

**Exhibit M**

**A Cultural Impact Assessment for the Proposed Kapa`a  
Highlands Phase II  
Kapa`a Ahupua`a, Kawaihau District, Kaua`i**



Exploration Associates Ltd.

A Cultural Impact Assessment  
for the Proposed Kapa`a High-  
lands Phase II,  
Kapa`a Ahupua`a, Kawaihau  
District, Kaua`i

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by

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# INTRODUCTION

## Scope of Work

The following scope of work was agreed upon to fulfill the requirements of a cultural impact assessment, as outlined by the Office of Environmental Quality Control guidelines:

- 1) Further background research with the goal 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- 2) Examination of historical documents, Land Commission Awards, and historic maps, with the specific purpose of identifying traditional Hawaiian activities including gathering of plant, animal and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 to develop a Cultural landscape background study,
- 3) A review of the existing archaeological information pertaining to the sites in the study area 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.
- 4) Conduct oral interviews with persons and agencies knowledgeable about the historic and traditional practices in the project area and region. This includes eight formal interviews and more informal interviews plus coordination with relevant community groups.
- 5) 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.

## Methods

### 1. Historic Research

Research was conducted to find historic maps at the Hawai'i State Survey Office, the State Historic Preservation Division library and the Kaua'i Historical Society. Historical research was conducted at the State Historic Preservation Division Library, the Hawai'i State Archives and the Bishop Museum where information on historic land use and past cultural traditions was sought. The Bishop Museum also provided historic photographs for

the report. In an attempt to obtain more regional or local sources, historic documents were sought at the Kaua'i Historical Society, Kaua'i Museum and the Kapa'a Public Library.

### 2. Archaeological Review

The library at the Department of Land and Natural Resources, State Historic Preservation Division were used to obtain information regarding previous archaeological and cultural studies in the Kapa'a area. Previously identified archaeological sites are presented for each section separately and are discussed in the context of associated cultural traditions. A complete review of archaeological sites, including descriptions, *ahu* *pua'a*, settlement patterns and archaeological constraints is available in a separate archaeological assessment document (McMahon 2012).

### 3. Identification of Knowledgeable Informants

Hawaiian organizations, community members and cultural and lineal descendants with lineal ties to the greater Kapa'a area were contacted to: (1) identify potential knowledgeable individuals with cultural expertise and knowledge of the project area and surrounding vicinity, and (2) identify cultural concerns and potential impacts relative to the project. An effort was made to locate informants who either grew up in the project area or who, in the past, used the area for cultural purposes. These included lifetime residents of Kapa'a Town, families with ties to the historic rice industries of Kapa'a and former employees of Lihue Plantation who may have lived in one of the residential camps near the study area. Other potential user groups were residents in the Kapa'a who have their roots in Kapa'a, and continue to utilize the *makai* areas for cultural reasons. In addition, informal talk-story with community members familiar with the study area is ongoing. The organizations consulted were the State Historic Preservation Division (SHPD), The Office of Hawaiian Affairs (OHA), the Kaua'i/Ni'ihau Islands Burial Council, the Royal Order of Kamehameha, Kaumuali'i Chapter, Kaua'i County Council, Kaua'i County Mayor, Kaua'i Health Heritage Coastal Corridor Committee, Kaua'i Historical Society, Kaua'i Historic Preservation Commission.

### 4. Interviews

Interviews were conducted for this assessment. Once the participant was identified, she/he was contacted and interviewed. Excerpts from the interview are used throughout this report, wherever applicable.

### 5. Report

This study documents relevant information on traditions and practices from the historic record as well as from contemporary oral sources. The report includes cultural and historic documentation of Kapa'a, a summary of archaeological studies, the results of

community consultation, and an assessment of traditional resources/traditional practices. The report is organized in such a way that reflects the effort of data and information gathering. This is the information used in the final assessment of Traditional Resources/Cultural Practices reported in the Conclusions Section IV and V.

## KAPA'A

The Kapa'a Highlands Phase II is located in Kapa'a, above the Kapa'a Bypass Road and adjacent to Kapa'a Middle School. The property is further identified by Kaua'i Tax Map Key No. (4) 4-3-03:01. The total acreage of the area is 163.125. (Figure 1 and 2).

The project area lies in the traditional *ahupua'a* of Kapa'a belongs' to the ancient district of Puna (now the district is more commonly called "Kawaihau"), one of five ancient districts on Kaua'i (King 1935: 228). Puna was the second largest district on Kaua'i, behind Kona, and extended from Kipu south of Lihu'e to Kamalomalo'o, just north of Kealia. For taxation, educational and judicial reasons, new districts were created in the 1840's. The Puna District, with the same boundaries became the Lihu'e District, named for an important town in that district. In 1878, by the act of King Kalakaua in securing a future name for the new Hui Kawaihau, created the new district of Kawaihau. This new district encompassed the *ahupua'a* ranging from Olohena on the south to Kilauea on the north. Subsequent alterations to district boundaries in the 1920's left Kawaihau with Olohena as its southernmost boundary and Moloa'a as its northernmost boundary (King 1935:222).

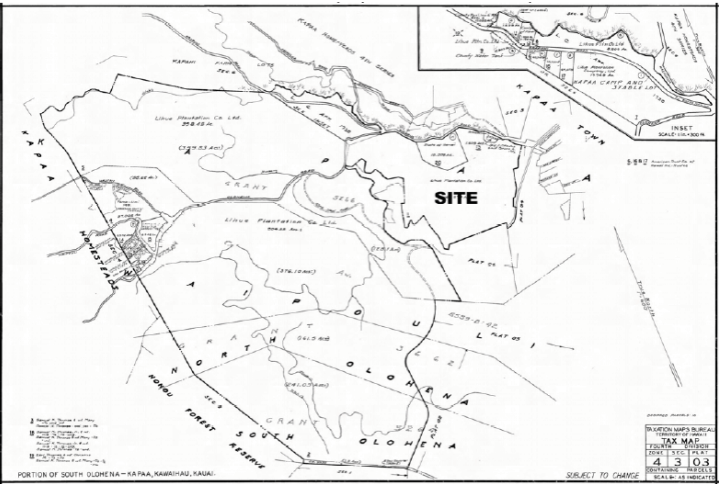


Figure 1. Tax Map Showing the Project Area for Kapaa Highlands Phase II.

Figure 2. Aerial View of Project Area Looking North



## Natural Setting

The *ahupua'a* of Kapa'a, is located on the eastern side of the island of Kaua'i, in the old district or *moku* of Puna. Adjacent and to the north is the *ahupua'a* of Keālia, and to the south, Waipouli. Like other *ahupua'a* in Puna, Kapa'a is exposed to the northeast tradewinds and receives 40 to 50 inches of rain a year at the shore and considerably more precipitation inland. The area of the *ahupua'a* of Kapa'a, is approximately 6,394 acres (Gay 1872 R.M. 159, Commission of Boundaries Record, Kaua'i, vol.1, 1873:23; Commission of Boundaries Record, Kauai, vol. 1, 1872:109). Wichman (1998:84) notes the paradox that Kapa'a "is one of the largest *ahupua'a* of the Puna District [of Kaua'i] and the most bereft of legends."

Alluvium, colluvium and terrigenous sediments resulting from the erosion of the primary island building events in Kaua'i history, the Waimea Canyon Volcanic Series and the Koloa Volcanic Series, are the major sources of sediment for the formation of Kaua'i's non-mountainous region, including Kapa'a (MacDonald and Abbott 1970:382-384). Kapa'a is located within the physiographic division known as the Lihue Plain (Armstrong 1973:30). During higher sea levels, terrigenous sediment accumulated further inland as streams released their sediment loads further inland from where the shoreline had encroached. Also, reefs grew with the rising sea level, and, as the sea receded, marine sediments were created and deposited on shore by the erosion of these reefs. Both of these processes were part of the formation of the Lihue Plain.

The soils of the project area reflect the original geologic sediments deposited and the erosional processes induced by climatic agents. Backshore of the sand berm in Kapa'a, are found sandy loams associated with the Mokuleia soil series (Foote et al. 1972:95). These soils consist of mostly recent alluvium deposited over coral sand and are typical of the eastern and northern coastal plains of Kaua'i. Behind Kapa'a Town and north of Moikeha Canal is found mixed fill. South of Moikeha Canal are Mokuleia clay loams, similar to the sandy loams fronting them. The soils found in the sand berm in Waipouli and Olohena are of the Lihue Series, which are characterized as well-drained soils derived from igneous material originating in Kapa'a's uplands (Foote et al. 1972:82).

Historically, these *ahupua'a* contained two prominent landscape features, a coastal plain with sand dunes and a large marsh. An 1872 map (Figure 2) by James Gay delineating the boundaries of Kapa'a and adjacent lands shows that much of the *makai* region was a "swamp" that extended from Waipouli into Kapa'a. This "swamp" appears to be the most prominent natural feature of the seaward end of Waipouli and Kapa'a. The *makai* areas of the *ahupua'a* can be characterized as fairly flat. Kapa'a has an irregularly-

shaped gulches and small valleys in the uplands, through which small tributary streams run, including the Kapahi, Makaleha, Moalepe and Konohiki Streams. While some of these streams combine with other tributaries in neighboring Keālia to form Kapa'a Stream, which empties into the ocean at the northern border of the *ahupua'a*, others flow directly into the marsh areas of Kapa'a and Waipouli (Handy and Handy 1972:394,423; Territorial Planning Board 1940:9).

Kapa'a Town areas is built on a sand berm with ocean on the *makai* side and marsh on the *mauka* side. The sand berm was probably slightly wider here than in other localities, but dry land was probably always at a premium.

## Mo'olelo of Kapa'a

A brief overview of some of the better documented mythological and traditional accounts of Kapa'a is presented below and is followed by a brief summation of their import.

The Puna district of Kaua'i is well known for two legendary chiefs, Kawelo and Mō'ikeha. Kawelo is more closely associated with Wailua and Hanamā'ulu and Mō'ikeha is linked to Kapa'a. Mō'ikeha is understood to be the grandchild of Maweke, one of the principal genealogical lines from which Hawaiians today trace their ancestry (Beckwith 1970:352). Sometime between the eleventh and twelfth centuries marks the arrival of Maweke to the Hawaiian Islands. Mō'ikeha succeeds his older brother Kumuhonua as ruling chief during the time of Mailikūhiki. Kapa'a is mentioned in traditions concerning Kawelo (Kaweloleimākua), the *mo'o* Kalamainu'u and the origins of the *hina'i hinālea* fish, and the story of Lonoikamakahiki (Fornander 1917:IV:318, 704-705; Rice 1923: 106-108; Thrum 1923: 123-135; Kamakau 1976:80).

### 1. Mō'ikeha

Kapa'a was the final home of the legendary chief Mō'ikeha. Born at Waipi'o on the island of Hawai'i, Mō'ikeha sailed to Kahiki (Tahiti), the home of his grandfather, Maweke, after a disastrous flood. On his return to Hawai'i, he settled at Kapa'a, Kaua'i. Kila, Mō'ikeha's favorite of three sons by the Kaua'i chiefess Ho'oiipoikamalani, was born at Kapa'a and was considered the most handsome man on the island. It was Kila who was sent by his father back to Kahiki to slay his old enemies and retrieve a foster son, the high chief La'amaikahiki (Handy and Handy 1972:424; Beckwith 1970:352-358; Kalākaua 1888:130-135; Fornander 1917:IV:160). Mō'ikeha's love for Kapa'a is recalled in the *'olelo no'eau*: *Ka lulu o Mo'ikeha i ka laulā o Kapa'a* "The calm of Mō'ikeha in the breadth of Kapa'a" (Pukui 1983: 157).

The place “Lulu-o-Mō’ikeha” is described as being situated “near the landing and the school of Waimahanalua” (Akina 1913: 5). The landing in Kapa’a was known as the Makee Landing and was probably constructed in the late 1870s, along with the Makee sugar mill. Today, in place of the old Makee Landing is part of a

breakwater located on the north side of Moikeha Canal, near the present day Coral Reef Hotel (Bushnell et al. 2002:7).

In the Hawaiian newspaper *Ku’oko’a* published at the turn of the century, Akina (1913: 6) also tells the story of how Mō’ikeha’s son, Kila stocks the Hawaiian Islands with the *akule*, *kawakawa* and ‘*opelu* fish. When Kila travels to Kahiki, he seeks out his grandfather Maweke and explains that he is the child of Mō’ikeha. When Maweke asks Kila if Mō’ikeha is enjoying himself, Kila answers with the following chant of Puna, Kaua’i:

My father enjoys the billowing clouds	<i>I walea no ku’u makuakāne i ke ao</i>
over Pōhaku-pili,	<i>ho’okanunu, iluna o Pōhakupili</i>
The sticky and delicious poi,	<i>I ka poi uouo ono ae no a,</i>
With the fish brought from Puna,	<i>Me ka i’a i na mai o ka Puna,</i>
The broad-backed shrimp of Kapalua,	<i>Ka opae hoainahanaha o Kapalua;</i>
The dark-backed shrimp of Pohakuahapai,	<i>Na opae kua hauli o Pohakuahapai,</i>
The potent awa root of Maiakii,	<i>Na puawa ona mai no o Maiakii,</i>
The breadfruit laid in the embers at Makialo	<i>Me ka ulu moelehu mai no o Makialo,</i>
The large heavy taros of Keahapana	<i>Me na kalo pehi hua o Keahapana,</i>
The crooked surf of Makaiwa too	<i>A i kekee nalu ae no hoi o Makaiwa,</i>
The bending hither and thither of the reed and rush blossoms,	<i>A i ke kahuli aku kahuli mai o ka pua uku me ka pua neki,</i>
The swaying of the kalukalu Puna,	<i>A i ka nu’a ae no o ke kalukalu o Puna, grasses of</i>
The large, plump, private of my mothers,	<i>A i na mea nui nepunepu no a ku’u mau parts makuahine</i>
Of Ho’oipoikamalanai and Hinaiu-u,	<i>O Ho’oipoikamalanai me Hinaiu-u,</i>
The sun that rises and sets,	<i>A i ka la hiki ae no a napoo aku,</i>
He enjoys himself on Kaua’i,	<i>Walea ai no ka nohona ia Kaua’i,</i>
All of Kaua’i is Mō’ikeha’s	<i>Ua puni a puni Kaua’i ia Mō’ikeha</i>

Maweke was delighted and when the boy is questioned as to his purpose, Kila tells his great grandfather he is seeking fish for his family. Maweke tells Kila to lead the fish back to his homeland. This is how Kila led the *akule*, *kawakawa* and ‘*opelu* to Hawai’i (Fornander 1917:IV:162-163).

In another legend of Kila, Mō’ikeha sends his son to Tahiti to slay his enemies. Upon reaching Tahiti, Kila meets his father’s aunt, Kanepohihi, in the form of a blind, supernatural rat. He introduces himself, sending his father Mō’ikeha’s greetings. Kanepohihi asks of Mō’ikeha, and Kila responds:

He is indulging in ease in Kaua’i	<i>I walea ia Kaua’i</i>
Where the sun rises and sets again,	<i>I ka lā hiki ae a pō iho</i>
Where the surf of Makaiwa curves and	<i>I ke kee a ka nalu o Makaiwa bends,</i>
Where the sun comes up over	<i>I ka hiki mai a ka la maluna</i>
The kalukalu of Kewa;	<i>O ke kalukalu o Kewa</i>
The stretched out waters of Wailua,	<i>O ka wai halau o Wailua</i>
And the entrancing favors of my mother	<i>O ka lealea o ka mai o kuu makuahine</i>
Ho’oipoikamalanai	<i>O Ho’oipoikamalanai</i>
He will live and die in Kaua’i	<i>O kahi noho no o Kaua’i a make</i>

(Fornander 1916:IV:162-163)

## 2. Ka’ililauokekoa the Chiefess of Kapa’a and the Lute Kanikawi

Waipouli and Kapa’a are mentioned in the legend of Ka’ililauokekoa, a chiefess of Kapa’a and granddaughter or daughter of Mō’ikeha. Thomas Thrum (1907: 83-84) relates that:

[Kaililauokekoa’s] greatest desire was to play konane, a game somewhat resembling checkers, and to ride the curving surf of Makaiwa (*ke’eke’e nalu o Makaiwa*), a surf which breaks directly outside of Waipouli, Kapa’a. She passed the larger part of her time in this matter every day, and because of the continual kissing of her cheeks by the fine spray of the sea of Makaiwa, the bloom of her youth became attractive ‘as a torch on high,’ so unsurpassed was her personal charm.

In the Thrum (1923:123-135) version, Ka’ililauokekoa is seduced by the nose flute of Kauakahiali’i who is at the time residing in Wailua uka at a place called Pihanakalani. She travels up to Pihanakalani with her companion where she joins Kauakahiali’i as his wife. They are found by Mō’ikeha’s people and taken down to Kapa’a where Kauakahiali’i is imprisoned. A boy named Kalukaluokewa takes pity on Kauakahiali’i and sneaks



through the *kalukalu* grass and the *ahuawa* rushes to bring the prisoner food and water. Meanwhile, Ka'ililauokekoa tells her parents of her calling by Kanikawi to the home of Kahalelehua at Pihanakalani and her encounter with Kauakahiali'i.

