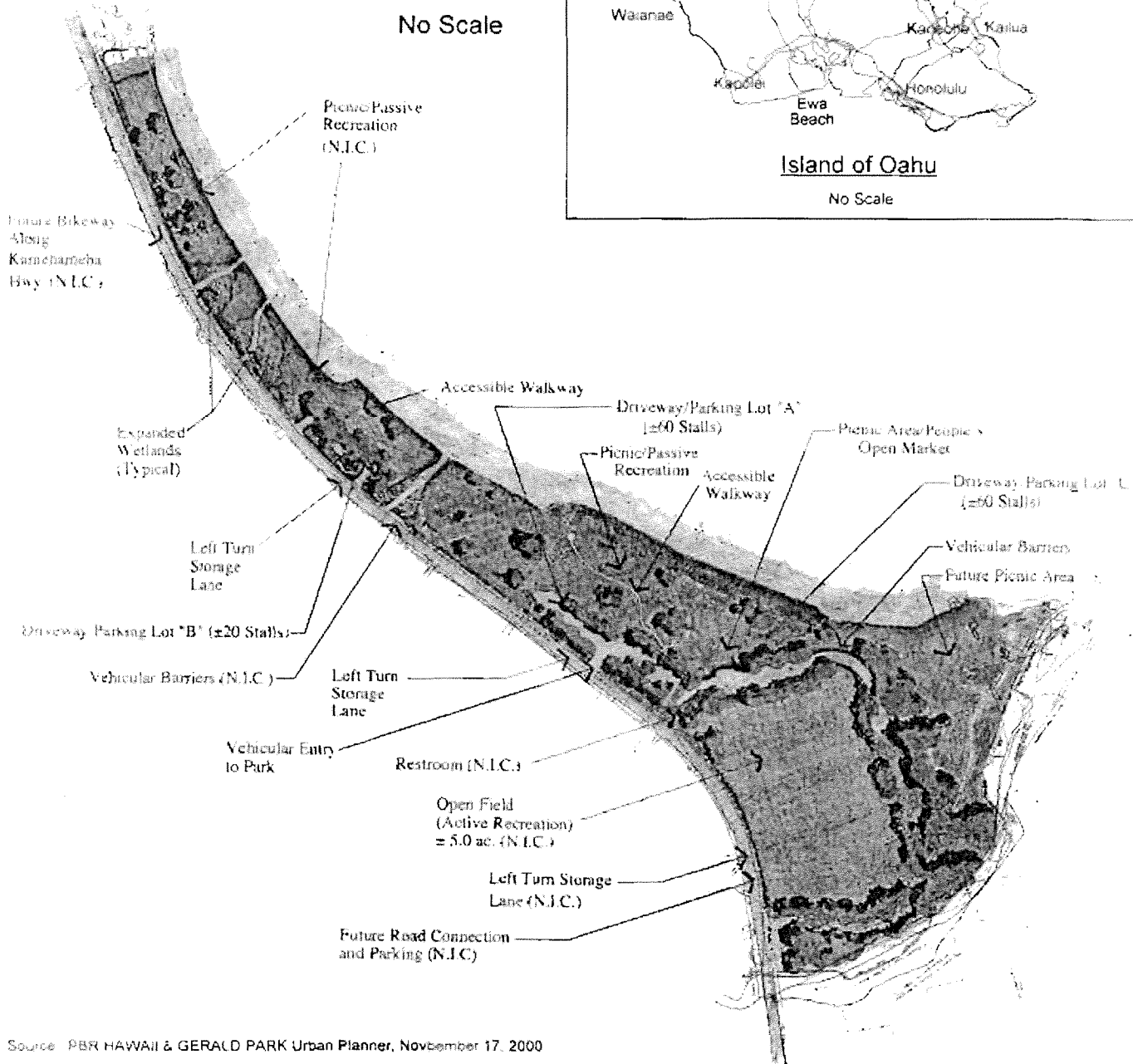
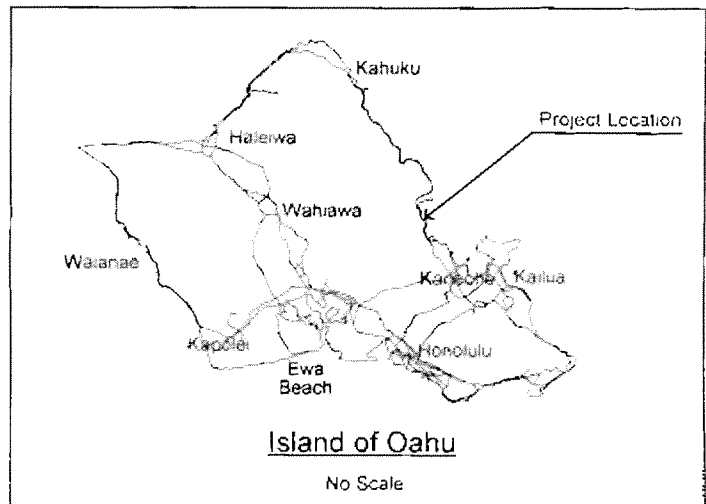
Sincerely,

JULIAN NG, INC.

