

**APPENDIX A**  
**A history of Waikapū**

# A History of Waikapū



Waikapū is shown here in the 1890's, some 30 years after sugar growers William Cornwell and Jamees Louzada formed Waikapū Plantation, which was acquired by Wailuku Sugar Company in 1894. The road shown is West Waiko Road, and the church building at right is now a private residence. Waikapu is now home to more than 1,000 Mauians and is the site of the Maui Tropical Plantation, a visitor attraction built around a tropical agricultural theme. Maui Historical Society Photo

*By*  
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## A History of Waikapū

by

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*Ka makani kokoloio o Waikapū*

*“The gusty wind of Waikapū”*

An ‘ōlelo no‘eau, or traditional saying, referred to in the song “Inikinikimālie” by James Kahale

Famed for its gusty winds and pleasant living, the land division called Waikapū originates in one of four valleys created by streams known as *Nā Wai Eha*--The Four Waters. One of those famous streams carved the steep ridges and gullies of Waikapū Valley through the West Maui volcano, transporting the mountain's core material and depositing it in an alluvial fan at the mouth of the canyon. This fan joined with those of the other three valleys -- ‘Īao, Waiehu and Waihe‘e -- to create an alluvial plain 13 km long. (Kyselka: 28, 36) The soil of this plain accumulated thickly near the mountain, spreading more thinly across the Isthmus formed when lava from Haleakalā pooled against West Maui. Over thousands of years, as glaciers grew in other parts of the world and sea levels dropped, broad stretches of coral reef were exposed and broken down to sand. Trade winds blew the sand onto the isthmus and formed it into ridges, which became lithified, or turned into stone, by carbonic acid released from the roots of plants growing in the sand.

By the time human beings arrived, the land of *Nā Wai Eha*, with its deep, rich alluvial soil and flowing streams, was ripe for cultivation. The new residents looked down over the sand dunes of the Isthmus, a shifting plain where inhabitants of the land believed that ghosts wandered. (Pukui: 81) Many years later, a writer would remark that "at times, the wind sweeps across this plain with great force, and clouds of sand, five hundred to one thousand feet high, move over it, presenting to the spectator on the mountains a most beautiful sight." (*Pacific Commercial Advertiser*, April 9, 1864)

Ambitious ancient farmers took advantage of the optimal growing conditions close to the streams. "Spreading north and south from the base of Waikapu to a considerable distance below the valley are the vestiges of extensive wet plantations, now almost obliterated by sugarcane cultivation," wrote E. S.C. Handy in 1934. "Far on the north side, just above the main road and at least half a mile below the entrance to the canyon, an extensive truck garden on old terrace ground showed the large area and the distance below and away from the valley that was anciently developed in terraced taro culture. On the south side there are likewise several sizable *kuleana* where, in 1934, old terraces were used for truck gardening. . . There were probably once a few small terraces on the narrow level strips of valley bottom in the lower canyon." (Handy: 497)

S.W. Nailiili, writing in 1865, offered this poetic description: "Waikapu, a district known for its majesty and splendid living, whose native songs gather flowers in the dew and weave wreaths of *ohelo* berries."

(Sterling: 91)

Though some maintain that "Waikapū" means "sacred water," others say "Waikapū" refers to a conch shell, or *pū*, once secreted in a cave "away up the stream, about a mile or more from the village," wrote W.K. Kauaililehua in 1872.

On the left side of the stream is a cave and in the cave was the conch. It sounded all the time, unseen by the public, but a prophet on Kauai listened for it and came to seek with the idea of finding it.

On the northeast side of that stream on the opposite side of the conch that sounded, on the cliff, was a dog named Puapualenalena. Because he heard it, he sought diligently to find it but he did not succeed. Those who guarded the conch were very watchful. The dog kept studying ways of obtaining it.

One day, when the owners of the conch had been "utterly careless," Puapualenalena stole the conch. "After he took it, it sounded no more to this day. It used to be heard everywhere in the islands and was annoying to some people. From this conch, the whole of the place was named Waikapū (Water of the conch). This is the legend of how it received its name. . . ." (Sterling: 93)

Others say the name refers to Kamehameha assembling his forces for battle by sounding a conch shell at Waikapū. (Sterling: 93) It's not clear which battle this story refers to.

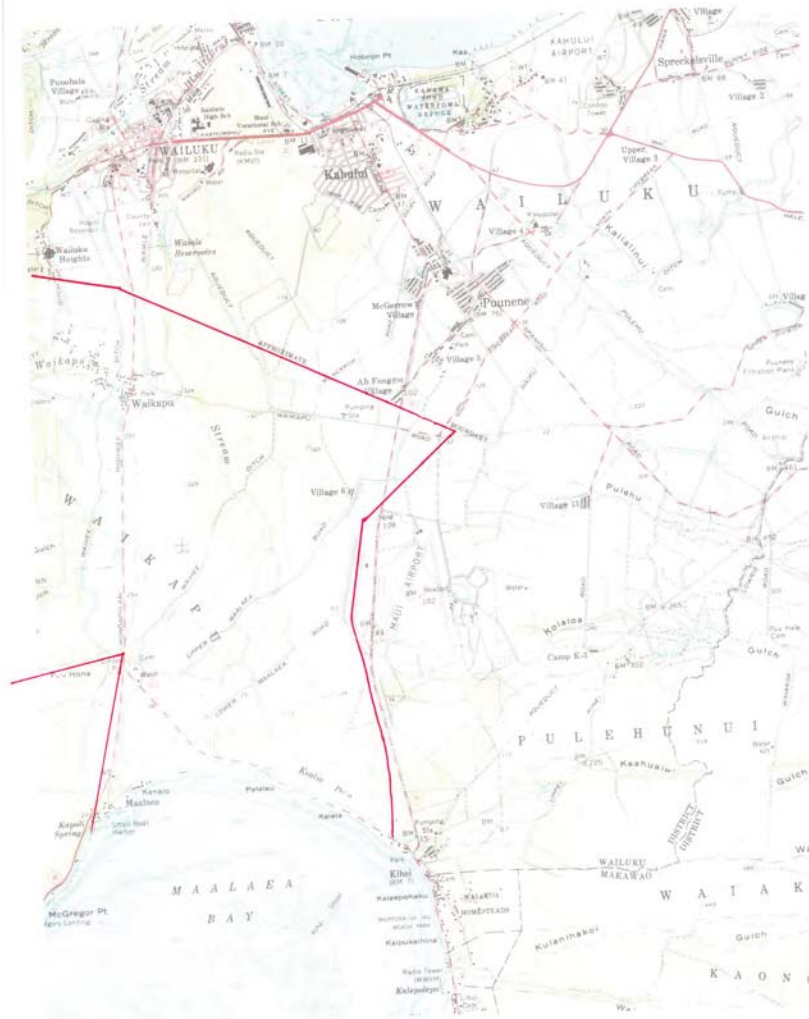
The great chief Kihapi'ilani and his wife passed through Waikapū on their travels around the island, finding a crowd near a huge rock above the stream of Waikapū, an adz rock said to be the boundary between Wailuku and Waikapū. "And it remains there until this day," writer Moses Manu said in 1884. (Sterling: 94)

Kiha also visited Waikapū on the advice of two old men in Ha'ikū, who told him their sister Pao could help him:

Kihapi'ilani started for Waikapū where the prophetess by the name of Pao was living. While Kihapi'ilani was yet on the road, on his way to meet her, she predicted to those around her, saying: "There is a chief on the way here in search for some one to help him in his revenge."

When Kihapiilani arrived in the presence of Pao, a rainbow appeared at the same time. Pao then said: "My lord is swift of foot." She then greeted Kihapiilani. Kihapiilani returned the greeting. After the greetings had been exchanged, Pao invited Kihapiilani to come in, and then she asked him: "What brings my lord here on this hot day?" The chief replied: "I have come in search of someone who will cause the death of my brother Piilani, for he has treated me shamefully." Pao then replied: "There in the lowlands of Kalepolepo lives the one who will assist you in killing your enemy. You go down till you reach Kalepolepo and look for a man whose face is covered over with filth. He is the one." At the close of the directions of Pao, Kihapiilani proceeded on his way to Kalepolepo, where in time he found the man described to him and he went up to meet him. (Fornander, Vol. IV)





1954 USGS map, with approximate Waikapū boundaries marked in red

### Waikapū the District

Traditionally, Waikapū is more than just the fertile valley at the base of the mountain. The district covers approximately half of the Isthmus known as Kama'oma'o, reaching the south shore and including the shoreline from near Ma'alaea to Kīhei Pūko'a. According to approximate boundary lines on a 1954 USGS map, the northern mauka boundary passes near the south end of Wailuku Heights and follows a line slanting down to a point near the bottom of modern-day Waiko Road. From there it turns sharply east, descending in a somewhat curved line to Kīhei. The eastern boundary line of the district meets the ocean at Kīhei Pūko'a, at the eastern end of the great wetlands known as Kealia Pond. Unlike the other three streams of Nā Wai Eha, Waikapū Stream did not reach the sea. Blocked by sand dunes, it drained instead into Kealia Pond. On this makai edge of the district is a surf spot still famous today and once there were salt pans "where they make most excellent salt," according to a voyager in 1817.