### 3. Kalukalu grass of Kapa'a

"*Kūmoena kalukalu Kapa'a*" or "Kapa'a is like the *kalukalu* mats" is a line from a chant recited by Lonoikamakahiki. *Kalukalu* is a sedge grass, apparently used for weaving mats (Fornander 1917:IV:318-319). Pukui (1983:187) associates the *kalukalu* with lovers in "*ke kalukalu moe ipo o Kapa'a*"; "the *kalukalu* of Kapa'a that sleeps with the lover." According to Wichman (1998:84), "a *kalukalu* mat was laid on the ground under a tree, covered with a thick pile of grass, and a second mat was thrown over that for a comfortable bed," thus the association with lovers. Kaua'i was famous for this peculiar grass, and it probably grew around the marshlands of Kapa'a. It is thought to be extinct now, but an old-time resident of the area recalled that it had edible roots, "somewhat like peanuts." Perhaps it was a famine food source (Kapa'a Elementary School 1933: VI).

### 4. Pāka'a and the wind gourd of La'amaomao (Keahiahi)

Kapa'a also figures prominently in the famous story of Pāka'a and the wind gourd of La'amaomao. Pāka'a was the son of Kuanu'uanu, a high-ranking retainer of the Big Island ruling chief Keawenuia'umi (the son and heir to the legendary chief 'Umi), and La'amaomao, the most beautiful woman of Kapa'a and member of a family of high status *kahuna*. Kuanu'uanu left the island of Hawai'i, traveled throughout the other islands and finally settled on Kaua'i, at Kapa'a. It was there that he met and married La'amaomao, although he never revealed his background or high rank to her until the day a messenger arrived, calling Kuanu'uanu back to the court of Keawenuia'umi. By that time, La'amaomao was with child but Kuanu'uanu could not take her with him. He instructed her to name the child, if it turned out to be a boy, Pāka'a. Pāka'a was raised on the beach at Kapa'a by La'amaomao and her brother Ma'ilou, a bird snarer. He grew to be an intelligent young man and it is said he was the first to adapt the use of a sail to small fishing canoes. Although Pāka'a was told by his mother from a very young age that his father was Ma'ilou, he suspected otherwise. After constant questioning by Pāka'a, La'amaomao told her son the truth about Kuanu'uanu.

Intent on seeking out his real father, Pāka'a prepared for the journey to Hawai'i Island. His mother presented him with a tightly covered gourd containing the bones of her grandmother, also named La'amaomao, the goddess of the winds. With the gourd and chants taught to him by his mother, Pāka'a could command the forces of all the winds in Hawai'i. While this story continues on at length about Pāka'a and his exploits on Hawai'i and later

on Moloka'i, it will not be dwelt upon further here. It is important to note that several versions of this story do include the chants which give the traditional names of all the winds at all the districts on all the islands, preserving them for this and future generations (Nakuina 1990; Rice 1923:69-89; Beckwith 1970:86-87; Thrum 1923:53-67; Fornander 1918:V: 78-128).

Frederick Wichman (1998:84) writes that Pāka'a grew up on a headland named Keahiahi just south of Kapa'a River. Here, Pāka'a learned to catch *mālolo*, his favorite fish. After studying the ocean and devising his plan to fabricate a sail, Pāka'a wove a sail in the shape of a crab claw and tried it out on his uncle's canoe. One day, after going out to catch *mālolo*, he challenged the other fishermen to race to shore. He convinced them to fill his canoe with fish suggesting it was the only way he could truly claim the prize if he won:

The fishermen began paddling toward shore. They watched as Pāka'a paddled farther out to sea and began to fumble with a pole that had a mat tied to it. It looked so funny that they began to laugh, and soon they lost the rhythm of their own paddling. Suddenly Pāka'a's mast was up and the sail filled with wind. Pāka'a turned toward shore and shot past the astonished fishermen, landing on the beach far ahead of them. That night, Pāka'a, his mother, and his uncle had all the *mālolo* they could eat [Wichman 1998:85].

### 5. Kaweloleimakua

Kapa'a is also mentioned in traditions concerning Kawelo (Kaweloleimakua), Keililauokekoa (Moikeha's daughter, or granddaughter, dependent on differing versions of the tale), the *mo'o* or reptile Kalamainu'u and the origins of the *hina'i hinalaea* or the fish trap used to catch the *hinalaea* fish, and the story of Lonoikamakahiki (Fornander 1917, vol.4 pt.2:318, vol.4 pt.3:704-705; Rice 1923:106-108; Thrum 1923:123-135; Kamakau 1976:80).

### 6. Kanaka-Nunui-Moe-The Sleeping Giant

Frederick B. Wichman relates an account of Kaua'i's Sleeping Giant:

A long time ago, there was a giant living in Kawaihau among the low hills behind Kapa'a town. He was so tall he could see above the coconut trees. If he sat very still, it was easy to mistake him for one of the hills. Anyone who did not know him was afraid of his great size, fearing



the damage he might cause. However the people of Kawaihau loved him, for he was very friendly and went out of his way to be useful.

This giant was always careful where he stepped so that he would not injure anyone and he never destroyed taro patches or houses with a careless foot. When he wished to rest, he sat on one of the small hills above Kapa'a. The villagers were glad when this happened for his weight flattened the hilltop, making another plot of ground fit for cultivation.

"He is very helpful," the Kapa'a people said to astonished stranger who came to their land. "He does many things for us quickly that otherwise we could not do in many months." Wherever this giant stepped he left deep footprints and in these deep holes the people planted banana trees. The villagers threw leaves, taro peelings, and other vegetable rubbish into these holes. When compost had been formed, they planted banana sprouts. In this way, the people of Kapa'a always had ripe bananas to give to the giant, for banana was his favorite food.

The giant yawned very often, for he was always sleepy. The gust of wind from his mouth often knocked down houses and blew the grass thatch into the sea. The giant was always very apologetic whenever this happened and he quickly brought logs from the uplands to rebuild the fallen houses and gathered *pili* for the thatching.

He found it difficult to stay awake more than a hundred years at a time. When he could no longer fight against the drowsiness overpowering him, he would sleep using a small hill for a pillow. Because of this, the people called him Kanakanunui-moe, the sleeping giant.

When he slept, Nunui slept for hundreds of years while the winds blew dirt over him and seeds were dropped there by the birds. The gently showers sent by *Kahale-lehua*, goddess of the gentle rains, fed these seeds and forest grew up over the giant. When Nunui awoke and stretched, the people of Kapa'a fled in great fear, for what they had thought to be a hill had come alive.

One time, while Nunui was still awake, the high chief of Kawaihau wanted to build a large *heiau* to honor one of his gods. This was to be no ordinary temple. The chief wanted water-polished rocks for the walls and hard *koa* wood from Kokee for the framework of the god's house.

So the chief told the Kawaihau people what he wanted them to do. They must gather rocks from the golden brown waters of the Koke'e streams and

cut *koa* trees on the edges of Waimea canyon, and gather *pili* grass that grew at Mana. "All this must be done in the turn of one moon," he ordered.

The unhappy people left their chief and silently returned to their village. The giant Nunui, stepping carefully among them, saw the long faces of the people.

"What is wrong?" he asked.

The Kapa'a villagers told him what they must do within the impossibly short time. "This cannot be done," the people said in low, sad voices. "How can we go to Kokee and bring back stones enough to build the walls in that time? And cut down the *koa* trees and bring the logs here and build the sacred house? And even if we do these things, who will cultivate our fields?"

Nunui smiled gently. "Tend to your fields," he said. "This work is nothing for me, and I'll gladly help you. Besides, it will give me something to do."

The giant went to Kokee and scooped up smooth, round boulders from the golden brown waters and brought them to Kapa'a. "Chief," he called to the astonished ruler, "show me where you wish to build this *heiau*."

The amazed chief pointed out the place set aside for the temple. Nunui placed the rocks to form a wall, fitting them so closely together that not even a mouse could squeeze between the cracks. Within a week, he had built a strong, thick, handsome wall around the sacred place.

Nunui returned to the edge of Waimea Canyon and cut down *koa* trees and trimmed them into the shape he needed. He carried these back and made the framework of the house. He gathered *pili* grass from Wild and wrapped the stems into bundles, tied these bundles to the framework, and within half the time the chief had set, the *heiau* was finished.

Everyone was happy. The farmers had been able to keep up with their chores, the chief had his *heiau*, and Nunui had something to do. There was even time enough a celebration. The chief ordered all his people to gather bananas and to pound sweet potatoes and taro into poi. Some people hurried to slaughter pigs and dogs to be cooked in the *imu*, while others paddled out to sea to fill their canoes with fish and sent their wives to gather seaweed and *opihī* from the reef. At last, enough food for everyone was ready, and the chief, the villagers, and Nunui sat down before the overflowing bowls and platters.

"Eat," said the chief to Nunui. "After the work you have done, you must be hungry."

The giant ate all the food that had been put before him. When he was through, his stomach bulged and he was very sleepy. He chose a comfortable hill just a short distance above Kapa'a town. Nunui stretched a last time, lay down along the top of the hill, and soon was sound asleep.

As he slept through the years, the winds blew dirt over him and the birds brought seeds. Ka-hale-lehua, goddess of the gentle rains, sent showers to water the plants that now covered the giant.

So Kanaka-nunui-moe sleeps and sleeps and has come to resemble a long hill with a lump at one end where his nose is and lumps at the other ends where his feet are. He no longer looks like a living being, but one day, perhaps soon, his eyes will open, he'll yawn and stretch his arms, and sit up. [Wichman 1985:13-16]

#### 7. Lepeamoa

In the Legend of "Lepeamoa (The Chicken Girl of Palama)" (Thrum 1923:177) is a reference to a fantastic battle at Kapa'a between Lepeamoa's brother, the hero Kauilani and a supernatural kupua called Akuapehuale ('god of swollen billows'):

Kauilani struck him a heavy blow and the spear leaped again and again upon him, till he rolled into a mountain stream at a place called Kapa'a, out of which he crawled, almost drowned. Then he was driven along even to the image houses, where a fierce battle took place, in which the wooden images took part, many of them being torn to pieces by the teeth of Akuapehuale.

#### 8. Palila and Ka'ea

High in the *mauka* region of Kapa'a in the Makaleha mountains at a place called Ka'ea, is reported to be the supernatural banana grove of the Kaua'i kupua or demigod Palila, grandson of Hina (Handy and Handy 1972:424). Joseph Akina for *Kieoko 'a* Newspaper in 1913 describes Palila's banana grove:

The stalk could hardly be surrounded by two men, and was about 35 feet high from the soil to the lowest petiole. The length of the cluster from stem to lowest end of the bunch of bananas was about  $1\frac{3}{4}$  fathoms long (one *anana* and one *muku*). There were only two bananas on each about 4  $\frac{1}{2}$  inches around the middle. There were just two bananas, one on the east side and one on the west, each about a foot or more in length. The one on the east side was tartish, like a *waiawi* (Spanish guava) in taste and the one on the west was practically tasteless. The diameter of the end of the fruit stem of this banana seemed to be about 11/2 feet. This kind of banana plant and its fruit seemed almost supernatural... (Akina, 1913:5).

#### 9. Winds

The winds of Kapa'a and Waipouli are named in the *mo'olelo* of Kuapaka'a and these include the *kehau* for Kapa'a, the *ho'olua* for Makaiwa and the *inuawai* for Waipouli (Fornander 1917:IV:96). A *kama'aina* interviewed for the 50th anniversary book of Kapa'a School in 1933 (p. 28) identified the winds of Kapa'a:

...Some persons call the wind MAKANI LIHUE: That is, those who live here in Kapa'a, because the wind comes from Lihue. The wind we had on Jan. 30 was really, MAKANI LIHUE. The wind that comes from Hanalei is called MAKANI KIU which means, a very cold wind. The wind that comes from the northeast—(tradewind) is called MAKANI HOOLUA. This is the plant destroying wind...

#### Place Names and Wahi Pana of Kapa'a

Place names and *wahi pana* ("legendary place") (Pukui and Elbert 1986:377) 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 meaning for the people of that time" (McGuire 2000:17). The *wahi pana* were then passed on through language and the oral tradition, thus preserving the unique significance of the place. Hawaiians named all sorts of objects and places, points of interest that may have gone unnoticed by persons of other cultural 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 et al. 1974:x)

The following is a list of place names for Kapa'a, mentioned in this report. This list should by no means be considered complete. Place names were gathered from traditional literature (*mo'olelo*, chants), historical sources, maps and the Māhele records. Almost all of the 'ili names were taken from Land Commission Award records. Sadly, none of these 'ili names were documented on historic maps researched for this project, and their meanings and cultural associations appear to be lost and forgotten.

*Place Names of Hawai'i* (Pukui et al. 1974) was used as the primary source for all place name translations. Where there were no known translations, a literal translation of the place name was sometimes made using the *Hawaiian Dictionary* (Pukui and Elbert 1986). The intent of the author is merely to present the available information and let the reader come to his/her own conclusions.

An attempt was made to include the proper diacritical marks for all known and generally accepted translations of place names. Making incorrect assumptions about the pronunciation and where to place the diacritical marks in a name can entirely change the meaning of a name, (e.g. *pū'ā'ā*: "scattered; to flee in disorder and fright"; *pua'a*: "pig, pork"). Therefore, in cases where the pronunciation of a name was uncertain, diacritical marks were not used and no attempt was made to translate the name. In some cases, cultural relationships were made based on the literal translation of the root word.

One of the beauties of the Hawaiian language is the dualism in names and the double meanings—the literal meaning and the *kaona* or hidden meaning. It should be remembered that the true significance of a place name lies only with the people who use them and know their history.

The following abbreviations are used throughout the Place Names section for ease and efficiency. (Refer to the References section for complete citations.)

LCA=Land Commission Award

PE=Hawaiian Dictionary by Pukui and Elbert, 1986

PEM=Place Names of Hawai'i by Pukui, Elbert and Mookini, 1974

**Table 1 Place Names of Kapa'a.**

Name	Meaning	Reference
Apopo	Land division, possibly 'ili in Kapa'a, pali, Literally "tomorrow"?	(LCA #10907/#8343) Soehren (2002:265)
Awawaloa	The name of a land division, possibly an 'ili in Kapa'a in which lo'i were cultivated meaning - long valley, gulch, ravine.	(LCA #8843/#8837), (Soehren, 2002:265)
Hahanui /Kahanui	The name of an 'ili in Kapa'a where lo'i were claimed pali, stream, Lobelia plant?	(LCA #10564/#3554/#3599), (Soehren, 2002:265)
Hoa	Pali, Literally "Friend"?	(LCA#3638:1) (Soehren, 2002:265)
Ho'opi'i	Waialele, Literally "To cause to rise?"	(Soehren, 2002:265)
Humu'ula	Pu'u, Literally "Jasper stone?"	(LCA #8247) (Soehren, 2002:265)
Kahana	The name of a land, possibly an 'ili in Kapa'a where uncultivated lo'i were claimed Literally, "cutting"	(LCA 3971). (PEM: 63), (Soehren, 2002:265)

Name	Meaning	Reference
Kaiakea/Kaikea	Name of area encompassing Kuahiahi Point. "Kaikea: White sea foam, especially as washed up on a beach: ka'ike'a: Station of the cross (Catholic); procession of the cross"	(PE:116).
Kalolo/Kaloko	The name of a village or houselot in Kapa'a Ahupua'a Kauhale, kula, Literally, "the pond", "liquor"	(LCA#3638, #8843), (Soehren, 2002:265)
Kaloloku	Name of swamp in back of Kapa'a and Waipouli	
Kamahuna	Pu'u	(Soehren, 2002:265)
Kamali'i	Ridge, Literally "Children"	(Soehren, 2002:265)
Kapa'a	Ahupua'a name, Literally "solid" or "the closing"	(Wichman, 1988:84 and Soehren, 2002:265)
Kapahi	Village, stream, Literally "the Knife"	(Soehren, 2002:265)
Kapeku	Lo'i, Literally "the Kick"	LCA# 8837, (Soehren, 2002:265)
Kaulolo	Kauhale	LCA# 3638, (Soehren, 2002:265)
Kehau	Name of wind of Kapa'a	(Fornander, 1918:V:96, 97)
Keiwa	Ridge, boundary point, Literally "The ninth"	(Soehren, 2002:265)
Koalua	Surf, Literally "Two coral heads",	Finney 1959, (Soehren, 2002:265)
Kolehaka	Pali,	LCA#3971/#3243 (Soehren, 2002:265)
Kolokolo	Name of deep fresh water pond, Literally "Soap Plant"	Wichman (1988:84)
Kolouna	Pali,	LCA# 8247, (Soehren, 2002:265)
Kuahiahi/Kaahiahi	Name of rocky headland at north end of Kapa'a Ahupua'a;	
Kuahiahi/Keahiahi	Location of first Kapa'a School (1883-1908); location of former heiau called Kuahiahi, place where the legendary figure Paka'a, keeper of the wind gourd of La'amaomao, grew up and fished Literally "twilight"	(PEM 211 :216) ; (Wichman 1998 : 85)
Kupali'i	Name of a pond in Puna district famed in chant for the rustling of the manienie grass	(PEM: 211-216)