  
Julian Ng, P. E., P.T.C.E.  
President

Attachments: Exhibits 1 and 2





Source: PBR HAWAII & GERALD PARK Urban Planner, November 17, 2000

## Conceptual Master Plan

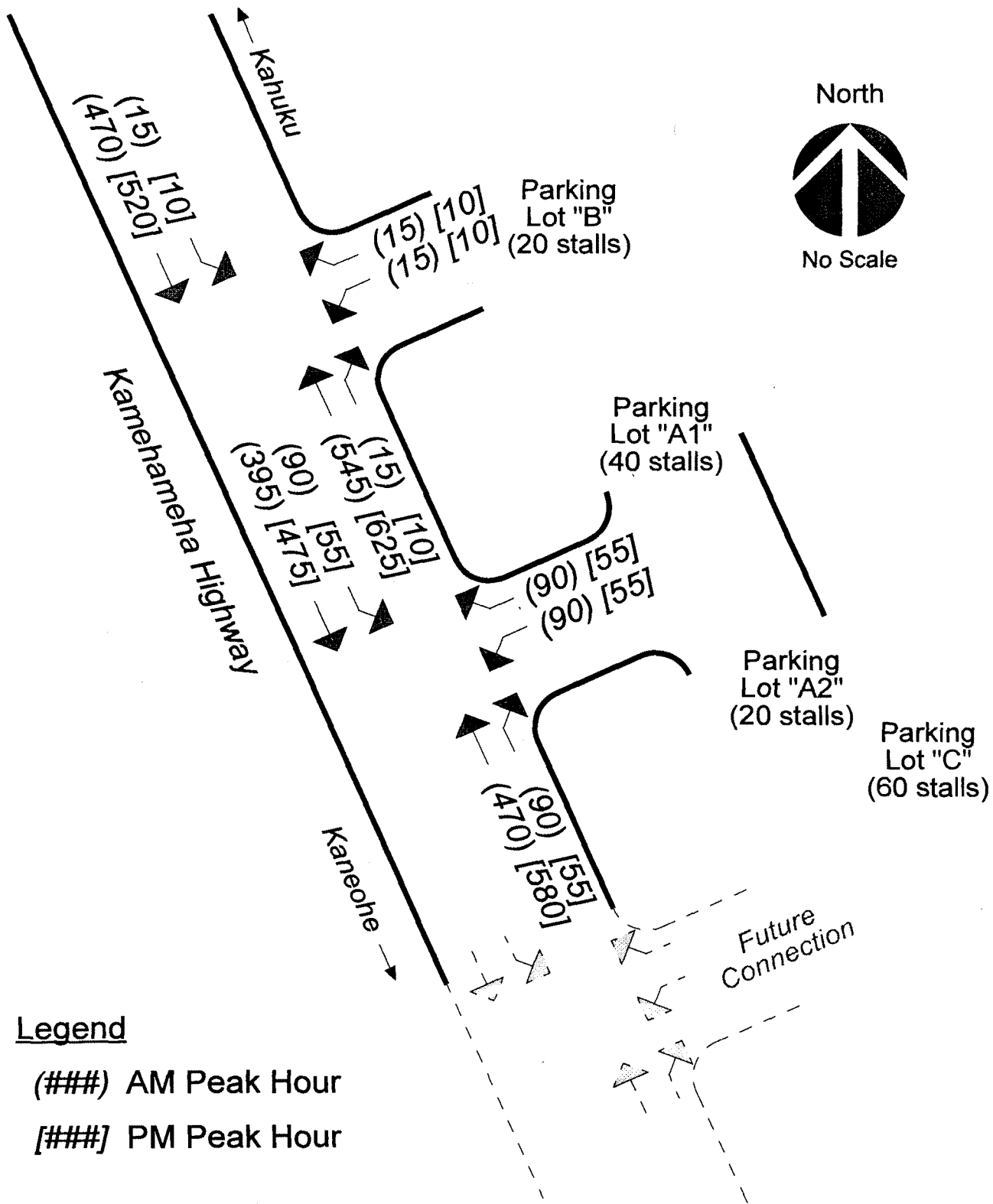
Traffic Assessment  
Waiahole Beach Park

Project Location & Vicinity

prepared by: Julian Ng, Inc.

September, 2002

Exhibit  
**1**



**Legend**

(###) AM Peak Hour  
 [###] PM Peak Hour