(Sterling: 95)

Between the shore and the valley was Pu‘u Hele, a cinder cone formed late in the history of the West Maui Volcano. According to legend, Pu‘u Hele was one of a pair of *mo‘o* (lizards), the husband of nearby Pu‘u-o-kali. Their child, Pu‘u-o-inaina, was placed on Kaho‘olawe and later was a lover of Pele's sweetheart, Lohiau, according to *Place Names of Hawaii*. (Pukui: 203) Once 20 meters in height, Pu‘u Hele was considered an essential stop on a trip around the island, according to Theodore Kelsey. "You cannot claim a circuit of Maui unless after you have been all around, you circle the hill above Puu-hele, then climb to the top and proclaim, 'Uapuni o Maui ia 'u'." (Sterling: 94)

Pu‘u Hele now is a hole in the ground, deeper than it once was tall. Its cinders were mined to make road beds, beginning in World War II, when the Navy built Naval Air Station Pu‘unēnē. (Kyselka:38 and Ashdown: 59) Today, what appears to be the remnants of the cinder cone's edges may be seen along Honoapi‘ilani Highway just mauka of the South Kihei Road intersection.

### A Famous Battle

In the days when Pu‘u Hele stood tall, before cultivation and sand mining had flattened the dunes of Kama‘oma‘o, those dunes provided cover for Maui warriors in a famous battle. Around 1776, near the end of a century of warfare that frequently brought the chiefs of Maui and Hawai‘i Island into conflict, the Big Island chief Kalaniopu‘u made what turned out to be a disastrous decision. Having successfully retaken Hana (a territory long disputed by chiefs of the two islands), he landed his fleet of war canoes along the south shore at Keone‘ō‘io, Honua‘ula and Kihei. From here, he planned to attack Maui's ruling chief, Kahekili, who happened to be his brother-in-law. Kahekili's sister, Kalola, was with her husband, along with Kīwala‘ō, the son of Kalaniopu‘u and Kalola.

Though he had arrived with close to 3,000 men, Kalaniopu‘u at first gathered only 800, his most skilled warriors, the ‘Ālapa and the Pi‘ipi‘i. These young chiefs were "of equal height and were garbed in feather cloaks of various colors. They were those of whom King Kalaniopuu thought a great deal, for they were skilled in the martial arts of those days," Stephen L. Desha wrote. "I am sending you inland to Wailuku to fight the warriors of Kahekili and my word of hope to you is you will have great strength and drink the water of Iao," Kalaniopu‘u said to these warriors as he sent them into battle at dawn. The warriors' shouted response in the quiet morning betrayed their battle preparation to spies who raced back toward Wailuku to inform Kahekili that the Hawai‘i Island army was ready to march.

Alas for those young warriors, their leader had failed to heed the advice of his own kahuna, who had warned him that he should wait until the next day at high noon, and have his nephew Kamehameha lead the army. On the other side of the isthmus, Kahekili had been given a more positive prophecy: "O heavenly one, the fish has entered the sluice-gate and is surrounded by the small-meshed net." A great strategist, Kahekili had planned carefully and also enjoyed the support of additional warriors provided by his ally and nephew, Kahahana of O‘ahu. "Kahekili's warriors were roused up, joined by the Oahu warriors under Kahahana, the young Oahu chief, and these numerous warriors were stationed at the sand dunes of Waikapu and also at a place close to those sand dunes seaward of Wailuku. Kahekili's warriors hid like sand crabs in their holes awaiting the onslaught of Kalaniopuu's relatively few warriors who would move inland to Wailuku without realizing that their death was awaiting them." (Desha: 35-43)

Historian Samuel Kamakau's description of the battle is evocative:

Across the plains of Pu‘u‘ainako (Cane-trash-hill) and Kamaomao shone the feather cloaks of the soldiers, woven in ancient pattern and covered like the hues of the rainbow in red, yellow, and green, with helmets on their heads whose arcs shone like a night in summer when the crescent lies within the moon. . . . Like a dark cloud hovering over the Alapa rose the destroying host of Kahekili seaward of the sandhills of Kahulu‘u. . . . They slew the Alapa on the sand hills at the southeast of Kalua. There the dead lay in heaps strewn like kukui branches; the corpses lay heaped in death; they were slain like fish enclosed in a net. This great slaughter was called Ahulau ka Piipii i Kakanilua (Slaughter of the Piipii at Kakanilua). (Kamakau: 85)

Kahekili's forces, hidden in the sandhills on either side of the plain, allowed the warriors to advance across the plain of Kama‘oma‘o until they reached the southeastern side of a place called Kalua, close to the village of Wailuku. (Sterling: 88) The Maui warriors then attacked, slaughtering all but two of the crack warriors in Kalaniopu‘u's army. These two managed to get back to Kihei Puko‘a, where Kalaniopu‘u was confidently boasting that his warriors had perhaps already drunk of the waters of Wailuku. Grief stricken and furious, Kalaniopu‘u and his chiefs determined to try again. In response, Kahekili's men rose at dawn once more and occupied the sand hills, and again their divided forces sent down a rain of spears, javelins and other missiles on the Hawaii warriors. "The terrified soldiers were surrounded and took to flight; they were driven by Kahekili's men like leaves before a whirlwind. The plains of Kamaomao became like a fishpond through whose sluice gate the sea flooded, Kalaniopuu's men like the mullet driven by the sound of beating into the sluice gate. . ." (Kamakau: 85-88)

At last accepting that his men were surrounded and the battle lost, Kalaniopu‘u first asked his wife to go to her brother and sue for peace. Kalola refused, saying that she would be killed "for we came to deal death. If we had come offering love we should have been received with affection. I can do nothing." Instead, she told her husband to send her son, a chief of divine rank, along with the twin half-brothers of Kahekili. Kiwalao's rank was such that even the Maui warriors had to bow before him and allow him passage to Wailuku, where Kahekili magnanimously accepted their surrender. "Then Kahekili said to his followers, 'Take the fish of Kanaha and Mau‘oni and the vegetable food of Nawaieha down to Kiheipukoa.' So the two chiefs became reconciled, but Kalaniopuu's was a feigned friendship." (Kamakau: 88-89)

The next great battle in Na Wai Eha would be the decisive battle of Kepaniwai, in which Kalaniopu‘u's nephew and heir Kamehameha would defeat Kahekili's son in the valley above Wailuku in his campaign to conquer and rule all the islands. As part of the spoils of war, the conqueror parceled out land to his supporters. Waikapū was among the ‘āina given to Ke‘eaumoku, one of the four "Kona Uncles," powerful chiefs whose support had helped Kamehameha rise. (Kame‘eleihiwa: 106)

### **The Outside World Arrives**

By this time, Western voyagers were beginning to appear regularly in the Islands as word spread of the visit by Captain James Cook in 1778.

Foreigners arrived early in Waikapū. Kamakau, describing the chief Kuakini (also known as John Adams), who "was fond of the foreigners and entertained them at meals," says "there were foreigners



Soon after the death of Kamehameha I in 1819, missionaries arrived to share the Gospel and the Western skills of reading and writing. Small schools and churches spring up everywhere around the islands. Though missionaries did conduct two censuses (one in 1832 and one in 1836, with 733 persons in Waikapū in 1832 and 709 in 1836), it is often school and church records that give us an idea of population levels at a time when few records were kept.

A report from 1834 counts individuals attending two schools in Waikapū, one with 170 *kane* and 155 *wahine* and another with 84 *kane* and 54 *wahine*. The report, printed in the mission-sponsored newspaper *Ka Lama*, laments that few children are represented in these numbers. In a report on the Wailuku Station from June 1, 1837 to June 1, 1838, missionary Richard Armstrong wrote: "From Waikapu to Waihee, there are now 5 good doby [adobe] schoolhouses." (Ms. in HMCS). In April 1841, school commissioner David Malo reported to the Legislative Council of the Chiefs held at Kaluaokiha in Lahaina that there were four schools and four teachers in Waikapū, with a total of 159 students. In his 1842 tour of schools, Malo found a total of 146 students in Waikapū. Teachers at this time were paid between 12.5 cents and 25 cents a day. (General Reports 1821-1842, HMCS) In 1852, the school agent's report found three schools, with a total of 84 students. Very likely these schools were scattered throughout the district, rather than clustered at the village we now call Waikapū.