Name	Meaning	Reference
Kupanihi	The name of a pond in the Puna district associated with Kao, Kaumuāli'i's older brother, ili, kauhale, Name of fishpond and land in Kapa'a claimed	(PEM:216); in LCA #3971/#3243, (Soehren, 2002:265)
Maelele	The name of a land division, possibly an 'ili in Kapa'a in which lo'i Literally "Numb" were cultivated,	(LCA #3638), (Soehren, 2002:265)
Makaleha	Pu'u, boundary point, Eyes looking about as in wonder and admiration,	Boundary Commission, (Soehren, 2002:265)
Makanalimu	Place, heiau, Literally "Gift of seaweed"	PEM:141
Makea	'Auwai, Literally "fallow land"	LCA# 3599/#3554 (Soehren, 2002:265)
Moalepe/Moalepi	Hill in the mauka region of Keālia (HAS, Interior Dept., Land, June 23, 1862); land division, stream possibly an 'ili in mauka region of Kapa'a	LCA #8247 (Soehren, 2002:265)
Moikeha Canal	Canal which is traversed by two plantation era railroads near the present day Kapa'a Public Library and the Coral Reef Hotel	
Naele	Pali, Literally "swamp, big"	LCA #8837, (Soehren, 2002:265)
Paikahawai	'ili,	(Soehren, 2002:265)
Pohakikii	Pu'u, Tilted stone,	(Soehren, 2002:265)
Pohakupili	Pu'u, boundary point, Literally "joined stone",	(Soehren, 2002:265)
Poo	Surf, Literally "Head"	Finney 1959, (Soehren, 2002:265)
Pueo	Pali, Literally "owl",	LCA# 8843, (Soehren, 2002:265)
Puhi	The name of a village or household in Kapa'a Ahupua'a, Kauhale, pond, Literally "eel",	LCA #3554/#3599, (Soehren, 2002:265)
Puohomaka	Pali,	LCA# 8837, (Soehren, 2002:265)
Pupukai	Pali,	LCA# 3638, (Soehren, 2002:265)
Puu Ekeeke	Pali,	LCA# 8837, (Soehren, 2002:265)
Puu Laui	Pu'u, boundary point, Laui'i fern hill,	Boundary Commission,(Soehren, 2002:265)
Ulakiu	Ku,	LCA# 8837, (Soehren, 2002:265)
Ulukiu	Name of a houselot or village in Kapa'a	(LCA #8837)

Name	Meaning	Reference
Waika'ea	Canal and boat ramp in Kapa'a adjacent to the present day Pono Kai Resort, ditch,	(Clark 2002:374), (Soehren, 2002:265)
Waikaeee	A place described as being located in the uplands near Nounou	(PEM Placenames, Ku'oko'a, May 2, 1913)
Waileia	Rock, boundary point, Literally "Abundant Water"	Boundary Commission, (Soehren, 2002:265)
Waimahanalua	Name of a stream and school located near the old Makee The name mahanalua suggests the stream was forked and fed by multiple streams which could well be the case since the backlands of Kapa'a were swamplands fed by many streams. near the present day Moikeha Canal.	(PEM Placenames, Ku'oko'a May 9, 1913).
Waitala	"local" name used to refer to Waika'ea Canal	(T. Sokei, July 28, 2003 in Bushnell et.al. 2004)

### Summary of the Mythological and Traditional accounts of Kapa'a

A survey of traditional mythological literature shows Kapa'a prominently associated with some of the most famous legendary and historical figures including Maui, Kawelo, Mo'ikeha, Maweke, Palila, Paka'a and Kanaka Nunui Moe. What few specific references there are suggest that high status habitation was focused near the coast with less intensive utilization of the uplands which were regarded as wild places. The most notable feature of the traditional accounts are the references to grasses and sedges (*Kalukalu* grass and *Ahuawa* rushes) which undoubtedly reflects in part the natural marsh lands near the coast but may also reflect transformation of the landscape through a denudation of trees by the activities of a relatively dense population harvesting slow growing trees for firewood and construction materials over many centuries.

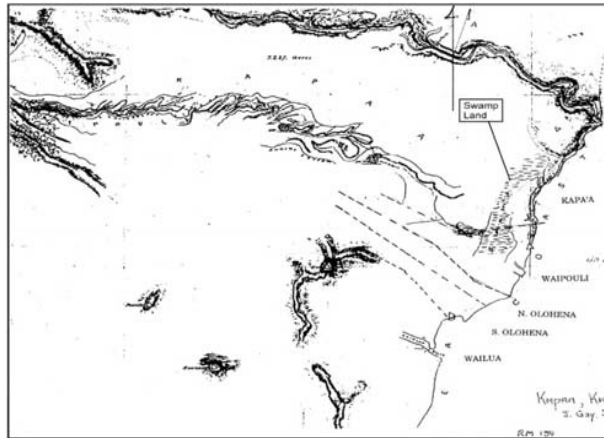


Figure 3. Portion of 1872 Survey Map by James Gay, Showing Swamp Land in Puna.

### Early Post-Contact Period

Very few recorded observations exist for this period in Kapa'a's history. George Vancouver (1798:2:221-223) examined the east coast of the island from his ship in 1793 and stated that it was the "most fertile and pleasant district of the island..." However, he did not anchor nor go ashore there due to inhospitable ocean conditions.

Kiimakani stands out as a particularly interesting Hawaiian chief in the early post-contact history of Waipouli. In 1824, the brig, "Pride of Hawaii," owned by Liholiho (Kamehameha II), ran aground in Hanalei Bay. Hiram Bingham (1847:221-222) recorded the efforts of a great crowd of Hawaiians to pull the vessel to shore for salvage:

Kiimakani passed up and down through the different ranks, and from place to place, repeatedly sung out with prolonged notes, and trumpet tongue... 'be quiet - shut up the voice.' To which the people responded... 'say nothing,' as a continuance of the prohibition to which they were ready to assent when they should come to the tug. Between the trumpet notes, the old chieftain, with

the natural tones and inflections, instructed them to grasp the ropes firmly, rise together at the signal, and leaning inland, to look and draw straight forward, without looking backwards toward the vessel. They being thus marshalled and instructed, remained quiet for some minutes, upon their hams.

The salvage efforts ultimately failed and the brig was lost. Bingham's account vividly suggests the force of personality of the chief and further betokens an authority and stature that may have been founded upon the traditional prestige of his domain, Waipouli.

Kiimakani appears in Samuel Kamakau's account (1961:267) of the 1824 rebellion of the chiefs of Kaua'i upon the death of Kaumuali'i. Kalanimoku, representative of Kamehameha II, had called a council of the Kaua'i chiefs at Waimea during which he announced

"The lands shall continue as they now stand. Our son, Kahala-i'a, shall be ruler over you." A blind chief of Waipouli in Puna, named Ki'ai-makani, said, "That is not right; the land should be put together and re-divided because we have a new rule," but Ka-lani-moku would not consent to this.

After some Kaua'i chiefs, including Kiimakani, rebelled against the imposed decrees:

On August 8 [1824] the battle of Wahiawa was fought close to Hanapepe. The Hawaii men were at Hanapepe, the Kauai forces at Wahiawa, where a fort had been hastily erected and a single cannon (named Hume-hume) mounted as a feeble attempt to hold back the enemy...Large numbers of Kauai soldiers had gathered on the battleground, but they were unarmed save with wooden spears, digging sticks, and javelins...No one was killed on the field, but as they took to flight they were pursued and slain. So Kia'imakani, Na-ke'u, and their followers met death [Kamakau 1961: 268].

Kamakau's singling out of Kiimakani for special mention reinforces the impression that the chief and his *ahupua'a* may have shared a traditional prestige.

In 1840, Peale and Rich, with Charles Wilkes' United States Exploring Expedition, traversed the coastline there on horseback heading north from Wailua:

The country on the way is of the same character as that already seen. They passed the small villages of Kuapau, Keālia, Anehola, Mowaa, and Kauharaki, situated at the mouths of the mountain streams, which were closed with similar sand-bars to those already described. These bars afforded places to cross at, though requiring great precaution when on horseback. The streams above the bars were in most cases deep, wide, and navigable a few miles for canoes. Besides the sugarcane, taro, &c., some good fields of rice were seen. The country may be called open; it is covered

with grass forming excellent pasture-grounds, and abounds in plover and turnstones, scattered in small flocks [Wilkes 1845:69].

James Jarves (1844:157), who tracked much of the same route as Peale and Rich, noted "nothing of particular interest is met with on the road, until arriving at Anahola."

### The Mahele Period

The Organic Acts of 1845 and 1846 initiated the process of the Mahele, which introduced private property into Hawaiian society. It is through information garnered from records for Land Commission Awards (LCAs) generated during the Mahele that specific documentation of traditional life in Kapa'a come to light.

**Table 2. Mahele Land Claims and Land Use of Kapa'a.**

LCA Number	Ahupua'a	Claimant	'Ili of the Ahupua'a	Land Use	Number of 'Āpana
3243 (See 3971)	Kapa'a	Honolii, Ioane	Kahana, Kupanihi Village	6 <i>lo'i</i> (uncult), house lot	2 (2 acres, 1 rood, 1 ord)
3554	Kapa'a	Keo	Kahanui Puihi Village	15 <i>lo'i</i> , house lot	2 (7 acres, 1 rood, 17 rods)
3638	Kapa'a	Huluili	Maelele Kalo Village	12-15 <i>lo'i</i> , house lot	2 (5 acres, 1 rood, 19 rods)
8247	Kapa'a	Ehu	Moalepe / Noalepe	20 <i>lo'i</i> ,	1 (3 roods)
8837	Kapa'a	Kamapaa	Ulukiu lalo Awawaloa Ulukiu	3 <i>lo'i</i> , 2 <i>lo'i</i> , house lot	1 (2 acres, 2 roods, 27 rods)
8843	Kapa'a	Kiau	Apopo Kalo Village	6 (5) <i>lo'i</i> and <i>kula</i> , house lot	2 (2.75 acres, 3 rods)
10564	Kapa'a	Oleloa, Daniel	Hikinui farm	fishpond, 10 <i>lo'i</i>	

### Kapa'a Land Commission Awards

Documents relating to Land Commission Awards (*kuleana*) during this period show, surprisingly, that only six individuals were awarded *kuleana* parcels in the relatively large *ahupua'a* of Kapa'a. Five of the six received multiple parcels and show characteristic similarities. They are Keo (LCA #3554, 3599), Kiau (#8843), Kamapaa (#8837), Ioane Honolii (#3971), and Huluili (#3638) (See Table 1). All five had *lo'i* on the *mauka* side of the lowland swamp area, sometimes extending a short distance up into small, shallow gulches and valleys. Each also had a separate house lot located on the *makai* side of the swamp, adjacent to the beach.

Interestingly, the residential "village" of Kapa'a did not exist as a single entity, but was a series of small settlements or compounds that stretched along the shoreline of the *ahupua'a* and included (south to north) Kupanihi (Makahaikupanihi), Kalo (Kaulolo), Puihi, and Ulukiu. The sixth individual, Ehu (#8247), was the only person to be awarded a single parcel in the upland area of Kapa'a at Moalepe valley, approximately five miles from the shore. In 1848, when Ehu made his claim, he was the only one living there. A few years later, according to Honolii's testimony to support Ehu's claim, "There are no houses and no people now living on the land. Ehu found himself lonely there, all his neighbors having either died or left the land. Ehu now lives in Wailua." Ehu may have been the last person to live at and cultivate in the traditional way the far *mauka* region of Kapa'a.

A check of the Foreign Testimony (F.T) for *Kuleana* Claims to Quiet Land Titles in the Hawaiian Islands (1848-50) reveals the names of three *'auwai* in Kapa'a. Cross-referencing this information with various maps gives a general indication of their location: Makahaikupanihi, along the southern border near the shore and the settlement in Waipouli; Makea, near the current Kapa'a Public Library on the *mauka* side of Kūhiō Highway; and Kapa'a, probably along the current Kanaele Road.

There were no *kuleana* claims found within the project area.

### The Late 1800s

In 1849, a son of Wai'oli missionaries, William P. Alexander, recorded a trip he took around Kaua'i. Although, he focuses on the larger mission settlements like Koloa and Hanalei, he does mention Kapa'a:

A few miles from Wailua, near Kapa'a, we passed the wreck of a schooner on the beach, which once belonged to Capt. Bernard. It was driven in a gale over



the reef, and up on the beach, where it now lies. A few miles further we arrived at Kealia. We had some difficulty crossing the river at this place, owing to the restiveness of our horses. The country here near the shore was rather uninviting, except the valley which always contained streams of water (Alexander, 1991: 123).

In later years, the notorious Kapa'a reef was to become the location of many shipwrecks particularly once a landing was built there in the 1880s.

Although most of the historic record documents for Kaua'i in this period revolve around missionary activities and the missions themselves, there was indication that the Kapa'a area was being considered for new sugar cane experiments, similar to those occurring in Koloa. In a historic move, Ladd and Company received a 50 year lease on land in Koloa from Kamehameha III and Kaua'i Governor Kaikio'ewa of Kaua'i. The terms of the lease allowed the new sugar company "the right of someone other than a chief to control land" and had profound effects on "traditional notions of land tenure dominated by the chiefly hierarchy" (Donohugh, 2001: 88). In 1837, a very similar lease with similar terms was granted to Wilama Ferani, a merchant and U.S. citizen based in Honolulu (Hawai'i State Archives, Interior Dept., Letters, Aug. 1837). The lease was granted by Kaikeaouli or Kamehameha III for the lands of Kapa'a, Kealia and Waipouli for twenty years for the following purpose:

...for the cultivation of sugar cane and anything else that may grow on said land, with all of the right for some place to graze animals, and the forest land above to the top of the mountains and the people who are living on said lands, it is to them whether they stay or not, and if they stay, it shall be as follows: They may cultivate the land according to the instructions of Wilama Ferani and his heirs and those he may designate under him... (Hawai'i State Archives, Interior Dept., Letters, Aug. 1837).

Unlike Ladd & Company which eventually became the Koloa Sugar Company, there is no further reference to Wilama Ferani and his lease for lands in Kapa'a, Kealia and Waipouli. In a brief search for information on Honolulu merchant, Wilama Ferani, nothing was found. It is thought that perhaps Wilama Ferani may be another name for William French, a well known Honolulu merchant who is documented as having experimented with grinding sugar cane in Waimea, Kaua'i at about the same time the 1837 lease for lands in Kapa'a, Kealia and Waipouli was signed (Joesting, 1984: 152).

The sugar industry came to the Kapa'a region in 1877 with the establishment of the Makee Sugar Company and subsequent construction of a mill near the north end of the present town. Cane was cultivated mainly in the upland areas on former *kula* lands. The first crop was planted by the *Hui* Kawaihau, a group composed of associates of King

David Kalākaua. The king threw much of his political and economic power behind the project to ensure its success (Dole 1929:8-15). The *Hui* Kawaihau was originally a choral society begun in Honolulu whose membership consisted of many prominent names, both Hawaiian and *haole*. It was Kalakaua's thought that the *Hui* members could join forces with Makee, who had previous sugar plantation experience on Maui, to establish a successful sugar corporation on the east side of Kaua'i. Captain Makee was given land in Kapa'a to build a mill and he agreed to grind cane grown by *Hui* members. Kalakaua declared the land between Wailua and Moloa'a, the Kawaihau District, a fifth district and for four years the *Hui* attempted to grow sugar cane at Kapahi, on the plateau lands above Kapa'a. After a fire destroyed almost one half of the *Hui's* second crop of cane and the untimely death of one of their principal advocates, Captain James Makee, the *Hui* began to disperse and property and leasehold rights passed on to Makee's son-in-law and new Makee Plantation owner, Colonel Z. S. Spalding (Dole, 1916: 14). As part of the infrastructure of the new plantation, a sugar mill was erected and the Makee Landing was built in Kapa'a during the early years of the Makee Sugar Plantation. Following Captain Makee's death, Colonel Spalding took control of the Plantation and in 1885 moved the mill to Kealia (Cook, 1999: 51). The deteriorating stone smokestack and landing were still there well into the 1900s (Damon, 1931:359).

A train line went inland from Kapa'a Town from the coast along the present Lehua Street alignment heading south behind Kapa'a Town. This railroad line skirts the rice lands behind Kapa'a Town. Another branch ran between Hauaala and Hundley Roads and the branch from behind Kapa'a Town joined the Hauaala/Hundley railroad alignment where the proposed corridors for this project join the present Kūhiō Highway. The train line continued north to the Keālia (Kapa'a) River. Chinese rice farmers had begun to cultivate the lowlands of Kapa'a with increasing success about this same time. Several Hawaiian *kuleana* owners leased or sold outright their parcels *mauka* of the swampland to rice cultivators. Concurrently, the economic activity as a result of the rice and sugar cultivation sparked interest in the house lot *kuleana* on the *makai* side of the marsh for increasing commercial and residential development (Lai 1985:148-161). This land was drained and used for cane in the early 20th century before more recent urbanization of the area.

Narrow wagon roads gave way to macadamized roads in the early part of the 20th century. This new road was called the Kaua'i Belt Road and parts of it are thought to have followed the "Old Government Road" (Cook, 1999). In Kapa'a, the present day Kuhio Highway probably follows the same route as the original Government Road and subsequent Kaua'i Belt Road. The location of the *kuleana* awards in Kapa'a indicates that the majority of the house lots were situated along the Government Road. LCA 3243 names a "road" as one of its boundaries.



## 20th Century History of Kapa'a

In the early 1900s, government lands were auctioned off as town lots in Kapa'a Town to help with the burgeoning plantation population. Many of these lots were purchased by Portuguese and Japanese laborers who had fulfilled their contract duties with Makee Plantation. One *kama'āina* interviewed for a previous project in Kapa'a mentioned that in the 1930s and 1940s, the area north of Mo'ikeha Canal in Kapa'a was mostly settled by Portuguese families (W. Kaneakua in Bushnell et al. 2002:28). The Japanese were also very prominent in the 1920s and 1930s, largely replacing the Chinese merchants of the turn of the century in the Kapa'a business sector.