Waikapū village was clearly well populated at the time of the Māhele, when land was divided between the king, chiefs and commoners. A map of Waikapū Plantation in the State Survey Office shows the area to be filled with the small landholdings known as *kuleana*. Though the map is not dated, it probably would have been drawn sometime between 1862, when Waikapū Plantation was founded, and 1894, when the plantation was purchased by Wailuku Sugar Company. One contemporary landowner, Avery Chumbley, says there are 32 *kuleana* within the 67 acres he owns in upper Waikapū. The old map shows that land use was similarly concentrated throughout the village area, with *kuleana* extending along the streambed far up the mountain.

The *Indices of Awards*, listing those who acquired land during the Mahele, shows some of the largest in plots in Waikapū going to *haole*. Michael J. Nowlien received 303.5 acres, William Humphries 131.3 acres and James Lozada 26.1 acres. Others with relatively large pieces include Haa (35 acres), Copp (16.94 acres), Catalina (13.61 acres), Manu (11.01 acres), John Richardson & Co. (two pieces, 8 and 6.10 acres), William Shaw (two pieces 13.6 and 6.3 acres), Anthony Silva (8.2 acres), Kepaa (9.69 acres), Kuihelani (9.4 acres), William McLane (5 acres). Maps of the time show Richardson with what looks like considerably more land than is indicated in the *Indices*. David Malo, the well-known scholar and author, also received a lot with a house and *kalo* and pasture land.

In addition to *kalo*, there was some early growing of sugar at Waikapū, perhaps by Anthony (Antonio) Sylva or by Antonio (or Antone) Catalina. One 1823 report says that Catalina made "an excellent syrup." (Girvin: 195) There was an early attempt at coffee growing around 1847, (Kuykendall: 316) and residents apparently raised cattle, whose "depredations" as they wandered the plain destroyed acres of young sugar cane. "Some of the natives have lost nearly all they had planted," J. S. Green wrote in 1846. (*The Polynesian*, October 3, 1846) Some indication of the area's agricultural nature comes also from this *Pacific Commercial Advertiser* report of a destructive storm in 1858, when:

. . . A waterspout was formed and carried to the summit of the mountains between Waikapū and Ukumehame and there discharged. The torrent rolled down on each side, bearing all before it; the branch of waterspout that came down to Waikapū uprooted huge trees and strewed them out



over the plain, dug up and removed large fields of kalo, and carried away considerable portions of arable land, leaving deep fissures and piles of stone instead. Many families, who before the catastrophe, sent food to market, were left destitute. The water came down in a body like a mighty wall fifteen or twenty feet high, with such majesty that it would not follow the windings of the brook, but rushed over whatever lay in its way, cutting its own path. Several horses and cattle were caught in its track and drowned. One dwelling house was carried off with all its contents, the inmates barely escaping with their lives. It is very remarkable that the house of Mr. Devauchelle escaped destruction. The torrent passed like a high wall on both sides of it, leaving it unhurt and strewing large boulders and trunks of trees all around it. After crossing the road in front of Mr. Antonio Sylva's house, the torrent parted and one branch rushed on to Kealia and the other hastened down to Kahului, both depositing all along their track large trunks of trees brought down from the mountain, and kalo and sugar cane from the Waikapu gardens. . . (P.C. Advertiser, 3/11/1858)

### **Waikapū Plantation**

Waikapū Plantation was founded several years later. It was formed by a series of purchases that began when James Louzada acquired the estate of the late Circuit Court Judge John "Iaone" Richardson. Members of the Richardson family had lived in Waikapū for many years. Apparently the first resident of that name was George Richardson, who was born in Ireland and died in Waikapū in 1835, leaving a widow named Kaneole. Their son or grandson, John Richardson, is named in several places on the Waikapū Plantation map. His land became available for sale through tragic circumstances, when Richardson committed suicide at age 35 by hanging himself from a tree on his cattle range in Kula. "He had been laboring for some time under a mental aberration, caused, it is said, by domestic troubles," said the *Pacific Commercial Advertiser* in January 1860. Perhaps this was depression resulting from the death of his wife, Dorcas (Doreka Ilai) in 1857 and their four-year-old daughter Fanny in 1859. The newspaper said Richardson had been a member of the House of Representatives, recently promoted by the king to a seat in the House of Nobles, and was considered "one of the most promising and intelligent of his race." (P.C. Advertiser, 1/12/1860)

Louzada, a native of New York, had arrived in the Islands in 1834. (*The Friend*, December 1869: 104) His acquisition of Richardson's estate was not his first stake in Waikapū land. A copy of a March 15, 1844, deed from Charles Kanaina to Louzada, translated from Native Register, Volume I, page 175, reads as follows:

I hereby give two ilis of mine at Waikapu, Aoaokamanu and Puahinakao, to James Louzada to live on under me, as the natives of Hawaii do. If he does wrong under the law, his occupation thereof shall end. Furthermore I shall have the Thursdays and the Fridays [tax days] of the land, and he shall be responsible to me. Furthermore he shall give the tribute to the tax

collector, as formerly paid by these lands. Furthermore, *e like no me ka la me ai kahiko* [the ancient ways of the land shall be followed?] Furthermore if it comes to us that he petitions as a foreigner [does not follow Hawaiian custom] then his occupation of the land shall cease. Furthermore if the *lunas* object to this grant of land, then it shall cease and the land be returned to me.

Several years later, Louzada wrote to William Richards, president of the Board of Commissioners to Quiet Land Titles, regarding his application for Land Commission Award 225, for land at Waikapū totaling 26.10 acres:

Enclosed I take the liberty to transmit to Your Excellency a verified copy of a deed for the land, which I cultivate at present, given me by Ch. Kanaina Esqr. with the consent of Her Highness the late Premier. The stipulations of the deed are of such a nature, that as a new order of things is impending, I cannot feel satisfied or safe, until I ensure that the land cannot be taken from me. I have the more reasons to be anxious, as I have expended all I had, to put the land in order, and it would be very distressing to me, if I had to leave it. I have always strictly adhered to the conditions of the writing, and shall certainly still in future endeavor to show, that I am not unworthy of the favor which I respectfully beg . . .

Copies of these two documents are in the possession of a contemporary Cornwell descendant, Mark R. Walker.

In a column by Mrs. D.P. Penhallow titled "Waikapu, Maui: a Sketch" in the February 3, 1926, *Maui News* is more detail.

As with much of early Hawaiian history, so it is with Waikapu. Definite dates of events are hard to fix and the sequence of them not always clear, but as Waikapu was first in this section of Maui in war so, evidently, was it the first to produce sugar and cattle. A Spaniard named Antone Catalina made cane syrup at Waikapu in 1823, which was apparently the beginning of the sugar industry in the Wailuku District. James Louzada came over from Waimea, Hawaii, a number of years later, established a cattle business, opened a store and began cultivating cane on a large scale. The date is not definite but he erected a stone mill with oxen for motive power on the premises known as Hale-pa-laha-laha at the interest in Waikapu Valley, located on its northern slope. It is reputed that Louzada's Hawaiian wife, Kapu, lost an arm while tending the mill.

Following this mill a stream driven one was erected in 1862 near the present road to Lahaina, just north of the stream crossing. . . the store referred to was the first in the district, people going from Wailuku to make purchases there. The store building was located on the lower corner of the Pia Cockett premises and remained as a landmark until a few years ago. The cattle industry flourished and also, many fine horses were produced, horseracing being a feature of Waikapu for years. . . . Aside



from its commercial aspect, there was much of romantic interest attached to Waikapu. Kalalaua spent some of his leisure time with the Cornwells, who kept open house, and it has been featured in song and story. Its romance was of the past, which belonged to its day and age. Of this there are but slight reminders evident only to those who can picture it as it was.