Though most of the large plantation camps were located in neighboring Keālia, there were a few in Kapa'a. Many people consulted had clear memories of the plantation camps in Kapa'a: a fairly large camp located just behind Kapa'a Town and three smaller camps located in the hills above Kapa'a. The large camp, Pueo Camp (Figure 6), was located adjacent to the intersection where the current Kapa'a Bypass Road turns off of Olohena Road (Interview w/ A. Paik, 5/14/03 in Bushnell et al. 2004). One Kapa'a resident who grew up in Pueo Camp remembers the camp being quite large with between 75 and 100 people, mostly single Filipino and Chinese men with some Japanese families and a few Hawaiian and Portuguese families. Pueo Camp is thought to be a fairly early Makee Plantation Sugar Camp built strategically adjacent to the railroad tracks which accessed the sugar fields in the upland areas of Kapa'a. Though no one consulted knew the date Pueo Camp was established, the oldest of our informants, Mrs. Alice Paik, born in 1912, knew the camp was there before she was born (Interview w/ A. Paik, 5/14/03 in Bushnell et al. 2004). Pueo camp was destroyed sometime in the 1950s. The other three camps located in the hills adjacent to or just off of Olohena Road were considerably smaller than Pueo Camp. These consisted of Stable Camp, 35 Camp and 18 Camp (See Figure 6). Two other camps in the Kapa'a/Waipouli area were also mentioned. Aguiar camp was a residential camp for employees of the pineapple industry, and Mundon Camp was thought to be a residential camp for Lihue Plantation workers (Interview w/ G. Hiyane, 5/14/03 in Bushnell et al. 2004).

Pineapple became the next largest commercial enterprise in the region. In 1913, Hawaiian Canneries opened in Kapa'a at the site now occupied by Pono Kai Resort (Cook 1999:56; Figure 6). The Kapa'a Cannery provided employment for many Kapa'a residents and many of the informants for this project mentioned having worked in the cannery during some time of their lives. By 1960, 3400 acres were in pineapple and there were 250 full time employees and 1000 seasonal employees for the Kapa'a Cannery. However, in 1962, Hawaiian Canneries went out of business due to competition from third world countries.

The Ahukini Terminal & Railway Company was formed in 1920 to establish a railroad to connect Anahola, Keālia and Kapa'a to Ahukini Landing at Hanamā'ulu and to "provide relatively cheap freight rates for the carriage of plantation sugar to a terminal outlet" (Condé and Best 1973:185). This company was responsible for extending the Makee Sugar Company railroad line from the Makee Landing [formerly located near the present day Coral Reef Hotel] to the Ahukini Landing at Hanamā'ulu Bay. This railroad line traversed near much of the study area (Figures 4 & 5) and was in use from 1921, through the take-over by Lihue Plantation Company in 1934 and until Lihue Plantation converted from railroad transport to trucking in the late 1950s.

Lihue Plantation was the last plantation in Hawai'i to convert from railroad transport to trucking (Condé and Best 1973: 167). In 1955, reports came out on the dredging for coral proposed for the reef fronting Kapa'a Beach Park (*Garden Island Newspaper*, September 21, 1955). This coral was to be used for building plantation roads. The dredging was later blamed for accelerated erosion along Kapa'a Beach (*Garden Island Newspaper*, October 30, 1963). Today, there are several sea walls along the Kapa'a Beach Park to check erosion. Old time residents claim the sandy beach at Kapa'a was once much more extensive than it is now. "By 1957 the company was salvaging a part of their plantation road, which was being supplanted by roads laid out for the most part on or close to the old rail bed" (Condé and Best 1973: 167). By 1959, the plantation had completely converted over to trucking.

Severe floods in Kapa'a in 1940 led to the dredging and construction of the Waikaea and Moikeha Canals sometime in the 1940s (Territorial Planning Board 1940:7). Although the Waikaea Canal, bordering the Kapa'a Pineapple Cannery, had been proposed as early as 1923, nothing was constructed until after the floods (Bureau of Land Conveyances, Grant 8248). A Master Plan for Kapa'a, published in 1940, asks the Territorial Legislature for funds to be set aside for the completion of a drainage canal and for filling *makai* and *mauka* of the canal (Territorial Planning Board 1940:7). In 1955, reports came out on the dredging for coral proposed for the reef fronting Kapa'a Beach Park (*Garden Island Newspaper*, September 21, 1955). The coral was to be used for building plantation roads. This dredging was later blamed for accelerated erosion along Kapa'a Beach (*Garden Island Newspaper*, October 30, 1963).

Today, there are several sea walls along the Kapa'a Beach Park to check erosion. Old time residents claim the sandy beach in Kapa'a was once much more extensive than it is now (Bushnell et al. 2002).

Many of the plantation workers bought property of their own and moved out of plantation camps. The plantation camps which bordered Kahio Highway were disbanded in the 1980s. The Lihue Plantation began to phase out in the last part of the 20th century. Kapa'a Town suffered after the closing of the Kapa'a Cannery, however the growing tourist industry helped to ease the economic affects of the Cannery's closing.



Figure 4. Aerial View of Kapa'a, Kaua'i, looking west, circa 1933 (Bishop Museum Archives)

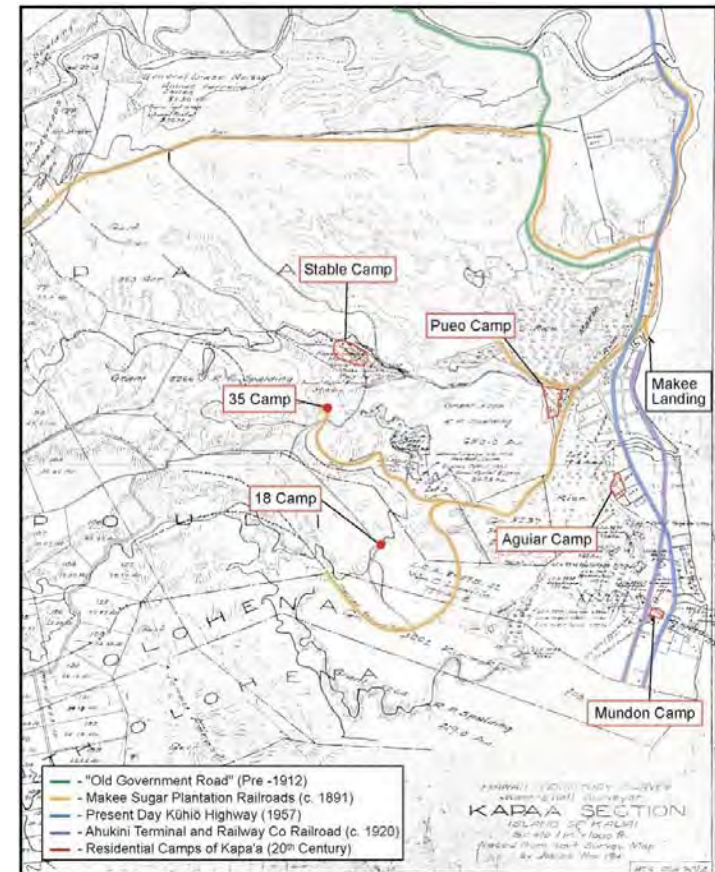


Figure 5. Hawai'i Territory Survey Map (1914) of Kapa'a Section Showing Roads, Railroads and Camps

### Previous Archaeological and Cultural Studies of Kapa'a

During their expeditions around Hawai'i in the 1880s collecting stories from *ka pō'e kahiko*, Lahainaluna students stopped in Kapa'a and Kealia and gathered information regarding *heiau* of the region (Bishop Museum Archives (HEN I:214). Fourteen *heiau* were named, suggesting that these two *ahupua'a* were probably more socially / politically / religiously significant in ancient times and a testament to the substantial population of these *ahupua'a*.

Unfortunately, the locations for most *heiau* were given as Kapa'a/Kealia, indicating that the exact location of the *heiau* was not identified. Of the fourteen *heiau*, five are definitely located in Kapa'a. These include the locations of *wahi pana* or sacred places, Mailehuna (in the area of the present day Kapa'a School), Pueo, Kuahiahi ((also spelled Kaahiahi and Keahiahi) the site of the first Government School in Kapa'a—adjacent to the Kuliö Highway near the northern boundary of Kapa'a Ahupua'a), Makanalimu (in upland of Kawaihau) and Kaluluomoikeha. Kaluluomoikeha is thought to be the general area near the Mo'ikeha Canal and the present day Coral Reef Hotel.

There are no known remains of these *heiau* today. The exact locations of these *heiau* are unknown.

**Table 3. Heiau of Kapa'a**

Name	Location	Type	Associated
Mailehuna	Kapa'a (Mailehuna is the area of the present day Kapa'a School)	unknown	Kiha, Kaumuali'i/ Lukahakona
Pueo	Kapa'a	unknown	Kiha, Kaumuali'i/ Lukahakona
Pahua	Kapa'a/Kealia	unknown	Kiha/ Lukahakona
Kumalae	Kapa'a/Kealia	unknown	Kiha/ Lukahakona
Waiehumalama	Kapa'a/Kealia	unknown	Kiha/ Lukahakona
Napu'upa'akai	Kapa'a/Kealia	unknown	Kiha/ Lukahakona
Noeamakali'i	Kapa'a/Kedlia	"heiau for birth of Kaua'i Chiefs, like Holoholoku"	Unknown
Pu'ukoa	Kapa'a/Kealia	"unu type heiau"	Unknown
Piuka	Kapa'a/Kealia	"unu type heiau"	Unknown
Una	Kapa'a/Kealia	Unknown	Kiha/ Lukahakona
Mano	Kapa'a/Kealia	Unknown	Kiha/ Lukahakona

Name	Location	Type	Associated
Kuahiahi	Kapa'a (govn't school stands on site now)	Unknown	Kaumuali'i/ Lukahakona
Makanalimu	Upland of Kawaihau	Unknown	Kaumuali'i
Kaluluomoikeha	Kapa'a	Unknown	Mo'ikeha

### 4. Historic Properties in Kapa'a Ahupua'a (see Figure 6)

Site # 50-30-08-	Ahupua'a	Site Type/ Name (if any)	Location	Site Constraints	Reference
B001	Kapa'a	Historic Cemetery	South of bend of Kapa'a Stream, a kilometer mauka from Kuliö Hwy	Appears to be a discrete historic cemetery	Kikuchi and Remoaldo 1992
B002	Kapa'a	Historic Cemetery	Just mauka from Kuliö Highway, south of Kapa'a Stream	Appears to be a discrete historic cemetery	Kikuchi and Remoaldo 1992
B003	Kapa'a	Kapa'a Public Cemetery	South of Kanaele Road, one kilometer inland of Kuliö Highway	Appears to be a discrete historic cemetery	Kikuchi and Remoaldo 1992
B004	Kapa'a	Historic Cemetery	North of Apopo Road, one kilometer inland of Kuliö Highway	Appears to be a discrete historic cemetery	Kikuchi and Remoaldo 1992
B013	Kapa'a	Historic Cemetery	Just mauka from Kuliö Highway, north of the Waikaea Canal	Appears to be a discrete historic cemetery	Kikuchi and Remoaldo 1992
B014	Kapa'a	All Saints Episcopal Church Cemetery	Just mauka from Kuliö Highway, south of the Waikaea Canal	Appears to be a discrete historic cemetery	Kikuchi and Remoaldo 1992:62-65
547	Kapa'a	sub-surface features including a firepit and a possible house foundation	South of bend of Waikaea Canal, mauka of Kuliö Highway	Archaeological monitoring in the vicinity is recommended	Spear 1992:3

Site # 50-30-08-	Ahupua'a	Site Type/ Name (if any)	Location	Site Constraints	Reference
626	Kapa'a	Burial	'Inia Street, makai of Kuliö Highway, central Kapa'a	Consultation and monitoring in vicinity indicated	Jourdane 1995
748	Kapa'a	Minimal findings, a weak cultural layer (buried A-horizon)	South of the bend of the Waikaea Canal, mauka of Kuliö Highway	Considered no longer significant within project area	Hammatt et al. 1994
789	Kapa'a/ Kealia	Historic Road	Coastal Cane Haul Road near Kawaihau Road turn off		Perzinski et al. 2000
867	Kapa'a	1 set of human remains	Kukui Street, just mauka of Kuliö Highway, Kapa'a Town	Consultation and monitoring in vicinity indicated	Creed et al. 1995:50
868	Kapa'a	1 set of human remains	Lehua Street mauka of Kuliö Highway, Kapa'a Town	Consultation and monitoring in vicinity indicated	Creed et al. 1995:50
871	Kapa'a	13 sets of human remains (Creed et al. 1995:50)	'Inia Street, makai of Kuliö Highway	Consultation and monitoring in vicinity indicated	Kawachi 1994; Creed et al. 1995:50
1848	Kapa'a	Cultural layer and sub-surface features	Along Kuliö Highway between Wana Road and the Waikaea Drainage Canal	Archaeological monitoring in the vicinity is recommended	Hammatt 1991; Creed et al. 1995
1849	Kapa'a	Cultural layer and sub-surface features; Creed et al. 1995:53 expands boundaries to incl. burial sites, - 626, -867, -868 -871, and -1894	Along Kuliö Highway between 'Inia Street and Kauwila Street extending to the coast	Consultation and monitoring in vicinity indicated	Hammatt 1991; Creed et al. 1995
1894	Kapa'a	11 sets of human remains	Ulu Street, just north of Kuliö Highway, Kapa'a Town	Consultation and monitoring in vicinity indicated	Creed et al. 1995:50

Site # 50-30-08-	Ahupua'a	Site Type/ Name (if any)	Location	Site Constraints	Reference
2075	Kapa'a/Ke ālia	Highway Bridge Foundation (old Kapa'i Belt Road)	Kuliö Highway at Kapa'a/ Keālia River		Bushnell et al. 2002:55
2076	Kapa'a	Petroglyph	Rocky coast below former cane haul road (Site -789)	Preservation	Bushnell et al. 2002:55
2077	Kapa'a	Concrete steps (related to historic beach pavilion)	Near present Kapa'a Beach Park Pavilion		Bushnell et al. 2002:55
2078	Kapa'a	Historic Railway Alignment (2 Railroad Bridges, & RR Culvert Foundation)	Both railroad bridges span the Moikeha Canal; the RR culvert foundation is located north of the Kapa'a Swimming Pool.		Bushnell et al. 2002:55





Figure 6. Historic Properties in Kapa'a, Waipouli and Olohena Ahupua'a.

In summary, the archaeological research of the Kapa'a, area has been somewhat skewed to development which has mostly occurred along the coast. Early 20th century archaeological studies attested to the existence of upland terraces, however subsequent studies in the 1980s found no record of upland sites. Although there is little in the way of surface archaeology of Kapa'a that has been able to withstand the test of time (with the exception of Kukui Heiau), archaeological studies have illustrated the vast potential for intact subsurface cultural layers. These cultural deposits extend throughout modern day Kapa'a Town, on the shorelines between the Waipouli Town Center and the Coconut Plantation Resort and along the coast in Olohena *makai* of the old Coconut Plantation Cinema. These cultural deposits suggest a long occupation of the area over many centuries beginning by the late 15th or early 16th centuries.

## RESULTS OF COMMUNITY CONSULTATION

As partial fulfillment of the Scope of Work, consultation with organizations and the community was conducted to identify knowledgeable *kāpuna* and participants to be interviewed, as well as others who could inform on the history of the subject area and previous land use. The organizations consulted were the State Historic Preservation Division, the Department of Land and Natural Resources (DLNR), the Office of Hawaiian Affairs, the Kaua'i/Ni'ihau Islands Burial Council, the Kaua'i Historical Society, and the Kaua'i Historic Preservation Review Committee (KHPRC).

A substantial effort was made to locate knowledgeable informants for the area of Kapa'a. An attempt was made to contact as many individuals as possible. These led us to the 5 knowledgeable parties that were interviewed for this project. A cultural impact assessment conducted for the Kapa'a-Kealia Bike and Pedestrian Path included a narrow corridor from the Waikaea Drainage Canal to Hömaikawa'a, a small inlet beyond Kealia (Bushnell et al. 2002). In addition cultural impact assessment was also conducted for the Kapa'a Relief Route (Bushnell et. al. 2004). Only one cultural impact assessment has been conducted for the uplands of Kapa'a for the proposed Water Reservoir *Mauka* Locale in Kapa'a, Kaua'i Island (Mitchell et. al. 2004). These CIA and historic research of the project area, community consultation and informant interviews were combined to provide an assessment of cultural traditions, both past and present.

Traditions were also collected in connection to the streams, canals and marsh areas where 'ōpae and 'o'opu were once found in abundance. Fishing for 'oama in Kapa'a's canals continues to be a lively family tradition during the summers.

### Consultation Process

Through the consultation process, five individuals were identified as potential informants. Three had written letters of their knowledge of the area (Stanley Vasques,

Willie Sanchez, and Albert Fukushima) [see Appendix]. Two others informants gave a verbal interviews. One of these the Martin family spoke about the use of the lands for pasture when the Plantation ceased using the land for cane. The other informant was from the East Kauai Soil and Water District (Les Milnes) and had no knowledge any plantation ditches that were still intact within the project area. The old maps he had, showed the ditch system around Twin Reservoir which is located directly across Olo-hena Road from this property but the maps stop before this project area. This indicates that there were no permanent plantation ditch lines on this parcel.

Mr. Fukushima drew a map of his recollection of the land uses of the project area, which matched some of the historic maps for Kapa'a.



Figure 7 and 8 Showing Cattle and Goats (in the Distance) Grazing.

No Native Hawaiian informants came forward to discuss any traditional gather associated with this project area. The Office of Hawaiian Affairs gave a list of possible individuals with extensive knowledge of traditional cultural practices and resources but none knew of any for this project area.



Figure 9. KIUC's Solar Farm and Equipment Buildings.