Louzada's acquisition of additional land in 1862 apparently was unplanned, simply a response to a promising opportunity. According to an article in the April 9, 1864, *Pacific Commercial Advertiser*:

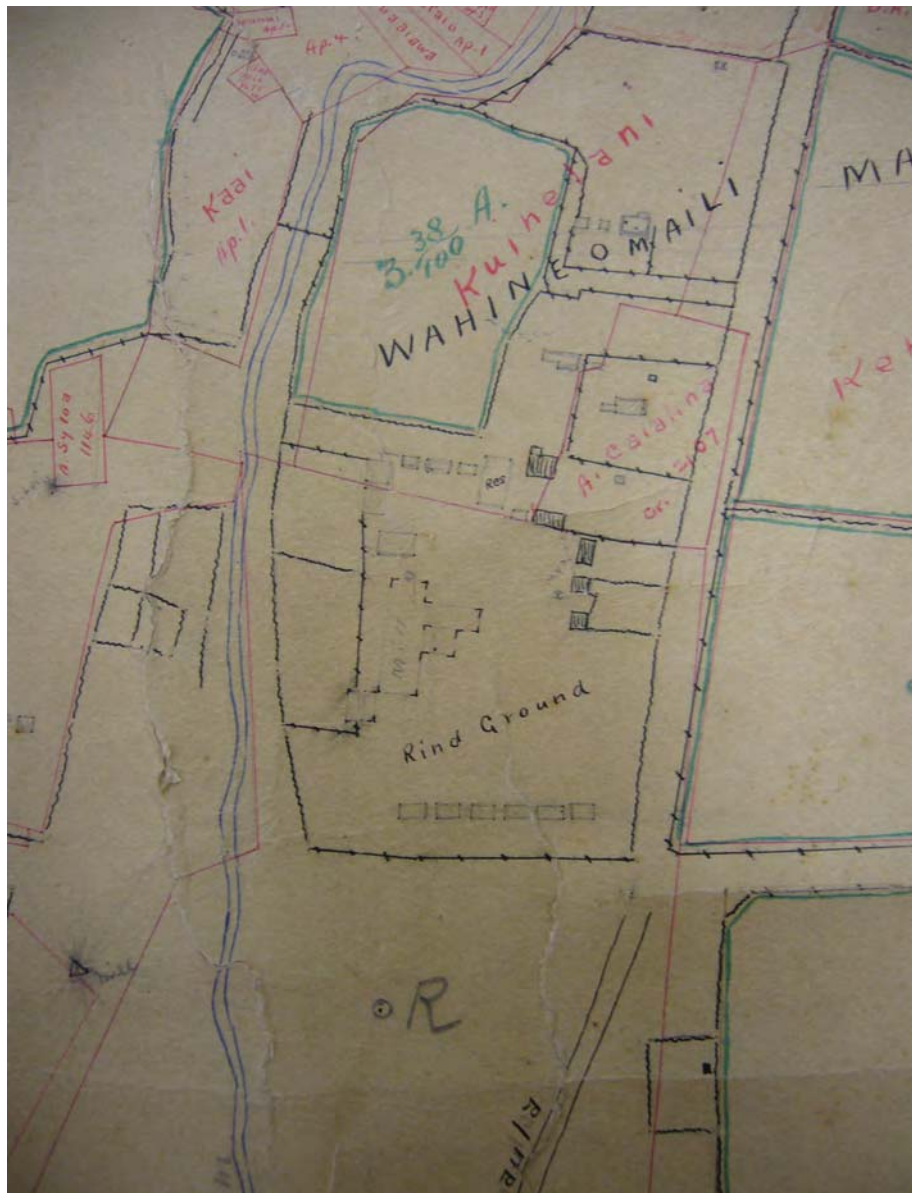
Mr. James Louzada, happening to be in the vicinity, heard that there was to be an auction sale of the estate of the late John Richardson, and attracted by curiosity attended it. A good frame house and lot was put up for sale, but nobody wanted it. Seven hundred dollars only were bid, and Mr. L. thinking it a safe investment, took it at a few dollars over that sum, and for a few hundreds also purchased the taro lands belonging to the estate. Thus, without any intention of buying when he went to the sale, he found himself possessed, for the paltry sum of \$1,200, of a good dwelling house and some of the finest cane land on the island. He was not long in finding out that he had located over a mine destined to be as productive as a gold mine, nor in making his plans for the future. Associating himself with his brother-in-law, Henry Cornwell, Esq. [married to Louzada's sister Adelia], formerly of this city [Honolulu], he set to work to erect a mill and commence the manufacture of sugar, the natives and foreigners in the village promising to plant cane on their own lands. Two years have passed since the lucky purchase of this property occurred, and already he has sent to market some 400,000 pounds of sugar, worth perhaps \$25,000, though his mill has been in operation only about eight months.

The writer said there had been a remarkable change in the village of Waikapū since "we last rode past it" four years ago, when "there was nothing here to attract a stranger--a few thatch houses with one or two frame buildings, scattered among taro patches were all that one would notice in passing. Now a tall chimney attracts for miles the eye of the traveler and the dark smoke, growing up in clouds from its top, tells plainly of the industry, capital and enterprise that center here."

The writer told of visiting the mill to meet:

"Mr. Cornwell and his son William, who were hard at work turning cane juice into gold. The mill consists of a large building in the form of an L, on a hill slope, which facilitates the work very much. The machine is driven by a 36 horse engine, built by Mr. Henry Hughes of this city, who also constructed all the machinery used on this plantation. Everything about the mill is of Hawaiian manufacture, which can be said of but a few sugar manufacturers on the islands. The capacity of the mill is about four thousand pounds of sugar per day, though, by working nights, which is sometimes done, five thousand pounds can be got off. To obtain this product, Messrs. Louzada and Cornwell employ about seventy field and mill laborers, of whom forty are females, who are engaged on account of

the scarcity of men. . . .The land at Waikapu consisting of a gentle slope from the base of the mountain to the road, irrigated by the Waikapu river, is admirably adapted to sugar culture, producing, when well cared for, very heavy crops. The extent of land suitable for cane is limited only by the amount of water obtainable for irrigation. The proprietors of the mill have purchased land largely since they began operations and have now some 200 acres. They purchase cane from the natives, paying generally about one hundred dollars an acre for the standing crop, taking it off at their own expense. The sugar boiling department is under the charge of Wm. Cornwell, who possesses all the activity, industry and perseverance of his father and uncle. The high reputation of the sugar made at this mill is the best recommendation that a sugar-boiler can wish.



Old map of Waikapu Plantation shows mill site near Waiko Road intersection.  
Map source: DLNR State Survey Office

About a mile back from the mill, and on an elevation overlooking the whole country, stands the house of the late Mr. Richardson, the sale of which we have already referred to, now occupied by Mr. Cornwell and his family. It has been much improved, by additions, and forms one of the pleasantest residences we have ever seen. From its front verandah, a most beautiful scene is had--the village and mill buildings, the plain, Kahului Bay on the left, Kalepolepo Bay at the right, and the whole of Mt. Haleakala, with its villages on its side--are all in view. Were we to select a site for a country home, it would be this charming spot in Waikapu, and we congratulate Mr. and Mrs. C. and their family on possessing so healthy and delightful a home, where in and around the dwelling every comfort and luxury is provided. The traveler, who enjoys, as did we, the pleasure of a short sojourn here, and an acquaintance with those who show such refinement and taste, and who welcome visitors with such cordial hospitality, will leave their pleasant home with many regrets. Such residences and such homes we trust will spring up in every district.

What a change has taken place in Waikapu within two years! Where were a few taro-patches, half cultivated by lazaroni, a village has sprung up, with its sugar mill and buildings, its waving cane fields and busy laborers, scattering industry, thrift and contentment everywhere. Here where a few hundred dollars worth of taro were formerly raised, forty thousand dollars' worth of sugar may now annually be made and sent to market.

A planter's life, however, is no playspell. Messrs Louzada and Cornwell and every one else engaged on the estate work hard -- up early in the morning, and late at night, they earn every dollar they receive. Although the first outlay in commencing a plantation is heavy -- and few estates are set in operation with less than forty or fifty thousand, and from that to one hundred thousand dollars -- yet when once completed, the income promises to be large, and on most plantations will amount to at least twenty-five per cent on the investment, when well managed. This estate, thus far, has cost its proprietors nearly fifty thousand dollars and it is safe to say that it will produce annually at least forty thousand dollars, at present prices of sugar."