## TRADITIONAL CULTURAL PRACTICES OF KAPA' A

### Burials

The coastline in Kapa'a once contained extensive sand dunes that were documented in travels throughout the nineteenth century (Knudsen 1991; Alexander 1991). Most of the sand dunes were modified or destroyed at the onset of the twentieth century. This was due to the extensive use of the coastal areas for ranching, settlement, and new transportation routes like trains and roads. Archaeological studies in the Kapa'a area demonstrate the widespread prehistoric use of sand as a medium for burials. Burials have been identified along the coast and extending well *mauka* of the coastline into present day Kapa'a Town. Cultural deposits found associated with burials in the Kapa'a area shed light on the Hawaiian tradition of burying members of the *'ohana* in the *kulaiwi*, or birth land.

For Hawaiians, "man's immortality was manifest in his bones...Even the bones of the living became symbols of the link between man's progenitors and his own eventual immortality" (Pukui et al. 1972:106). Thus, the discovery of *iwi* (bones) is a very sensitive issue for the Hawaiian community requiring much mediation and protocol.

No burials are believed to be present within the project area and none are known in the vicinity.

### Marshlands of Kapa'a

The areas inland of Kapa'a and Waipouli Towns were formerly the marshlands of Kapa'a. During the 20th century, portions of the marshlands of Kapa'a and Waipouli were filled, drained and designated as marginal agricultural lands. Traditionally, however, these marshlands were once much more significant. Westerners may call them "swamps," but Hawaiians who grew up in the Kapa'a and Waipouli area knew they were fishponds (Bushnell et. al. 2004). Many *kama'aina* recall fishing for freshwater shrimp and



gobies, the *‘opae* and *‘o‘opu*. For the Kaneakua brothers, their childhood memories of *‘opae* are tied to the old Chinese vendors who once traversed the neighborhood selling the shrimps.

I can remember Chinese, they used to catch shrimp, fresh water shrimp in big five gallon can. They put it in there, both side and they have their stick across, walking through the little village that we were over there and used to come out and say, “*‘Opae, ‘Opae*” and families who want buy the *‘Opae* and they used to dig it out in a big a scoop, bowl, and was so much you know. Yeah, those were the days. Our streams used to be loaded with shrimp (Interview with J. & W. Kaneakua 8/1/02 in Bushnell et al. 2002).

One informant said that his experience catching *‘opae* centered on the irrigation ditches that drained the marshlands behind Kapa’a. “My first lessons in swimming were in the drain ditches the sugar people created to dry out their cane lands. Also in the ditches were the *‘opae* or river shrimp. I caught *‘opae* and cooked them with soy sauce in recycled oil sardine cans.” (Interview with G. Hiyane, 5/14/03 in Bushnell et al. 2004). One individual who grew up in Pueo Camp adjacent to the marsh recalls frequenting the irrigation ditches in Waipouli for *‘opae*, *‘o‘opu*, and *pantat* (catfish) that were then sold to the old Chinese men in the camp for 10¢ (Personal communication with G. Mukai, 8/5/03 in Bushnell et al. 2004).

Mr. Sokei who grew up in a rice growing family in the back of what is known as All Saints Church in Kapa’a shared some memories of his home in the 1930s that may reflect the landscape a hundred years prior. Mr. Sokei remembers the family home located on high ground above the marsh. “Back then, the land was natural, full of mounds. Rice was cultivated in fields all the way to the hills. The water level in the marsh would go up and down with the tide and when there was lots of water, one could find *‘o‘opu*, *‘opae*, catfish, frogs and mud turtles for eating” (Personal communication with T. Sokei, 7/28/03 in Bushnell et al. 2004). Likewise, the *kuleana* awards of the 1840s and 1850s present a picture of homes scattered on the edges of the marsh and on islands of high ground within the marsh. Numerous *‘auwai* were constructed to irrigate *lo‘i kalo*. *Hau* bush was shaped into fences to separate *kuleana* or physical features and fishponds were built to stock fish. For Hawaiians living the marsh was an extremely productive area constituting the basis of their existence.

The notion that the marshlands were quite significant traditionally is also evident in the Hawaiian place names, particularly the *wahi pana* (storied places) associated with the Kapa’a/Waipouli marsh. Mākaha-o-Kupānihi was a pond, a “deep pool set aside for *ali‘i* to bathe in” located at the border of Kapa’a and Waipouli Ahupua’a presumably within the marsh (Lahainaluna Students Compositions, No. 15). It was here that Kaumuali‘i’s half-brother Keawe was shot to death forever defiling the waters of Kupānihi. Another *wahi pana* in this district was Kēwā. The proverb *‘ke kalukalu o Kēwā* refers to a certain type

of grass, *kalukalu* (used in making a very soft gauze or *kapa*) found growing in the marshlands of Kapa’a and Waipouli (Fornander 1916:IV:162).

## Gathering for Plant Resources

Hawaiians utilized upland resources for a multitude of purposes. Forest resources were gathered, for not only the basic needs of food and clothing, but for tools, weapons, canoe building, house construction, dyes, adornments, hula, medicinal and religious purposes. The present project area is dominated by alien vegetation (albezia, ginger, California grass) although some traditional cultigens (banana, bamboo, *kid* and historically introduced food plants (papaya) are present as well. Within the project area itself no specific documentation was found regarding gathering of plants during traditional Hawaiian times. During this assessment there were no ongoing practices related to traditional gathering of plant resources identified in the present project area. None of the individuals contacted for this assessment identified any native plant gathering practices within the project area.

## Historic Properties

No historic properties were identified within the project area or in the vicinity. The density of identified historic properties is far greater near the coast of Kapa’a Ahupua’a. For a listing of the historic properties of Kapa’a, Kaua’i, see Table 4.

## Trails

Based on nineteenth and twentieth century maps the primary transportation routes *mauka/makai* correlated closely to the existing major roadways. During this assessment there were no trail systems identified in the proposed project area.

## Planation Ditch System or ‘Auwai

Based on the archaeological assessment (McMahon, 2012), field checks, documentation from land records, plantations records and maps, and informants information, no remnants of these historic properties exist. Several pieces presumed to be rem-

nant of the metal flumes (transportable irrigation) were found. It is also thought that the existing roads on the property might be filled.



Figure 10. Remnant Road and Cattle Grazing in the Project Area.

## SUMMARY AND CONCLUSIONS

A cultural impact assessment was conducted for the proposed Kapa'a Highlands Phase II. Historic research of the project area was carried out to identify any cultural resources or traditional cultural practices associated with the area encompassing the proposed Kapa'a Highlands Phase II. In addition, community consultation was conducted. An attempt was made to contact parties regarding cultural knowledge, land use history, cultural sites and traditional Hawaiian or other cultural practices in the vicinity of the project area. Five individuals came forward as knowledgeable informants. In addition to the informants, other community members shared valuable information regarding traditional land use, attitudes and practices associated with the project area.

The marshlands of Kapa'a were once a significant resource prior to Western contact. The fringes of the marsh were utilized for *lo'i kalo*, and other resources including the gathering of *kalukalu*, a type of grass utilized for *kapa*. Places in the marshes also served as fishponds. Vestiges of the cultural significance of the marshlands are retained in the *mo'olelo* and *'olelo no'eau* particular to this area. With the establishment of the sugar plantations in the late nineteenth century, the marshlands were significantly altered. Marsh areas were drained and filled to create more dryland for commercial agriculture and pasture land. Several individuals consulted and interviewed grew up fishing for *'opae* and *'o'opu* in the irrigation ditches which once drained the swamps. They expressed sadness at the changing of the landscape and the passing of their childhood traditions with the final draining and filling of the swamps. No further concerns regarding the marshlands were expressed other than the presumed low potential of possibly encountering habitation deposits and burials related to former LCA parcels.

This report documents the use of the *'auwai* or plantation ditches for irrigation and water use by the residents up until the 1960s. The *'auwai* were also utilized for a variety of activities beyond their primary irrigation purpose. The bulk of the *'auwai* have been lost through modern pasturage, disuse and adjacent road improvements.

In general the community emphasized the importance of communicating with the *'ohana* of Kapa'a regarding changes to the land. This includes asking permission of the *'ohana*, including *'uhane* (immortal spirits) for opening up the land to proposed new

uses. It was stressed that this and other protocols are necessary to “open the path” for change, thus avoiding accidents and potential obstacles of a cultural nature.

In summary, there are no known traditional resources or cultural practices associated with the Kapaa Highlands Project Area.

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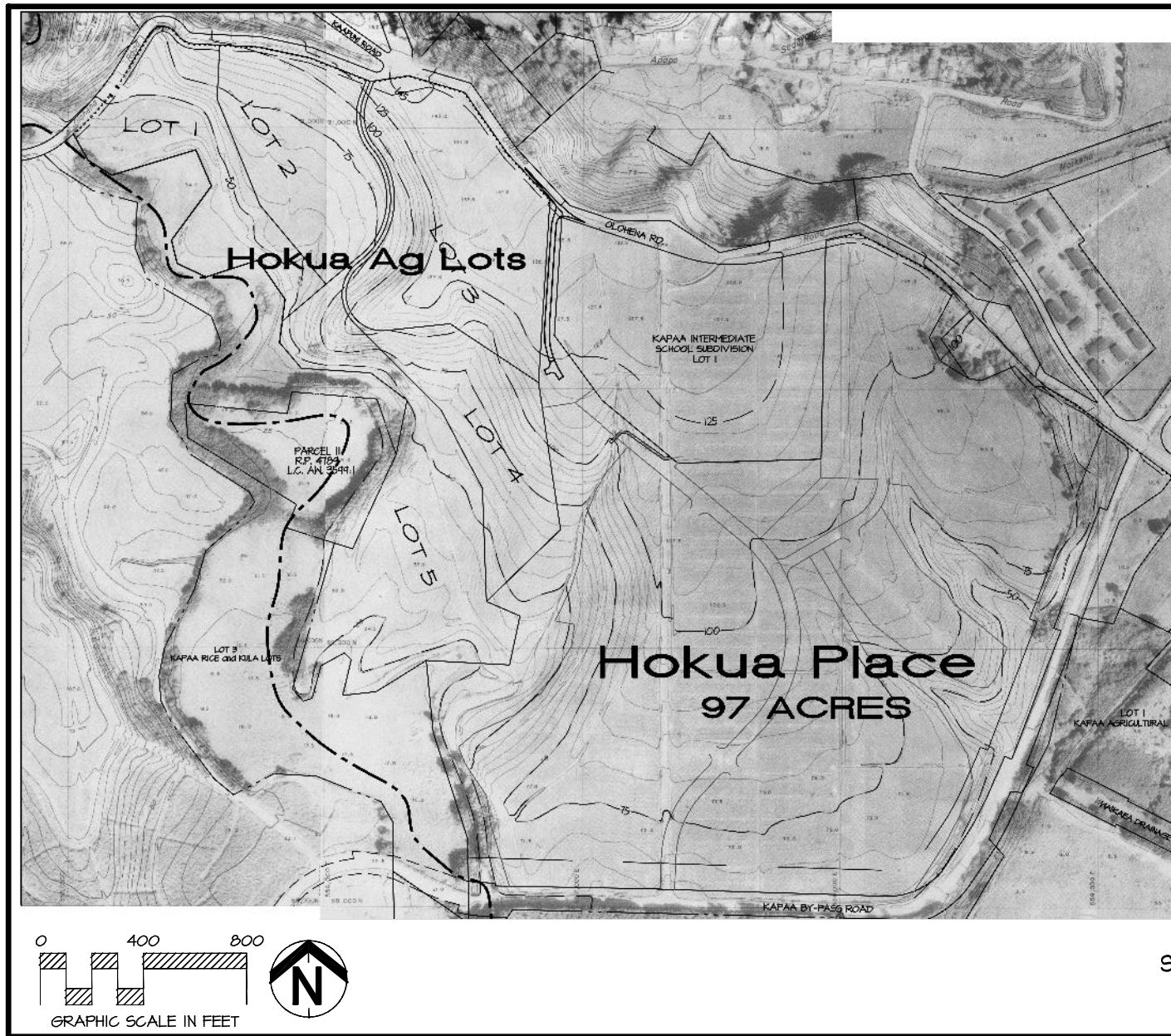
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## APPENDIX

### Letters from Informants

Exhibit N.1



**HOKUIA PLACE**  
SCALE: 1 INCH = 400 FEET  
AERIAL TOPOGRAPHY  
Source: County of Kauai - 1977

# Exhibit N.2

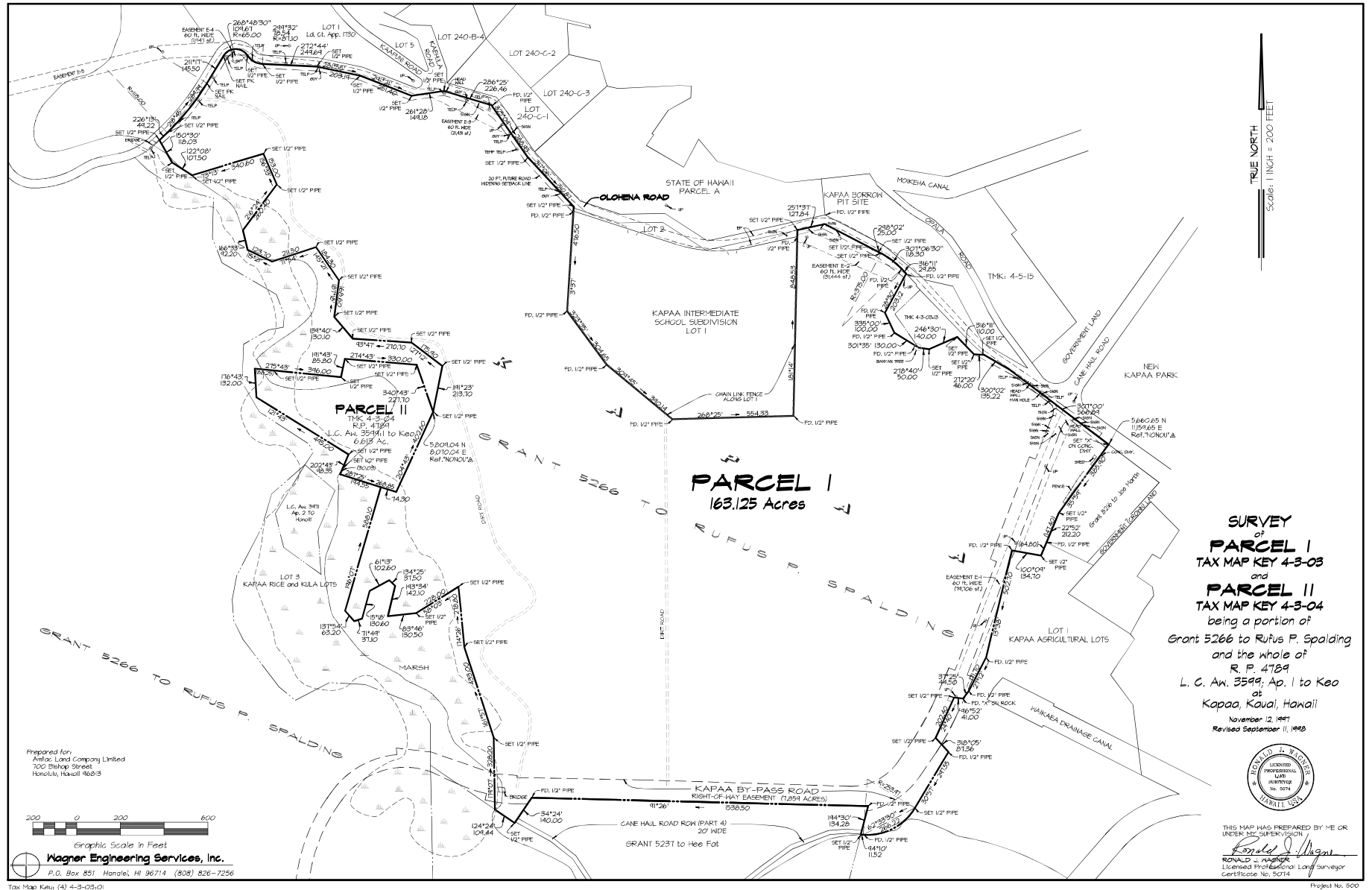


Exhibit O

Kaua'i County Planning Commission  
Tentative Subdivision Approval for HoKua Farm Lots  
June 19, 2014

Jan Kimura  
Chair

Angela Anderson  
Vice-Chair

Hartwell Blake  
John Isobe  
Wayne Katayama  
Sean Mahoney  
Amy Mendonca  
Members



PLANNING COMMISSION  
County of Kaua'i, State of Hawai'i  
4444 Rice Street  
Kapule Building, Suite A-473  
Lihu'e, Hawai'i 96766-1326  
TEL (808) 241-4050 FAX (808) 241-6699

Michael A. Dahilig  
Clerk of the Commission

JUN 19 2014

Mr. Brian M. Hennessy  
HONUA ENGINEERING, INC.  
Ching Young Center, Suite C7  
P.O. Box 851  
Hanalei, Hawai'i 96714

Subject: Hokua Farm Lots, being the Subdivision of Parcel 1 into Lots 1 to 6 inclusive and designating Easements "AU-1", "AU-2", "D-1", and "W-1", being a portion of Grant 5226 to Rufus P. Spalding at Kapa'a, Kaua'i, Hawai'i.  
(S-2014-02, HG Kauai Joint Ventures LLC)

Dear Mr. Hennessy,

This letter memorializes the action taken by the Kaua'i Planning Commission effective JUNE 10, 2014 concerning **TENTATIVE APPROVAL** of the above subject application. Final subdivision map approval, per your consent, is subject to the following conditions:

1. Requirements of the Planning Department:

- a. An updated preliminary title report for the existing lot shall be submitted to the Planning Department for review.
- b. All existing and proposed easements shall be identified in the deed descriptions of affected lots and shown on the final subdivision map. Draft copies of the deed descriptions shall be submitted to the Planning Department for review and approval.
- c. Pursuant to section 9-3.8(b) of the Subdivision Ordinance, Kaua'i County Code (1987), the applicant shall submit to the Planning Department an electronic record (digitized format) of the final subdivision map(s) on disk for record keeping purposes prior to final subdivision approval.