This account, in addition to providing a detailed glimpse of life at Waikapū in 1864, also offers insights into attitude and understanding at the time. Clearly, sugar plantations were welcomed as the economic future of the Islands. The use of the word "lazaroni" in relation to Waikapū taro farmers now seems insulting; *Webster's New World Dictionary* defines lazaroni as "any of the class of homeless beggars formerly common on the streets of Naples." The writer apparently has no understanding of the fact that "a few taro patches, half cultivated" may be the remnants of a highly productive farming community devastated by imported diseases in previous decades. Or perhaps the "few taro patches" were all that was left after the destructive 1858 waterspout described above. This 1864 writer's view is in contrast to that of Gorham D. Gilman, who wrote in 1843 of a tour of Maui: "The country around Waikapu and

approaching Wailuku is quite fertile and well cultivated, and formed a pleasing contrast to the arid plain below." Gilman reported being greeted by friendly natives who offered "a tumbler of fine cool water" and "a stick of Sugar Cane in our hands to eat on the way." (MHS ms. collection)

The new plantation established a mill at the Kīhei-mauka corner of West Waiko Road, which may be seen on the old Waikapū Plantation map. The map also shows another mill east of that site and on the other side of the stream; it seems unlikely that this is the earlier mill set up by Louzada, because a *Maui News* column from 1926 (quoted below) sites the first mill at Halepalahalaha, which is higher up the hill. The site of the Waikapū Plantation mill yard continued as stables until it was subdivided for housing starting about 1955. (Chumbley) The old smokestack "which marked the site of the original Waikapu sugar mill," toppled in a Kona gale in 1918. (Silva: 32)

Not all was rosy in the early years of the Waikapū Plantation. One problem arose from the establishment by Louzada and Cornwell of a road that is now known as Old Waikapū Road. Thomas W. Everett, a Waikapū resident who served as sheriff of Maui for many years, reported in an 1866 letter:

I got Mr. Alexander to survey the Crownenburg Lot last week and likewise the Nowlien Lot Boundaries. He found that the disputed road was no part of it on the "Nowlien" land now owned by Cornwell but that after the road left the Crownenburg land it ran through Govt. land all the way into the main road leading from Wailuku to Lahaina. He found that Louzada and Cornwell had fenced in quite a piece of land into their pasture from the main road up to what I have marked on enclosed sketch Pohakoi. . . this stone "Pohakoi" was decided by the parties who settled the boundary question in 1847 or 8 to be the boundary between Wailuku and Waikapu. Consequently the Nowlien lot is in Wailuku. Cornwell has lately bought the Crownenburg lots, but Daniels has possession for three years to come. . . . there is no doubt that the parties knew of this piece of land when it was fenced up but it was probably thought it would not be missed. . . (MHS files)

This road still remains, though it is little used today. According to Avery Chumbley, the road once continued more parallel with Honoapiʻilani Highway, rather than turning down toward the highway around Kuikahi Drive. Chumbley thinks it was realigned some time around the 1930s. He is not sure why this happened, but says until that time the road was the main access to the hundreds of *kuleana* properties scattered throughout the valley.

A much bigger issue was the unclear boundary between Waikapū and Pulehunui. Much of the land of Waikapū was part of the one-twentieth of all unappropriated public lands set aside to produce income for school purposes by a law established in 1850. "During the next few years considerable acreage was sold to procure money for educational purposes." (Wist: 60) "In 1875, the Board of Education sold at auction the 'Land known as the Ahupuaa of Waikapu, saving grants hitherto made within the said ahupuaa, or sales by the Board of Education,' to Henry Cornwell, from the Government issuing a royal patent in the above terms without survey or statement of area. Mr. Cornwell afterward sold to Claus Spreckels and others the part known as Waikapu Commons." (Sterling: 95) This 1878 sale was of an undivided half interest in 16,000 acres of the Waikapū Commons from Henry Cornwell to Spreckels, who was in the process of acquiring land and water rights in order to begin what would become Hawaiian Commercial & Sugar Company. (Adler: 36)

This land sale was to result in problems within the next few years, as the owners of the adjacent *ahupua'a*. The original sale to Cornwell had been based on a map, with no survey or notes and just an estimate of the acreage. For \$15,050, Cornwell received "all that tract of Kula land commonly known as the Waikapu commons, extending on both sides of the Waikapu main road and embracing all the said commons land known to belong to the Hawaiian Board of Education." Subsequent to the sale, the owner of Pulehunui went to court to claim that the boundaries were incorrect. Based on testimony by "the oldest native residents" of the area, the claim was upheld, and Cornwell was "ejected." Having already sold it, he was obliged to repurchase it from the owner of Pulehunui at a cost of \$7,500. Cornwell then went to court to claim that the Board of Education was responsible for this problem, and the court agreed. (Supreme Court of the Hawaiian Islands)

Meanwhile, the ownership of Waikapū Plantation had changed in 1877, with the original proprietor retaining an interest but selling the remainder to his son William H. Cornwell and William's brother-in-law, George W. McFarlane. At this point, Waikapū Plantation could produce 1,000 tons annually, and if water could be brought in, it would produce 2,000 tons of sugar. (Apparently this need would be met by the first artesian well on the outside islands, drilled in 1881 at Waikapū Plantation by the McCandless brothers.) Ownership changed yet again, with the partnership known as the Waikapū Sugar Plantation Company dissolved by mutual consent to be continued thereafter by William Cornwell and George McFarlane under the firm name of Cornwell & Company. (Silva: 17, 19) Louzada had died in 1869, and Henry Cornwell was getting on in years and would die in 1886 at the age of 70. (familysearch.org)

In 1889, the *Pacific Commercial Advertiser* reported the sale of W.H. Cornwell's half-interest in the Waikapū Plantation to Spreckels. "The remaining half is held by G. W. MacFarlane and Company and probably will be purchased by the same party. Major Cornwell will continue to be the manager. . . the purchase of this plantation by such a shrewd, farseeing capitalist as Colonel Spreckels, indicates that he has firm faith in Hawaiian sugar property, and that the proposed changes in the American tariff will not ruin our sugar planters, croakers to the contrary notwithstanding," the paper said. (Silva: 22) The next year, MacFarlane sold the other half interest to Spreckels. In 1894, Wailuku Sugar Company purchased Waikapū Sugar Company, with 2,500 shares at \$42 per share. The first crop of the combined Wailuku, Waihee and Waikapū plantations in 1895 produced 4,939 tons of sugar. The survey for a railroad line to Waikapū had just been completed--this line would be 20,800 feet in length. (Silva: 24) Over the next 20 years or so, Wailuku Sugar Company would also buy up another operation, Waikapū Agricultural Company; it is not clear at this point who or what constituted this company. (Silva: 29-32)

### **Colonel Cornwell**

Through the late 19th century, the Cornwell residence was a center of hospitality enjoyed by none other than King Kalākaua, as William Henry Cornwell's involvement in the affairs of the kingdom grew. Cornwell, born about 1842 in Brooklyn, New York, came to the Islands with his parents about 1857, according to his 1903 obituary in *Paradise of the Pacific*. Cornwell married Blanche MacFarlane, sister of G.W. MacFarlane, and the two had three children before her death at the age of 27. The obituary said that Cornwell:

" . . . grew up in the cane fields and was made manager at an early age. Throughout his whole life he was one of the most successful planters in the group. He became quite intimate with Claus Spreckels when the latter launched his great plantations on Maui, and through business dealings



with the gentleman afterwards, which involved the acquisition of water rights from the King, he got well acquainted with his Majesty, who made him a member of his staff. In 1890 he was elected noble and ever after that time was prominent in politics. On March 14, 1891, he [and others were] appointed by Queen Liliuokalani as members of her personal staff with the rank of Colonel. At the time of the overthrow of the Monarchy he was Minister of Finance in the Queen's Cabinet. After annexation Colonel Cornwell allied himself with the Democratic Party, being at the time of his death member of the National Democratic Committee. No one in the islands had a keener relish for honest racing sport than he. As an importer of superior breed of horses he was instrumental in improving much island stock for racing and general purposes." (*Paradise of the Pacific*, December 1903: 69)

Family stories shared by Cornwell's great-grandson, John Cornwell Walker of Honolulu, tell of the two-story house acquired in the original purchase of the Richardson state, its location still marked by two Norfolk pines that stood on either side of the walkway, with another pine a quarter-mile away at the site of the stables. Cornwell raised horses to race in Honolulu, and once took a winning steed to a downtown hotel and poured champagne over the horse. The king would come to visit, landing at McGregor Point, where he would be joined by other riders for a parade to Waikapū. He would stay for perhaps a week of parties and poker games, then depart, accompanied once again by an escort of horsemen. (Walker)



Two Norfolk pines mark the former site of the Cornwell home. Engledow photo 7/09

Some say that the character of "Uncle Bill Calhoun" in Armine von Tempski's *Born in Paradise* is based on that of William H. Cornwell. Though much of the story beginning on page 64 is obviously

fiction, it may be that some of the descriptions apply to the real Waikapū and the real Cornwell.

"A short distance from the sheer walls of rock which made a sort of awesome portal [to the valley], a sprawling house sat on a low hill top surrounded by Norfolk Island Pines. Purple mango trees and dark pointing fingers of Italian cypresses flanked brick walks which leaped down through terraces of gay flowers in wide steps to meet the road. A feeling of excitement poured from the house though no people were visible . . ."

Inside the house, in "a spacious room filled with pictures of racehorses and women," Uncle Bill Calhoun lay, obviously ill. But "I sensed he was a great figure. His conversation was punctuated with damns, shouts, and 'Let's hoist another!' Opened-armed, open-hearted, he seemed to embrace life as it came toward him."