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rec'd 6/21/14

File #5117

d. The following fees shall be paid to the County of Kaua'i:

- 1) Park Dedication fee: \$900.00
- 2) Environmental Impact Assessment fee: \$1,250.00

- e. A future road widening reserve shall be established along the frontage of Olohehena Road and Kapa'a By-Pass Road which shall be subject to the specifications of the Public Works Department for a major street. There shall be no new structures permitted within the reserve, and any new structures should be setback from the reserve. The reserve along with its restrictions shall be incorporated into the deed descriptions of the affected lots, draft copies of which shall be submitted to the Planning Department for review and approval.
- f. Prior to final subdivision approval, the subdivider shall delineate the Class "B" classified lands on the final subdivision map. In addition and pursuant to Act 199, Session Laws of Hawai'i, 1976, the applicant shall enter into an agreement with the County to incorporate agricultural restrictions into the instruments of conveyance for those lots which contain the Class "A" and/or "B" soils.
- g. The Applicant is advised that uses on the newly-created lots shall be limited to those listed as permissible uses within the "A" Agricultural District in the State Land Use Commission Rules and Regulations. Dwellings on the lot shall mean a single-family dwelling located on and used in connection with a farm where agriculture activity provides income to the family occupying the dwelling. These restrictions shall be included in the covenants for the proposed lots, draft copies of which shall be submitted to the Planning Department for review and approval.
- h. Prior to final subdivision approval, the Applicant shall submit to the Planning Department a density breakdown for each lot which will be subject to review and approval by the Department. These restrictions shall be included in the covenants and deed descriptions of the proposed lots, draft copies of which shall be submitted to the Planning Department for review and approval. The Planning Department reserves the right to impose additional conditions relating to this matter while in the process of resolving this condition.
- i. The pole sections of the double flag lots shall be designated as common access/utility easements in favor of each other and shall be incorporated into the deed descriptions of the affected lots (Lot 4 and Lot 5), draft copies of which shall be submitted to the Planning Department for review and approval.
- j. The subdivider shall resolve with the Planning and Public Works Departments the following:
  - 1) Participation in the upgrading of the intersection of 'Olohehena Road, Ka'apuni and Kaehulua Roads by providing necessary lands to accommodate the future improvements.
  - 2) Limiting vehicular access points onto 'Olohehena Road.

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- 3) Establishing a road reserve within the project area in order to accommodate future construction of interior roadway system that would allow a connection for 'Olohehena Road to the Kapa'a By-Pass Road and relieve traffic off 'Olohehena Road.

The Planning Department reserves the right to impose additional conditions relating to this matter while in the process of resolving this condition.

- k. The Applicant shall prepare and obtain construction plan approvals for necessary road, water, drainage, electrical and telephone utilities and facilities, and either construct the same or post a surety bond for completion.
- l. In order to ensure that the subdivision and development of property complies with the land use requirements contained in Chapter 205 of the Hawai'i Revised Statutes ("HRS"), the following matter shall be resolved prior to final subdivision approval:
  - (1) The Applicant shall provide the following documents to the Subdivision Committee of the Planning Commission ("Subdivision Committee") for its review and approval:
    - (A) An Agriculture Master Plan shall describe the proposed agricultural uses of the property, the marketing and business plans associated with such activities, and the manner in which the agricultural and related uses on the property will comply with HRS Chapter 205.
    - (B) A map of the property showing the proposed location of: Agricultural Activities; Building Areas; and Agricultural Easements.
    - (C) A Declaration of Conditions, Covenants and Restrictions ("Restrictive Covenants") which will be recorded in the Bureau of Conveyances of the State of Hawai'i ("Bureau"), which will encumber and run with the property, and which will provide and require: that the owners of the lots in the subdivision ("Subdivision Lots") shall comply with the Agricultural Plan and the provisions of HRS Chapter 205; that the owners of all of the Subdivision Lots shall be members in an association ("Association") which will have the power and duty to enforce the Restrictive Covenants; that the Association shall file periodic reports (as determined by the Planning Department) with the Planning Department verifying compliance with the Agricultural Master Plan; and that the Agricultural Master Plan shall not be amended without prior approval of the Planning Department.
    - (D) An Agricultural Subdivision Agreement which will be recorded in the Bureau, run with and encumber the property, and which will provide and require: that each Subdivision Lot owner shall indemnify, defend and hold the County harmless from any claims arising out of the failure of the Subdivision Lot owner to comply with the Agricultural Master Plan and/or HRS Chapter 205; and that in the

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event of a Subdivision Lot owner's noncompliance with the Agricultural Master Plan and/or HRS Chapter 205 as determined by the Planning Department, the County and the State of Hawai'i shall have the right to refuse to grant any permits or approvals for uses or development on any Subdivision Lot affected by such noncompliance unless and until the noncompliance is cured, as determined by the Planning Department.

- m. The subdivider shall resolve with the Planning Department the provision of public access within the subdivision. The applicant shall propose an access plan for the review and approval of the Planning and Public Works Departments. Additionally, due to the farming activities, the subdivider shall work with the Planning Department on establishing a public access control system.

Proper documents shall be prepared and ready for execution prior to final subdivision approval. The Planning Department reserves the right to impose additional conditions relating to this matter while in the process of resolving this condition.

2. Requirements of the Department of Public Works:

DRAINAGE

- a. The subject subdivision abuts a natural unnamed drainage way on the West for which a detailed flood study has not been incorporated with the Flood Insurance Rate Maps (FIRM). Several natural drainage valleys or drainage swales traverses through and along the property. The natural drainage water courses will collect and concentrate storm flows through the site. A drainage study and provisions need to be established to prevent structures from being built in flood prone areas and to preserve the function and capacity of the natural water courses.

The subdivision and subsequent development of residences and other impermeable surfacing will increase storm water flowage. A drainage study needs to be made to evaluate the impacts of the increased storm runoffs. Measures to keep flow rates to predevelopment conditions is required.

- b. Flood studies need to include the existing bridge at the Kapa'a By Pass Road whether the bridge is adequate to convey storm flows without overtopping the Kapaa By Pass Road.
- c. The flood zoning, FIRM panel no. 204F and the date of the FIRM November 26, 2010 needs to be labeled on the final maps as well as the determined flood prone areas with base flood elevations. The applicant and future owners shall be advised that construction of new structures in flood prone areas presents flood risks and associated flood problems.

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ROAD

- d. The street name labeling for *Opala Road* needs to be amended to "**Malu Road**". The Kapa'a By Pass Road traverses through the proposed Lot 6. We recommend that the Kapa'a By Pass Road be named to facilitate house addressing assignment.
- e. The subject subdivision abuts the Olohena Road on the North. Olohena Road has a right of way width of 40 feet and an average pavement width of 20 feet. The pavement width is adequate for two way passenger vehicular type traffic. The right of way width is inadequate for a major collector street classification (60 feet right of way). We recommend a road reserve be established along Olohena Road or lands be dedicated to the County as well as improvements to Olohena Road to facilitate Safe Route to School and Complete Streets facilities.
- f. Access along Olohena Road **must** be restricted. Access for Lots 1, 2 and 3 **shall** be restricted to the pole section for Lots 4 and 5. Easement "AU-1" for roadway and utility purposes shall be restricted to the pole section for Lots 4 and 5. Comments should be solicited from the State Department of Transportation whether access would be allowed for Lot 6 from the Kapa'a By Pass Road.

OTHERS

- g. Complete Streets and Safe Route to School design principles needs to be incorporated with the subdivision improvements to Olohena Road. Complete Streets and Safe Route to School features include interconnected sustainable transportation networks providing opportunities for all modes of travel to and from neighborhood destination points for users of all ages and abilities. Comments should be solicited from the County's Transportation Planner.

3. Requirements of the Department of Water:

- a. The subdivider shall pay the Department of Water, a Facilities Reserve Charge of \$23,000 (5 lots at \$4,600 per lot). The subdivider shall pay any rate increase and/or applicable charges in effect at the time of receipt.
- b. The subdivider shall prepare and get Department of Water's approval on construction drawings for necessary water system facilities and either construct said facilities or post a performance bond for construction. These facilities shall also include:
- 1) Additional source facilities. The Applicant may wait until others (including the Department of Water) to construct additional source for this area.
  - 2) The domestic service connection.
- c. Locate and show all existing water meter/s (with appropriate water meter number) on the tentative subdivision map for the Department of Water's review and approval. Also identify the proposed subdivision lot that the existing water meter/s will be assigned to. The DOW comments may change depending on the approved tentative map.

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4. Requirements of the State Health Department:

- a. The existing individual wastewater system can continue to serve the existing building. However, wastewater generated from any additional dwelling units and other buildings shall be disposed of in wastewater systems that meet the wastewater rules in effect at the time of building permit application.
- b. Noise will be generated when construction occurs after Lots 1 through 6 are subdivided, shall not exceed the applicable maximum permissible sound levels as stated in Title 11, Hawaii Administrative Rules (HAR), Chapter 11-46, entitled "Community Noise Control" unless a noise permit is obtained from the State Department of Health (DOH).
- c. Temporary fugitive dust emissions could be emitted when/if construction activities occur after Lots 1 through 6 are subdivided. At that time, in accordance with Title 11, HAR, Chapter 11-60.1, entitled "Air Pollution Control", effective measures for air pollution control shall be provided to minimize or prevent any fugitive dust emissions caused by the construction work from impacting the surrounding areas. This includes the off-site roadways used to enter / exit the project. The control measures include but are not limited to the use of water wagons, sprinkler systems, dust fences, etc.
- d. In accordance with Title 11, HAR, Chapter 11-58.1, entitled "Solid Waste Management Control", the construction waste that is generated when/if the subdivided lots are developed shall be either recycled or disposed of at a solid waste disposal facility that complies with the DOH. The open burning of any of these wastes on or off site is prohibited.
- e. Any project and its potential impacts to State waters must meet the following criteria:
  - 1) Anti-degradation policy (HAR, Section 11-54-1.1), which requires that the existing uses and the level of water quality necessary to protect the existing uses of the receiving State water be maintained and protected.
  - 2) Designated uses (HAR, Section 11-54-3), as determined by the classification of the receiving State waters.
  - 3) Water quality criteria (HAR, Sections 11-54-4 through 11-54-8).
- f. Please call the Army Corps of Engineers at (808) 438-9258 to see if this project requires a Department of the Army (DA) permit. Permits may be required for work performed in, over, and under navigable waters of the United States. Projects requiring a DA permit also require a Section 401 Water Quality Certification (WQC) from our office.
- g. You are required to obtain a National Pollutant Discharge Elimination System (NPDES) permit for discharges of wastewater, including storm water runoff, into State surface waters

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(HAR, Chapter 11-55). For the following types of discharges into Class A or Class 2 State waters, you may apply for NPDES general permit coverage by submitting a Notice of Intent (NOI) form:

- 1) Storm water associated with industrial activities, as defined in Title 40, Code of Federal Regulations, Sections 122.26(b)(14)(i) through 122.26(b)(14)(ix) and 122.26(b)(14)(xi).
  - 2) Storm water associated with construction activities, including clearing, grading, and excavation, that result in the disturbance of equal to or greater than one (1) acre of total land area. The total land area includes a contiguous area where multiple separate and distinct construction activities may be taking place at different times on different schedules under a larger common plan of development or sale. **An NPDES permit is required before the start of the construction activities.**
  - 3) Treated effluent from leaking underground storage tank remedial activities.
  - 4) Once through cooling water less than one (1) million gallons per day.
  - 5) Hydro-testing water.
  - 6) Construction dewatering effluent.
  - 7) Treated effluent from petroleum bulk stations and terminals.
  - 8) Treated effluent from well drilling activities.
  - 9) Treated effluent from recycled water distribution systems.
  - 10) Storm water from a small municipal separate storm sewer system.
  - 11) Circulation water from decorative ponds or tanks.
- h. You must submit a separate NOI form for each type of discharge at least 30 days prior to the start of the discharge activity, except when applying for coverage for discharges of storm water associated with construction activity. For this type of discharge, the NOI must be submitted 30 before to the start of construction activities.
  - i. For types of wastewater not listed in Item 3 above or wastewater discharging into Class 1 or Class AA waters, you must obtain an NPDES individual permit. An application for an NPDES individual permit must be submitted at least 180 days before the commencement of the discharge.
  - j. You must also submit a copy of the NOI or NPDES permit application to the State Department of Land and Natural Resources, State Historic Preservation Division (SHPD), or

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demonstrate to the satisfaction of the CWB that SHPD has or is in the process of evaluating your project. Please submit a copy of your request for review by SHPD or SHPD's determination letter for the project along with your NOI or NPDES permit application, as applicable.

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

5. Requirements of the Housing Agency:

- a. Chapter 7A of the Kaua'i County Code, 1987, as amended, is applicable to the proposed subdivision, pursuant to Section 7A-1.4(c)(1).

Prior to final subdivision approval, the Applicant shall resolve the workforce housing assessment and shall execute a Workforce Housing Agreement with the Kaua'i County Housing Agency, as to the method of meeting the workforce housing requirement pursuant to Chapter 7A. The executed agreement shall be recorded on the deed of the project properties concurrent with final subdivision approval.

The Kaua'i County Housing Agency reserves the right to change this determination if the petition or application changes from the above, or if the project incorporates or becomes part of a larger residential or resort project, such that provisions of Kaua'i County Code, Section 7A-1.4 become applicable.

6. Requirements of the Department of Wastewater:

- a. The proposed subdivision is near the County's sewer service area. If sewer service is needed, the Applicant shall apply for County sewer service and shall be responsible for design and construction of all infrastructure necessary to connect to the County sewer and shall be responsible for payment of all applicable fees.

7. Requirements of the State Historic Preservation Division (SHPD):

- a. Pursuant to Hawaii Administrative Rules §13-284 we request an **archaeological inventory survey** be conducted by a qualified archaeologist in order to adequately determine the potential impacts of this subdivision on both surface and subsurface historic properties. We look forward to the opportunity to review the archaeological report prior to commencing further on the subdivision application. We recommend the final subdivision approval be deferred until the archaeological inventory survey report has been completed and appropriate mitigation measures/plans are in place.

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- b. As recommended by the State Historic Preservation Division (SHPD) of the Department of Land and Natural Resources (DLNR), in the event that historic resources, including human skeletal remains are identified during routine construction activities, all work needs to cease in the immediate vicinity of the find, and the finds need to be protected from additional disturbance, and the State Historic Preservation Division, Kaua'i section, needs to be contacted immediately at (808)692-8015.

8. The Applicant is advised that prior to and/or during construction and use additional conditions may be imposed by government agencies. Should this occur, the Applicant shall resolve these conditions with the respective agency(ies).

Sincerely Yours,



MICHAEL A. DAHLIG  
Clerk, Kaua'i Planning Commission

xc: COK Public Works Dept.  
COK Water Dept.  
COK Real Property – Assessment Div.  
State Dept. of Health  
State Historic Preservation Dept.

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## Survey of Native Invertebrate Resources in proposed HoKua Place project area

January 24, 2018

Prepared by:  
Steven Lee Montgomery, Ph. D., Waipahu, Hawai'i

Submitted to:  
Agor Jehn Architects, LLC

For:  
HG Kaua'i Joint Venture LLC

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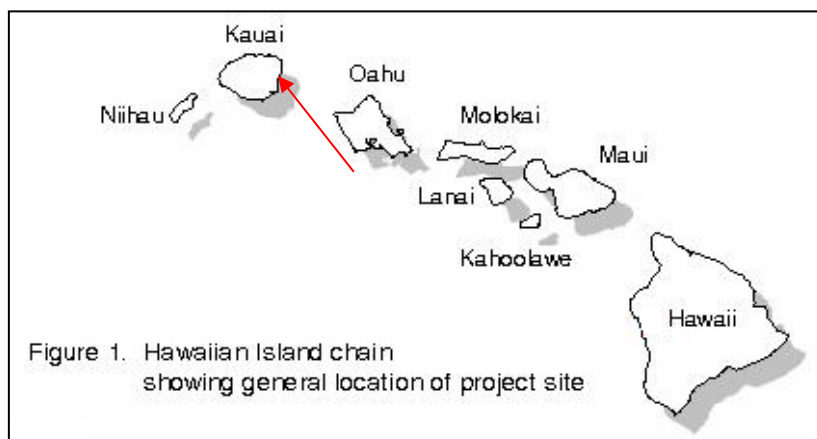
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## SUMMARY

This report summarizes the findings of an invertebrate<sup>1</sup> survey conducted within approximately 97-acre parcel, TMK (4) 4-3-003: 001 (portion) in Kapa'a of the Kawaihau District on the island of Kaua'i. (Figure 1, 2)

## INTRODUCTION

The primary purpose of this survey was to determine the presence or absence on the property of any endemic or indigenous terrestrial invertebrates, especially any species with legal status under federal or state threatened and endangered species statutes (DLNR 1998, USFWS, 2017). Invertebrates are often the dominant fauna in natural Hawaiian environments. Native Hawaiian plant, vertebrate, and invertebrate populations are interdependent. Invertebrates are the food of some birds and the pollinators of plants. Certain insects are obligatorily attached to specific host plants and are able to use only that plant as their food. Those insect - host relationships are ancient and intertwined. Native invertebrates have proven inventive in adapting to opportunities in changed ecosystems. A surprising number of native arthropod species survive even in degraded habitats. Nevertheless, the overall health of native Hawaiian invertebrate populations depends upon habitat quality and absence or low levels of predators introduced from the continents. Sufficient food sources, host plant availability, and the absence or low levels of introduced, continental predators and parasites comprise a classic native, healthy ecosystem. Consequently, where appropriate in the survey discussion, host plants, and some introduced arthropods are also noted.