A photograph of Colonel Cornwell published in the Wailuku Sugar Company's Centennial history shows a man who might very well have been this hearty, lively character, though the real Cornwell did not die a lingering death tended by a lovely young *hapa-haole* woman, but died suddenly following an attack of angina pectoris at his home in Waikapū, having married Josephine Colvin a year earlier. William H. Cornwell was buried in Honolulu, but a Cornwell family graveyard remains on the property in upper Waikapū owned by Avery Chumbley, and Chumbley says other graves that were next to the Piltz house above Old Waikapū Road (near the site of the old Cornwell house) were exhumed. These may have included the grave of George E. Richardson, brother of Judge John Richardson, who was buried in Waikapū in the "family vault."



Col. William H. Cornwell. Source: Wailuku Sugar Co. Centennial

Cornwells maintained their presence in Waikapū for at least a few years; William H. Cornwell Jr. opened a butcher shop called the Waiohuli Market in Waikapū in 1906. He left in 1907 to establish a business on the mainland. And at least one contemporary family, the Vidas, is of Cornwell ancestry.



## Wailuku Sugar

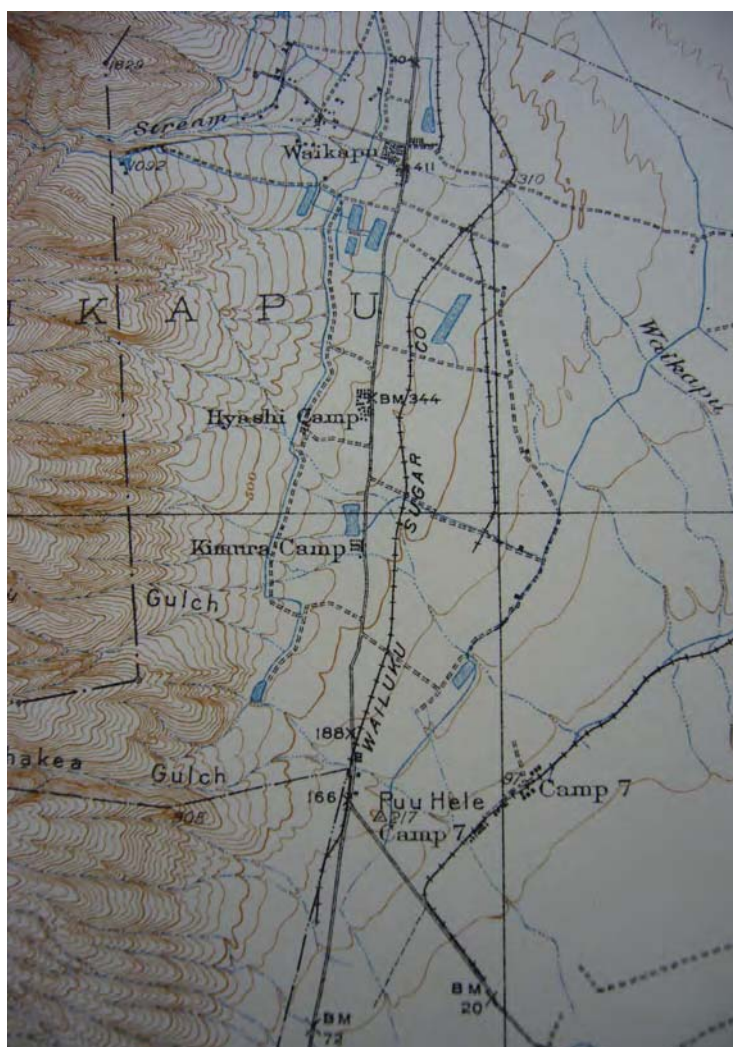
The sale of Waikapū Sugar Company to Wailuku Sugar Company brought it into a much larger operation and into the plantation lifestyle often remembered today, with workers of various ethnicities living in separate camps near their work sites. Apparently there was a camp at Waikapū village, which was enlarged in 1919 by bringing in six houses from Pu‘uhele Camp. That same year, a new dispensary was built at Waikapū. (Silva: 32) Old maps show two camps between Waikapū and Pu‘u Hele, one called Kimura Camp and one called Hayashi Camp. Graves in a small cemetery on East Waiko Road are almost all marked in Japanese, indicating that there may have been another ethnic Japanese camp nearby, but no such camp shows on maps consulted for this report. There are about 75 marked graves and more than 20 unmarked graves at this Waikapū Community Cemetery. (MHS)



Waikapu Community Cemetery. Engledow photo 7/09

The 1910 census enumerator noted specific areas as he filled in the names on each 25-line page for Census District 76, making it possible to estimate population at that time. Kimura Camp had about 60 residents; Hayashi about 100; Pu‘uhele Camp about 60; "Waikapu Plantation Camps" more than 200; "Waikapu Camp number one," 100; Waikapu Ranch Camp, 50; Waikapu Village about a dozen; "plantation camps," 50; and "Waikapu mauka camps," 50.

The 1920 count lists about 175 residents on Waikapū Road. The 1930 count lists 325 in Waikapū Village, 25 in Waikapū and an unclear number, at least 125, in Hayashi Camp.



1923 Ma'alaea Quadrangle map showing Waikapū with camps and railroads. Hawai'i State Archives

### School and Church

Old maps show the parcel on the Wailuku side of the Waikapū Protestant church as a school. Whether this is the same location as the missionary schools reported in the mid-1800s is not clear, but a current Waikapū resident, Zelig Rogers Harders, says school continued to be in session there at least through the early 1940s. Mrs. Harders was attending Kaunoa School when Pearl Harbor was attacked, and her parents decided to keep her closer to home and enrolled her in the one-room Waikapū schoolhouse. A few records on file at the State Archives in the Department of Education "Reports on Numbers and Nationalities of Pupils" mention the school. In 1890, F.R. Woolsey was principal, with 29 boys and 14 girls (all "native") plus two girls who were "half caste" in first through fourth grade. Most were aged six to 15; one was older than 15 years. (262-8-19) In 1911, Zelig Rogers (Mrs. Harders' grand-aunt) was a teacher. In the term ending March 31 of that year, there were 42 pupils but only 32 seats, all in first grade. The report said 16 were Hawaiian, five-part Hawaiian, 19 Japanese and one Chinese. Most were six or seven years old; two were 11 years old and beginning school for the first time. (262-9-39) Mrs. Harders says that when her grand-aunt was teacher, she was able to fool naughty boys who plotted mischief in Hawaiian, because she herself was part Hawaiian and fluent in the language. Miss Rogers later married Patrick "Pia" Cockett, who would become a member of the county Board of Supervisors.



Waikapu Church in 2009. Engledow photo 7/09

The Protestant church in Waikapū began in 1838. Its first building was erected in 1866. Records of church growth and change may be found in the Mission Houses Museum Library, which includes minutes of the Maui Presbytery and of the Hawaii Evangelical Association. Originally, this church was part of the Wailuku parish, which included Wailuku, Waikapū, Waihe'e and Waiehu. In the minutes of the Maui Presbytery for 1869, translated by H. P. Judd, a request by members of the Waikapū congregation that it be separated as an independent church was approved. In 1870, church elder J. Kamakele reporting on the doings of the church, and the church called a new pastor, W. Kaho'okaumaha (also spelled Ho'okaumaha).

Archives of the Hawaiian Evangelical Association provide annual statistics as well as occasional insights into the life of the church and the village. In 1871, a report from the Rev. W. Ho'okaumaha says "this is a small parish but rich (fertile). There are not many members of this church, for they are a small family." Religious meetings were held on Wednesdays, Saturdays and Sundays and not many attended during the week because they were working for the sugar planters, but "on Sundays the Hawaiians set apart that day, so they assemble in larger numbers in the church. There are some unbelievers in the parish. In the camps of the '*haole*' are the chief doubters." The pastor said these would hide in their office or lie down and pretend to be sick when church members came to visit. The church building was in poor condition, and the congregation was preparing to raise a fund of \$2,000 to improve it. At this time, "there are two schools in the parish, the teachers of which are Protestant." There were a few Roman Catholics and Mormons. Apparently there was some sort of epidemic, because the pastor notes that "last March, 40 died." He was also concerned that hula teachers had come from Lahaina and unbelievers practiced the dance. "Some religious persons went to forbid that evil practice and it has ceased," and the teacher had gone back to Lahaina, he wrote.

In the Presbytery minutes of 1876, the minister reported "great activity of the church at Waikapu in rebuilding their edifice."

The statistical tables for 1870-71 shows 197 members in good standing. By 1887-88, there were only 56 members, with the Reverend S. Kaili in charge. The statistical report for 1889-90 shows that



Wailuku and Waikapū were under the leadership of the Reverend O. Nawahine, with a total of 94 on the membership rolls. Consolidation continued--in 1897-98, Wailuku, Waikapū and Honuaʻula were led by the Reverend S. Kapu, with a total of 187 congregants.

In 1909, the Maui News reported that the Reverend Lincoln Benjamin Kaumeheiwa had been invited to co-pastor with the Reverend R.B. Dodge of Kaahumanu and Waikapū churches; he had been in Hana and was "a good preacher and has a good voice for singing," the newspaper said. In 1918, he was installed as pastor of Waikapū and Puʻunene churches. Church membership continue to dwindle, and by the 1940s a supply pastor preached to 27 members. In 1957, Waikapū, still listed as a "Hawaiian church," had an average attendance of 10 and was "yoked" with Kahului Union. By 1958, the church is no longer included in the annual statistical reports.

St. Joseph Mission, on Honopiʻilani Highway, served the Catholic community of Waikapū from 1900 (*Pioneers of the Faith*: 327) until it burned down in February 1997. Today it is a well-kept shrine to St. Joseph, with some graves, only three of which are marked. They are the graves of Hanna Sylva, wife of Antone, who died October 13, 1885, and of Mary Ann and George Maxwell (died 1931 and 1930).

## **World War II**

Like others around Hawaii, the people of Waikapū endured martial law and pitched in to prepare for possible enemy attack. There also was new construction in the village with the establishment of Waikapū Station Hospital. An article in the June 17, 1942, *Maui News* describes its formal opening at a banquet held in a hospital's mess hall.

The hospital is considered an example of the speed with which defense construction has been accomplished on the island, in as much as it was not completed until last January, and now includes almost complete facilities for operation of a general hospital. . . . Major J. Mulligan asserted that the hospital could not have been built without the combined efforts of individuals present at the banquet, and asserted that he appreciated the neighborliness and assistance that had been given on the project. Staff of the hospital consists of eight physicians, ten nurses and 21 enlisted men. Facilities installed include four wards, complete surgery, laboratory, dentistry office, X-ray machine and darkroom, beside large storerooms, mess hall and quarters for the officers, nurses and enlisted men. Wards at the new hospital are so constructed that emergency wards may be organized on the ground beneath them. The surgery is located in the old Waikapu church, from which the steeple has been removed to make it less conspicuous. Now serving as a nurses cottage is the old parsonage. {According to Avery Chumbley, this site was the triangular parcel at the junction of Waiko and Old Waiko roads.]



Steps at junction of Waiko and Old Waiko roads may have led to WWII nurses cottage.  
Engledow photo 7/09

An article in the August 18, 1923, *Maui News* tells of the formation of a volunteer company made up mostly of men from Waikapū.

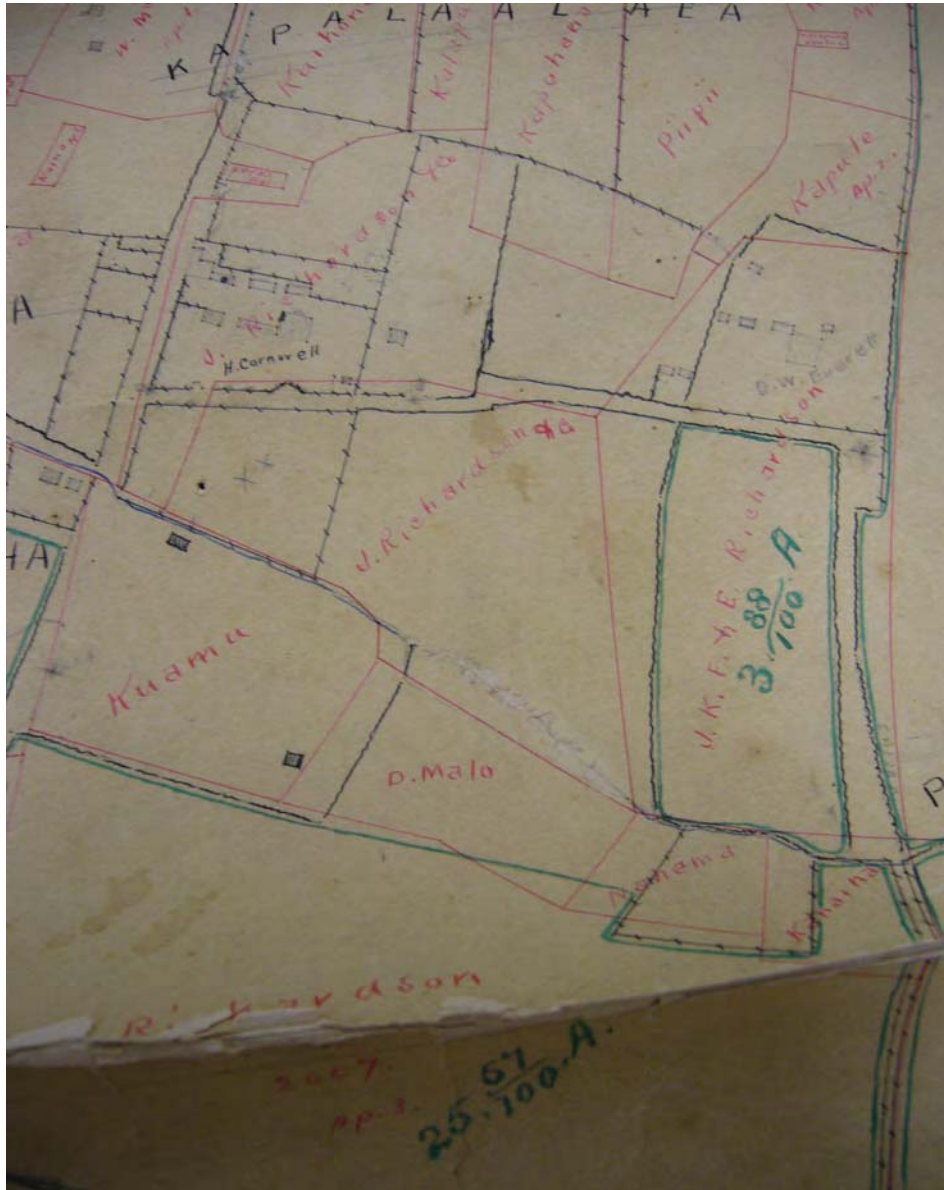
Proficiency in the use of the bolo knife, with which the majority of its members are armed, and skill with small arms and in hand-to-hand combat is the pride of Co. E. 2nd Bn., Maui Volunteers.

The company, sponsored by the Wailuku Sugar Company, comes largely from Waikapu, where it has its headquarters, and consists largely of men working for the Wailuku Sugar Co. Most of its members are Filipino nationals.

The company is commanded by Capt. Wayne Richardson, Jr., Wailuku Sugar Co. division overseer and a graduate of Stanford University, with 1st Lt. James A. Tokunaga, former Hawaiian National Guardsman and highway maintenance foreman for the Territorial department of public works here, as executive officer and second in command.

Approximately 130 men answered the call on May 10, 1942, which deemed a volunteer company necessary at Waikapu. After considerable organizing and fundamental training, the company was under way to becoming a top-notch outfit. . . . Training primarily has been with small arms. Considerable effort and time also has been spent in training on hand-to-hand combat, bayonet defense and the use of bolo knives. Most members of the company are equipped with a bolo knife made by themselves and each man owns a hunting knife. . . . Weekly drills are

conducted from 8:30 to noon each Sunday at the Waikapu ball park. The public is invited to witness these drill periods and see the men who volunteer their time, in addition to fulfilling their civilian jobs, for the defense of Maui.



Section of Waikapu Plantation map showing Kuamu and David Malo kuleana, plus Richardson and Cornwell lands  
DLNR State Survey Office

### Waikapu Residents

Waikapū has over the years at home to many families whose names are familiar around Maui, including the Sylvas, Cocketts, Vidas and Maxwells, who are descendants, according to Charles K. Maxwell, of Kealiwahineholololio, a high chiefess who once controlled all the lands from Waikapū to Ma‘alaea. (BWS 12/4/2002)

One of the oldest families in Waikapū is descended from Kuamu, whose *kuleana* was high on Waiko Road, which was bounded on one side by David Malo and on others by John Richardson. The great-great-great-grandson of Kuamo is Glenn McLean, who lived on the property for many years beginning in 1973. McLean is the family historian, having spent much time listening to the stories of his elders as he was growing up, and he has studied history formally in recent years, learning Hawaiian and digging into archival records. McLean's grandfather Kalā Pelekai grew up on the Kuamu kuleana. His grandmother Lu'ukia Pelekai grew up on land mauka of the Maui Tropical Plantation belonging to her stepfather, Ka'a'a; there are several family graves on that parcel. Kalā and Lu'ukia married in 1916 and moved to Hāna, where Glenn McLean now lives. McLean's mother also grew up in Waikapū, but now lives in Hāna as well.