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<sup>1</sup> Animals without backbones: insects, spiders, snails, shrimp, etc.

**Figure 5-6 East Kaua'i Land Use Map**

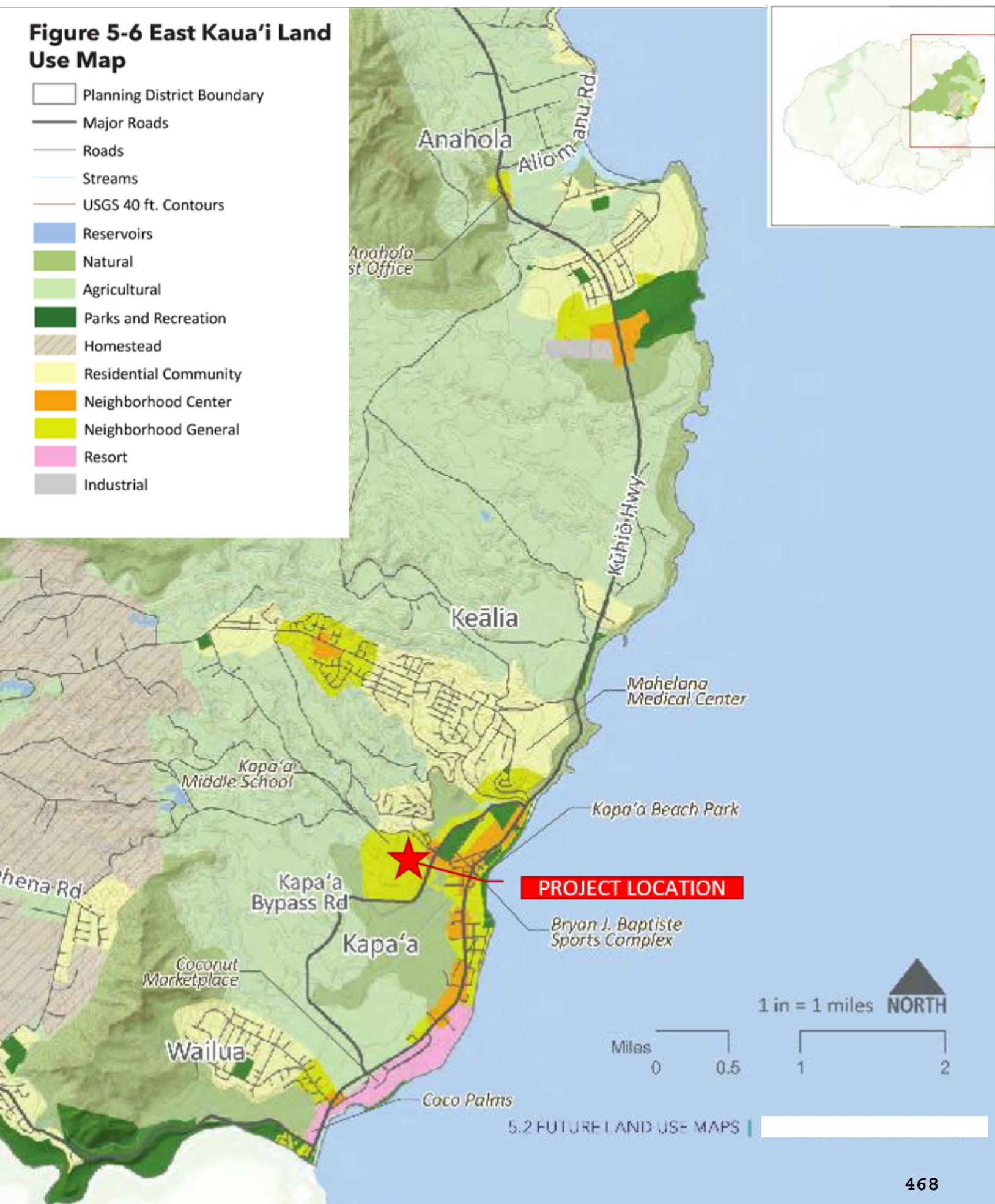


Figure 2 - Map showing project location

## GENERAL SITE DESCRIPTION

The botanical survey describes the site (Figure 2) as “a lowland non-native mesic plant community dominated by secondary vegetation of trees, shrubs, and grasses, many of which are considered invasive. The land . . . has a past history of grazing and sugarcane cultivation. . . . No Hawaiian endemic species . . . were observed. One Polynesian introduction was observed, namely *Aleurites moluccana* (kukui tree) . . . The three indigenous species found at the site are quite common and include: *Hibiscus tiliaceus* (hau) which is also often an invasive tree species, the fern species *Psilotum nudum* (moa), and *Waltheria indica* (uhaloa).” (Wood 2012) As many invertebrates are dependent on plant hosts, the botany report findings are predictive of the invertebrate survey results.

## INVERTEBRATE SURVEY METHODS

### Previous Surveys

Prior to the field survey, a search was made for publications relating to invertebrates associated with this particular site or with nearby sites, and for other projects in the general area that generated an Environmental Assessment or Environmental Impact Statement filed at the web site of the State's Office of Environmental Quality Control (2017). This review did not show any previous large scale invertebrate surveys in the area.

Searches were made in the University of Hawai'i and Bishop Museum library catalogs and in the University of Hawai'i, Hamilton Library's Hawai'i-Pacific Journal Index (2017). Searches were made for publicly available articles mounted on the web through Google Scholar. Surveys for avian and mammalian (David 2012) and botanical resources (Wood 2012) at the project area were very helpful in preparing for this study, but had no reference to other invertebrate surveys or sightings. A review of the online collection databases of the Bishop Museum entomological collections (2017 a,b) and University of Hawaii Insect Museum (UH 2017) and a search of the index of the *Proceedings of the Hawaiian Entomological Society* using place names did not reveal any prior studies. Available field reports of early Kaua'i studies by Bishop Museum entomologists were also reviewed as available.

### Fieldwork

Since 1968, I have taken part in field projects in environments similar to the project site, at other locations on the island of Kaua'i, and throughout the island chain. Those experiences and the results of those surveys provided the basis for my study design and my analysis of results.

Field surveys in January 2018 were conducted at the project site over a period of three days. I conducted a general assessment of terrain and habitats after reviewing maps and prior reports (above). Survey efforts were conducted by day and night, a technique which is vital for a thorough survey. The property was traversed across all habitat types, alternately following pathways to search for any water sources or native botanical resources and substitute host plant options for native invertebrates. The areas designated “greenbelt” were a special focus as most likely to attract invertebrates (Figure 3).



## FIELD SCHEDULE:

January 7	recon; day field survey, night light survey; sunset 6:10 p.m. moonset 11:56 a.m.
January 8	day field survey; night light survey; moonrise 12:19 a.m. [midnight] <sup>2</sup>
January 9	day field survey

## COLLECTING METHODS

The following collecting methods for terrestrial invertebrates were used as appropriate to the terrain, botanical resources, and target species.

**Host plant searches:** Host plants, both native and introduced, were sampled for arthropods that feed or rest on plants. Searches included visual inspection of resting sites and searching known feeding or breeding sites such as under dead bark or rocks.

**Sweep nets:** This is a general method of censusing most flying and perching insects. A fine mesh net was swept across plants, leaf litter, etc. to sample any flying or perching insects. Transfer from the net was either by aspiration, or by placing the net contents into a holding container.

**Visual observation:** At all times, I was vigilant for any visual evidence of arthropod presence or activity. Visual observations provide valuable evidence and are a cross check that extends the reach of sampling techniques. Visual observation also included turning over rocks, dead wood, and other debris.

**Light sampling:** A survey of insects active at night is vital to a complete record of the fauna. Many insects are active only at night to evade birds, avoid desiccation and high temperatures, or to use night food sources, such as night opening flowers. Light sampling uses a bright light in front of a white cloth sheet. Night active insects seem to mistake the collecting light for the light of the moon, which they use to orient themselves. In attempting to navigate by the entomologist's light, confused insects are drawn to circle the light and land on the cloth in confusion. This type of collecting is most successful during the dark phase of the moon, or under clouds blocking starlight. On level sites vegetation usually blocks the light from being seen over long distances, and moths and other night fliers are not drawn from distant locations outside the survey area.

The locations for my light were chosen based on experience, potential native host plant proximity, and to obtain a variety of terrain types (Figure 3). Screening vegetation meant that the nearby housing areas contributed little competing light. The primary light source was a mantel propane lantern bulb. Light wave lengths from the bulb are known to be attractive to night active insects. The sheet was monitored and visiting species observed and recorded.

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<sup>2</sup> all moon data from U.S. Naval Observatory [USNO]

## **Survey Limitations / Conditions**

My ability to form advisory opinions is limited or influenced in the following ways:

### **Collecting conditions**

Weather was favorable for surveying during the fieldwork. Day one had some light passing showers. Day two and three had patchy clouds and light breezes on the second night. Night monitoring was not influenced by the partial moon as the rise and set times caused the moon to be visible only after light surveying had ceased (USNO). Nights were dark making stars quiet visible. Street and school lights presented no competition to the collecting light as I was able to position my site to mask their light.

**Seasons:** Monitoring at a different time of the year might produce a different arthropod list. Weather and seasonal vegetation changes play an especially important role in any survey of invertebrates. Many arthropods time their emergence and breeding to overlap or follow seasonal weather or to coincide with growth spurts of an important plant food. Host plant presence/absence, and seasonal changes, especially plant growth after heavy rains, affect the species collected. Winter 2017 rains put vegetation into a normal seasonal condition optimal for invertebrate growth. However, the low level of native plants found at the site is the strongest factor in determining the invertebrates encountered. Given the very short inventory of native plants at this site, even with positive seasonal factors, native insects traveling across HoKua simply do not find the flora to support them or their eggs are soon eaten by ants.

**Limited duration:** Surveying for a longer period of time might change the list of species; however, given the size of the property, I believe the survey provides an adequate review of the property's resident native invertebrates. (See below: INVERTEBRATES NOT PRESENT, for exceptions)

**Physical limitations:** The size of the property allowed the survey to cover the area adequately. The overall study strategy and light survey site selections were designed to achieve this aim. The resulting survey was representative and targeted in favor of locating and examining the few native host plants.

**Selectivity:** My survey was focused on finding endemic and indigenous Hawaiian species. No attempt was made to collect or completely document the many common alien arthropod species present in the area. Several invertebrates of human health concern are noted later in this report. See MEDICALLY IMPORTANT SPECIES.

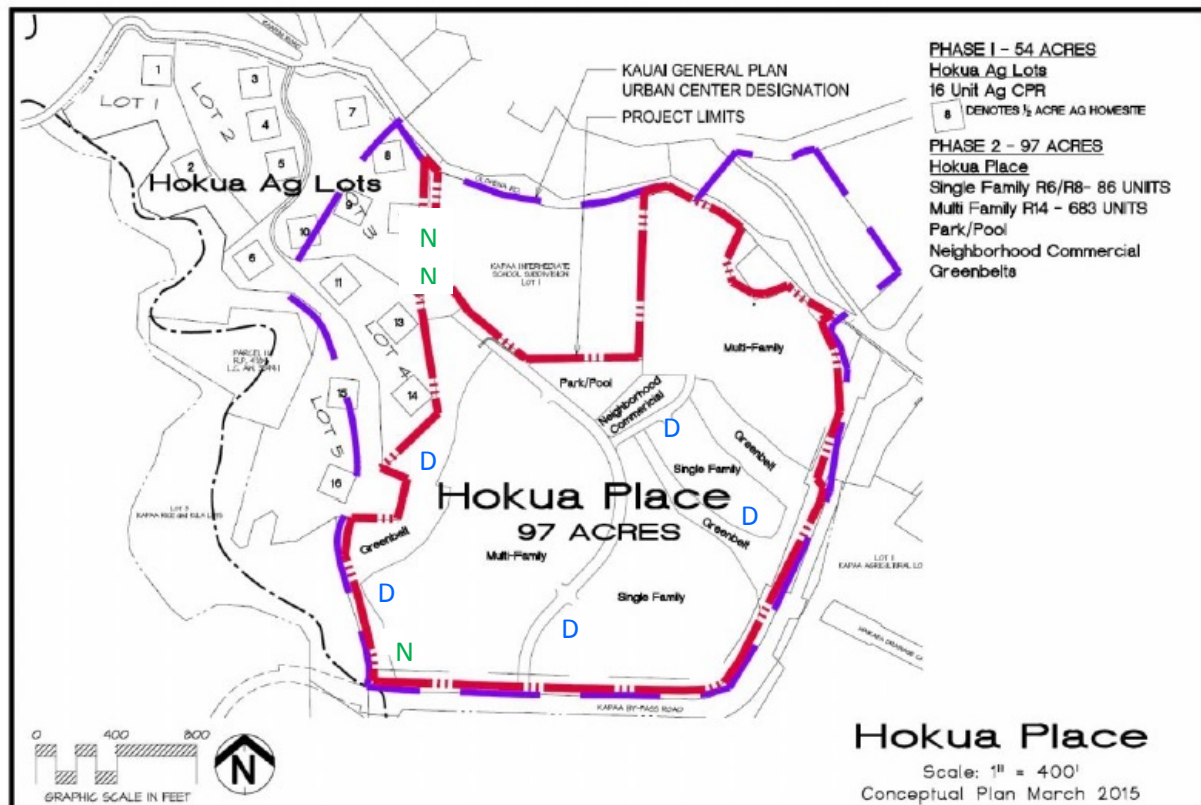


Figure 3: Map of project site showing light survey locations  
[from “HoKua Place ...Final EIS Vol. 1”]

N = night light survey sites

D = areas of day survey concentration

## INVERTEBRATE SURVEY RESULTS:

This discussion focuses on native species encountered, on species that affect native invertebrate survival, and on adventive species of concern in human health or commonly feared.

### MOLLUSCA: PULMONATA

#### Giant African Snail

*Lissachatina fulica* (Bowdich)

The Giant African Snail (Figure 4) is an introduced pest common throughout the island chain lowlands. The Rosy Wolf snail, introduced as a control species, was not seen, but may be present. Rosy Wolf snail has done great damage to populations of native land snails, but there are no longer native snails here.



Figure 4: Rosy Wolf snail (R) approaching Giant African Snail (L)

### ARTHROPODA: ARANEAE (spiders)

#### Araneidae

#### Orb Weaver Spiders

*Argiope appensa* (Walckenaer 1841)

Orb Weaver spiders (Figure 5) were found in bushes especially well placed to host the spiders as breezes deliver flying insects to their webs. They are easily spotted by the distinctive white X where they rest ready to rush out and wrap up the next item snagged by their web. These spiders pose no threat to people or pets and are a good control on pest alien species. They should be allowed to scramble off to find a new home during clearing operations.



Figure 5: Orb Weaver spiders are common in home gardens throughout the island chain.

## Heteropodidae

*Heteropoda venatoria*

### Large Brown Spider or Cane Spider

Although the fast running Cane spider (Figure 6) is often startling to people, they are not known to bite or harm humans. Conversely, they are helpful in controlling pests such as cockroaches. They hunt mostly at night and do not pose a risk to people or pets. They may be encountered by work crews in clearing the site. They should be allowed to run away.

NOTE <sup>3</sup>



Figure 6: Adult cane spider with egg case

## ARTHROPODA: INSECTA

### DIPTERA (Flies and Mosquitoes)

#### Lauxaniidae

*Homoneura hawaiiensis* (Grimshaw 1902) is the Gray-thorax pomace fly look-alike species that, despite the species name “hawaiiensis”, is now known to be adventive and widespread in Oceania to Solomon Islands.

## HYMENOPTERA (wasps, bees, ants)

### Formicidae (ants):

#### Big-headed ant

*Pheidole megacephala*, especially fierce predators on other insects, are present. They are a known threat to native species of invertebrates. Alien ants are known to prey on other insects (Zimmerman 1948-80) and are well documented as a cause of low levels of native arthropods, especially in elevations up to 2000 ft. (Perkins 1913). They are not a common threat to humans.

---

<sup>3</sup> For anyone skeptical of the safety of either spider: we have used Cane spiders in close ‘encounters’ filming on numerous occasions; we used orb weavers in filming scenes for the TV series LOST where the actors had to have the spider ON them; we use orb weavers with children’s wildlife classes.

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## LEPIDOPTERA (butterflies and moths)

### Cosmopterygidae (Case-bearer micro-moths)

*Hyposmocoma* sp. 1 nocturnal

*Hyposmocoma* sp. 2 larvae on slender cases on stones



Figure 7: *Hyposmocoma* sp.

Photo# starr-030724-0089

credit: "Forest & Kim Starr" (HEAR)

Adult *Hyposmocoma* or Case-bearer moths responded to the light. *Hyposmocoma* (Figure 7) are called “case-bearers” because after an early beginning inside a leaf curl or similar hiding place, caterpillars create protection in intricately constructed portable shells of silk. For camouflage, they add bits of their surroundings to the case: snips of dry grass / leaves, flakes of bark, maybe a little dirt. The case is then easily mistaken by a predator as another part of the inedible landscape. These bunkers are fitted with a hinged lid (operculum), pulled shut by mandibles to defend them from enemies, especially ants now. They are dependent on their case, and die if removed – even if protected from predators and given food. They don’t move far, feed while partly emerged from the case, dragging along the protective armor by six true legs. Cases are sometimes attached to rocks or tree trunks and foliage. (Manning/Montgomery in Liittschwager & Middleton 2001) With over 500 kinds, these micromoths are the greatest assemblage of Hawaiian Island

moths, with astonishing diversity. After writing 630 pages on them, Dr. Zimmerman lamented the inadequacy of his study. He noted an enormous cluster of species with explosive speciation and diverging radiation (Zimmerman 1978). Much remains to be learned about them by University of Hawaii’s Daniel Rubinoff and his graduate students (Rubinoff & Haines 2006).

### Crambidae (micro-moths)

*Mestolobes minuscula* (Butler 1881)

The commonest of the small moths or micro-moths, *Mestolobes* (Figure 8), responded to the light survey. It is known from every major island. Although a large genus of over 30 species, 9 known from Kaua’i, it has not been studied in depth despite a 1906 plea to study its habits by R. C. L. Perkins (1907). It has been collected while visiting flowers for nectar diurnally and when responding to light. *Mestolobes* was reported to “often fly actively in cane fields” (Williams 1931). In the 1800s it was reported to fly in small groups and was seen at lower elevations (Perkins 1913). The host plant of this endemic is not certain. There is one record of one larvae reared from a host - the roots of sugar cane on O’ahu in 1930, yet it was never considered even a minor pest (Swezey 1931.) (HBS 2002a, HOSTS, Zimmerman 1958)



Figure 8: *Mestolobes* sp.

Photo# starr-030825-0008

credit: "Forest & Kim Starr" (HEAR)



Lepidoptera: continued

*Orthomecyna phaeophanes* Meyrick 1899

This is a little known ½ inch long moth known from 3 other islands that may feed on grass roots.

**ODONATA** (Dragonflies, Damselflies)

**Coenagrionidae**

*Ischnura posita* (Hagen, 1862) Fragile Forktail Damselfly

This damselfly was introduced to Hawaiian Islands in 1936 and is now found on all the main islands up to 1000 ft. It originated in Canada and is considered an indicator of disturbed aquatic habitat (Polhemus & Asquith 1996).

**Libellulidae**

*Pantala flavescens* (Fabricius) (Globe Skimmer)

An indigenous dragonfly (*Pantala flavescens*) (Figure 9) was observed on the property. Among the most readily observed native insects, Globe Skimmers are large, easily approached by people, and graceful in flight. Any small amount of fresh water will attract them and they often colonize human maintained water sources such as golf-course water hazards and stock tanks. Globe skimmers are widely distributed throughout the Hawaiian Islands, from Kure to Hawai'i Island (HBS 2002a, Nishida 2002) and have even been found flying at sea (Howarth & Mull 1992). They will adapt or move to a nearby water source.



Figure 9: Globe skimmers are found through the Pacific.

**ORTHOPTERA**

**Tettigoniidae**

*Euconocephalus nasutus* (Thunberg) (Aggravating Grasshopper)

This noisy cone-headed grasshopper might be heard on site at night. It makes a variety of sounds by rubbing the base of its wings against its body. Variouslly described as “loud, shrill, and continuous”, “wind whistling through telephone wires,” “long, steady buzzing,” and the buzz of high voltage wires, it is always irritating. It also can ‘throw’ it’s voice or project the sound to another part of the underbrush, diverting you from their hiding place if you are trying to hunt them. (Tenorio and Nishida 1995)

**Table 1:** List of Invertebrates: HoKua Place, Kaua'i

<b>PHYLUM ARTHROPODA</b>		
<b>CLASS ARACHNIDA</b>		<b>MITES, SPIDERS, AND RELATIVES</b>
<b>ORDER ARANEAE</b>		<b>spiders</b>
		<b>Araneidae</b>
	adv	<i>Argiope appensa</i> (Walckenaer 1841) (Orb weaver spiders)
		<b>Heteropodidae</b>
	adv	<i>Heteropoda venatoria</i> (Linnaeus), 1767 (Cane spiders)
<b>CLASS CHILOPODA</b>		
<b>ORDER SCOLOPENDROMORPHA</b>		<b>centipedes</b>
		<b>Scolopendridae</b>
	adv	<i>Scolopendra subspinipes</i> Leach 1815
<b>CLASS INSECTA</b>		<b>INSECTS</b>
<b>ORDER COLEOPTERA</b>		<b>beetles</b>
		<b>Scolytidae</b>
	adv	<i>Xylosandrus compactus</i> (Eichhoff)
<b>ORDER DIPTERA</b>		<b>flies</b>
		<b>Asteiidae</b>
	end	<i>Asteiia sabroskyi</i> Hardy & Delfinado, 1980
		<b>Lauxaniidae</b>
	adv	<i>Homoneura hawaiiensis</i> (Grimshaw, 1902)
<b>ORDER HETEROPTERA</b>		<b>true bugs</b>
		<b>Lygaeidae</b>
	adv	<i>Pseudopachybrachius pacificus</i> (Stal, 1874)
<b>ORDER HYMENOPTERA</b>		<b>wasps, bees, ants</b>
		<b>Anthophoridae</b>
	adv	<i>Xylocopa sonorina</i> F. Smith, 1874 (Sonoran Carpenter Bee)
		<b>Apidae</b>
	pur	<i>Apis mellifera</i> (Honey bee)
		<b>Formicidae</b>
	adv	<i>Pheidole megacephala</i> (Fabricius 1793)

ORDER LEPIDOPTERA		butterflies, moths
		<b>Cosmopterygidae</b> (Case-bearer micro-moths)
	end	<i>Hypasmocoma</i> sp. 1     2 adults at light
	end	<i>Hypasmocoma</i> sp. 2     9 larvae in slender cases
		<b>Crambidae</b> (micro-moths)
	end	<i>Mestolobes minuscula</i> (Butler 1881)
	end	<i>Orthomecyna phaeophanes</i> Meyrick 1899
		<b>Limacodidae</b>
	adv	<i>Darna pallivitta</i> Moore, 1877
ORDER ODONATA		dragonflies, damselflies
		<b>Coenagrionidae</b>
	adv	<i>Ischnura posita</i> (Hagen, 1862) (Fragile Forktail Damselfly)
		<b>Libellulidae</b>
	ind	<i>Pantala flavescens</i> (Fabricius) (Globe Skimmer)
ORDER ORTHOPTERA		grasshoppers, crickets
		<b>Tettigoniidae</b>
	adv	<i>Euconocephalus nasutus</i> (Thunberg) (Aggravating Grasshopper)

## Status:

- End    endemic (only in the Hawaiian Islands)  
Ind    indigenous (naturally in the Hawaiian Islands but also elsewhere)  
Adv    adventive (inadvertently introduced)  
Pur    purposeful (deliberately introduced)

Names authority: Hawaii Biological Survey 2002a,b; Nishida 2002; Zimmerman 1948-80; Zimmerman 2001

## INVERTEBRATES NOT PRESENT:

Plant and invertebrate populations are interdependent; consequently, host plant availability is one way to review invertebrate health. As discussed in the botanical survey (Wood 2012) and archaeology report (McMahon Tolleson 2013), the area has a long history of human use, Hawaiian agriculture, sugar production, and current sheep, goat and cattle grazing, all activities that removed native plants. The resulting extremely low level of native flora serving as arthropod hosts leads to the low level of Hawaiian arthropods at this site. Wood did find some Hawaiian plants: *Hibiscus tiliaceus* (hau) is the sole host of a tiny moth with a leaf mining larva, *Philodoria hauicola*, reared from Kaua'i and 3 other islands, often scarce, but at this site, none were present. *Psilotum* has no insect specialists in Hawaii.

## SPECIES NOT FOUND

Any survey for federally protected species should include consideration of all native invertebrates (snails, spiders, and insects).

## Cave-adapted Species

A review of the archaeological survey of the area (McMahon Tolleson 2013) indicated no lava tubes at the project site which could support cave-adapted native invertebrate species, nor did this survey show any evidence of lava tubes.

## MOLLUSCA:

No native mollusks were observed during this survey.

Of the family Lymnaeidae, *Erinna newcombi* Adams & Adams, 1855 or Newcomb's Snail, this threatened species was not found by my survey. The habitat (stream flow and moisture levels) makes the survey area unsuitable for this snail (USFWS 2006).

## DIPTERA

### Drosophilidae: *Drosophila*

No native *Drosophila* were observed. The property is now unsuitable habitat for any of the endemic Kauai *Drosophila*, two in the uplands being listed as endangered or threatened. These native Hawaiian picture wing flies require a much cooler native environment, with host flora not offered at this property (*Federal Register* 2006a, b).

Invertebrates not present: continued

## HETEROPTERA

Based on other Kaua'i lowland surveys, I expected, but did not find, native *Nysius* seed bugs.

## HYMENOPTERA

No native bees were observed on the property.

## LEPIDOPTERA

Based on other Kaua'i lowland surveys, I expected to encounter the native micro- moths *Tamsica*, *Thyrocopa*, and *Philodoria*, but at this site ants and cane plows appear to have extirpated them.

### Sphingidae: *Manduca blackburni*

The Blackburn's sphinx moth<sup>4</sup> (*Manduca blackburni*), an endangered species (Fed Reg 1999-2000) was not found in this survey. Historically, the moth is known from the Island but only in the Nāwiliwili area and has not been seen for a century. There is no critical habitat established for the moth on Kaua'i. (USFWS 2002) Neither the moth's solanaceous native host plant, 'aiea (*Nothoecstrum* sp.), nor the best alien host, tree tobacco (*Nicotiana glauca*), were observed on the property or found by the botanical survey (Wood 2012).

## ODONATA (Dragonflies, Damselflies)

No native Damselflies were observed on the property.

## MEDICALLY IMPORTANT SPECIES

### Centipedes, scorpions, black or brown widow spiders:

Centipedes were observed but scorpions, black or brown widow spiders are also likely. They typically hide in dry leaves, under dead wood or rocks. Surveyors, crews clearing debris, etc. should be alert for all these species which may pose a serious risk to some individuals. When moving stones or piled brush, wearing gloves, covered shoes, long sleeves, and long pants will greatly reduce the risk of accidental contact and bites [for example: pull socks up over pant cuffs to deter disturbed critters from crawling up pants; use cut off socks to slide over connect between gloves and long sleeve shirt cuff]. Supervisors should be aware of any allergy by employees. Some individuals can experience anaphylactic reactions to venom of any of the mentioned arthropods, not just bees. Please see *What Bit Me?* (Nishida and Tenorio 1993) for additional information.

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<sup>4</sup> Blackburn hawk moth is the official common name recognized by the HES Committee on Common Names of Insects (1990). Blackburn's sphinx moth has come into popular usage.

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Medically Important Species-continued

**HYMENOPTERA:**

**Anthophoridae**

**Carpenter bees** (*Xylocopa sonorina*) were observed on the property. They favor dry, dead wood on site. The black carpenter bee females and golden males are easily seen. Carpenter bees carve out a short tube tunnel in soft wood (fence post, dry branches) as their home (Figure 10). They do not form colonies, but live individually. Carpenter bees are not a danger to people under normal circumstances, but if cornered can sting.



© Figure 10: Black female, golden male Carpenter bees; tunnel housing.

**Apidae**

**Honey bees** were noted on the property although the hive was not located. As in many wild locations in the islands, there are likely hidden, wild honey bee (*Apis mellifera*) colonies on the property. Dead trees with hollows are a favored location for a hive. If in clearing areas bees are encountered, a beekeeper should be contacted to remove the colony safely. Employees with an allergy to stings should inform their supervisor and carry their response kit at all times.

**Vespidae**

**Common Paper Wasps** (*Polistes* sp.) are on the property. This wasp favors dry, sheltered sites. These wasps are common throughout the lowlands and especially like to build their 'paper' nests under natural overhangs, including tree branches. (Figure 11). They are a danger to humans. They sting repeatedly as unlike honey bees they do not die when they sting. Nests are best destroyed at night when all wasps are on the paper nest. Destroying the nest during daylight hours will result in rebuilding when the wasps return later in the day. Protection should be worn and the task should not be attempted alone for safety backup.



Figure 11: Typical paper wasp nest



Medically Important Species-continued

**LEPIDOPTERA**

**Stinging Nettle caterpillar (*Darna pallivitta*)**

This introduced pest has spreading across the islands and reached Kaua'i in 2011. The adult responded to my light survey. DOA personnel inform me the level of infestation on Kaua'i has not been high (Conant 2018). Nevertheless, survey and crews clearing the area should be alert for the caterpillar which has numerous spines. The stinging spines may cause burning and itching sensations on the skin. Swelling and welts can last for several days, then a persistent rash may last for weeks. For any severe symptoms, especially breathing difficulty, seek medical help immediately. (DOA 2005, 2011)



Figure 12. Avoid contact with the spines of the Stinging Nettle caterpillar (HDA photo)

**POTENTIAL IMPACTS**

**Potential Impacts on Native, Rare, Federally or State Listed Species**

No federally or state listed endangered species was found in this survey. No anticipated actions related to the proposed project activity in the surveyed locations are expected to threaten an entire species.

**General Recommendations for promotion and protection of native invertebrates**

**Landscape with native plants:**

The 2012 botanical survey recommended landscaping with native plants as the project develops (Wood / David 2012). In addition to their beauty and the positive cultural and social values communicated by the use of native plants, these plants would provide habitat for native arthropods while creating a more interesting botanical area. Native plants will remain green and thus more fire resistant throughout the summer. Native plantings often have lower maintenance costs and water needs when chosen to match area needs. As native plants tend to reach a predictable height and foliage spread, well-chosen plantings usually mean less hedge trimming and weed whacking. In the areas to be left undeveloped or used to screen some areas or along roadways, native plants in a mixture of ground cover, shrub, and tree heights will slow run off, retain moisture and recharge aquifers while holding soil at low cost. The plantings can provide educational, visual, and aesthetic benefits to residents. Native insects and other creatures may use this refuge over time.

Native plants can be as convenient for mass plantings as the introduced plants commonly used to re-vegetate after new construction. A list of suppliers of native plants is available at <http://nativeplants.hawaii.edu/nursery/>

## **ACKNOWLEDGMENTS**

Steven Lee Montgomery conducted all surveying and is responsible for all conclusions. Anita Manning assisted with database searches and contributed to preparation of this report.

Photos are by Anita Manning or Steven Montgomery unless otherwise attributed.

## STANDARD NOMENCLATURE

**Invertebrate** names follow

*Freshwater & Terrestrial Mollusk Checklist* (HBS 2002b)

*Common Names of Insects & Related Organisms* (HES 1990)

*Hawaiian Terrestrial Arthropod Checklist* (HBS2002a; Nishida 2002)

**Plant** names follow

*Manual of the Flowering Plants of Hawai'i* (Wagner et al. 1999)

*A Tropical Garden Flora* (Staples and Herbst 2005)

**Mammal** names follow *Mammals in Hawai'i* (Tomich 1986).

**Place name** spelling follows *Place Names of Hawaii* (Pukui et al. 1976).

## ABBREVIATIONS

**asl**        above sea level

**DLNR**     Department of Land and Natural Resources, State of Hawai'i

**DOA**       Department of Agriculture, State of Hawai'i

**DOFAW**   Division of Forestry and Wildlife

**ESA**       Endangered Species Act of 1973, as amended.

**HBS**       Hawai'i Biological Survey

**n.**          new

**sp.**        species

**spp.**       more than one species

**TMK**       Tax Map Key

**USFWS**   United States Fish and Wildlife Service

## GLOSSARY<sup>5</sup>

**Adventive:** organisms introduced to an area but not purposefully.

**Alien:** occurring in the locality it occupies ONLY with human assistance, accidental or purposeful; not native. Both Polynesian introductions (e.g., coconut) and post-1778 introductions (e.g., guava, goats, and sheep) are aliens.

**Arthropod:** insects and related invertebrates (e.g., spiders) having an external skeleton and jointed legs.

**Diurnal:** active in the daylight hours

**Endangered:** A species listed and protected under the Endangered Species Act of 1973, as amended.

**Endemic:** naturally occurring, without human transport, ONLY in the locality occupied. Hawaii has a high percentage of endemic plants and animals, some in very small microenvironments.

**Indigenous:** naturally occurring without human assistance in the locality it occupies; may also occur elsewhere, including outside the Hawaiian Islands. (e.g., Naupaka kahakai (*Scaevola sericea*) is the same plant in Hawai'i and throughout the Pacific).

**Insects:** arthropods with six legs, and bodies in 3 sections

**Invertebrates:** animals without backbones (insects, spiders, snails / slugs, shrimp)

**Larva/larval:** an immature stage of development in offspring of many types of animals.

**Mollusk:** invertebrates in the phylum Mollusca. Common representatives are snails, slugs, mussels, clams, oysters, squids, and octopuses.

**Native:** organism that originated in area where it lives without human assistance. May be indigenous or endemic.

**Naturalized:** an alien organism that, with time, yet without further human assisted releases or plantings, has become established in an area to which it is not native.

**Nocturnal:** active or most apparent at night.

**Pupa:** the stage between larva and adult in insects with complete metamorphosis, a non-feeding and inactive stage often inside a case

**Purposefully introduced:** an organism brought into an area for a specific purpose, for example, as a biological control agent.

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<sup>5</sup> Glossary based largely on definitions in *Biological Science: An Ecological Approach*, 7<sup>th</sup> ed., Kendall/Hunt Publishing Co., Dubuque, a high school text; on the glossary in *Manual of Flowering Plants of Hawai'i*, Vol.2, Wagner, et al., 1999, Bishop Museum Press, and other sources.

**Polyphagous:** eating many different types of food

**Rare:** threatened by extinction and low numbers.

**Species:** all individuals and populations of a particular type of organism, maintained by biological mechanisms that result in their breeding mostly with their kind.

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