McLean said Kuamu was awarded five *apana*--three for *kalo*, one for *wauke* and one in Keokea for sweet potatoes. The Waikapū property as it now exists has shrunk by about two-thirds from the original dimensions of about 3.5 acres shown on early maps. The property has limited access to water from the Waikapū stream, through a 1-inch pipe that waters fruit trees and the native plants grown by McLean's son Luke, who now lives on the property. McLean has applied for a Commission on Water Resource Management surface water use permit in order to re-open old *lo'i* on the property.

In a brief, informal conversation, McLean shared a few tidbits of Waikapū history. Some of his relatives were among many who left the village in the 1930s to move to Moloka'i and take up homestead lands there. Eddie Rogers, whose family still lives in Waikapū, once leased 5,000 acres between Waikapū and Ma'alaea for his cattle; as a young man, McLean worked for him fixing fences. Near the junction of Waiko and Old Waiko roads was a store run by Ah Fat Soong, where Rogers and other residents loved to go for bread and coffee in the morning. Another old family is the Vidas (descendants of Kate Louzada Cornwell and Daniel Rodrigues Vida, who came from Chile and married Kate in 1868). (familysearch.org) A grave on their property belongs to a Cockett, perhaps Charles, the first person of that well-known Maui name to come to the island.

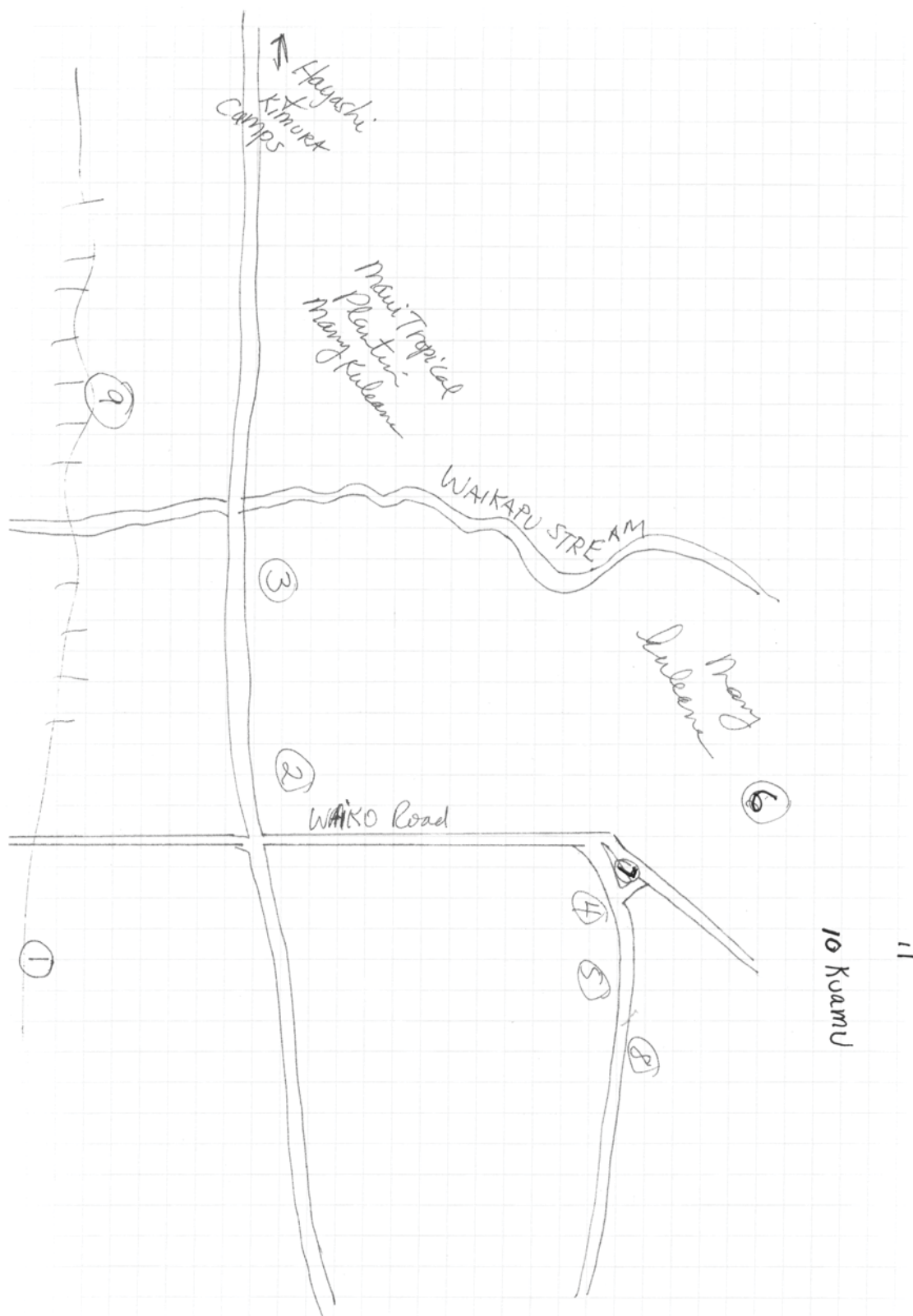
Waikapu also has spawned some famous individuals, beginning with earliest recorded history. The early Hawaiian evangelist known as Blind Bartimeus was born in Waikapū about 1875 and was a noted hula performer and drummer for Hawaiian royalty. (Bingham)

More recently, it is the hometown of the late Shin'ichi Suzuki, a world-class teacher and practitioner of aikido. Suzuki was born in 1917 in Waikapū, the first in a family of ten children whose father immigrated from Japan to work in the cane fields. (Curtis)

\* \* \* \* \*

Author's note: Waikapū clearly was a vital and important community in Maui's history, and its story as presented here could be greatly expanded. Due in part to time constraints, this report is based almost entirely on documentary resources, with few interviews of contemporary Waikapū residents (who are putting together their own oral history). Stories told by residents and descendants of former residents would fill in gaps and perhaps correct errors or misperceptions found in this report. The author hopes that this report turns out to be the first draft of a comprehensive history of Waikapū.





Engledow map 7/09

### Approximate locations of various sites mentioned in A History of Waikapū

1. Waikapū Community Cemetery.
2. Site of 1862 Waikapū Mill, later Wailuku Sugar stables area. This was subdivided starting 1955.
3. Old Catholic church that burned in 1997
4. Old Congregational church. Turned into a surgery during WWII; now a private residence.
5. Old school site, closed sometime after early 1940s.
6. Many kuleana on Avery Chumbley's land, and some Cornwell graves.
7. WWII nurses cottage
8. Old Waikapu Road, created in 1860s, was much-used access route between Wailuku and *kuleana* in the area.
9. Plantation railroad in this approximate area.
10. Kuamu *kuleana*
11. Cornwell home

### Sources Cited for Waikapū Historical Documentary Research

Adler, Jacob. *Claus Spreckels: The Sugar King in Hawaii*. Honolulu: University of Hawai'i Press, 1966.

Ashdown, Inez MacPhee. *Ke Alaloa O Maui*. Wailuku: Kama'āina Historians, 1971.

Bartholomew, Gail. *The Index to the Maui News, 1900-1950*. Wailuku: Maui Historical Society, 1985.

Bingham, Hiram. *Bartimeus, the Blind Preacher of Maui*. Pamphlet at Maui Historical Society, AR44

Board of Education records at Hawai'i State Archives: General Reports 1841-1842, School Agents' Reports 1852, and Reports on Numbers and Nationalities of Pupils 1890, 1911. Series 262.

Board of Water Supply Special Meeting. Accessed 7/27/09 at <http://www.co.maui.hi.us/archives/121/min021204sp.pdf>

Chumbley, Avery. Personal communication, 6/30/09 and 7/02/09.

Curtis, Christopher. *Shin'ichie Suzuki Sensei*. Accessed 6/22/09 at <http://www.aikidojournal.com/article?articleID=278>

Department of Commerce and Labor--Bureau of the Census. *Census of the United States, 1900*,

1910, 1920. Accessed via Ancestry.com 6/24/09.

Desha, Rev. Stephen L. *Kamehameha and His Warrior Kekūhaupi'o*. Honolulu: Kamehameha Schools Press, 2000.

Everett, T.W. Letter to F.W. Hutchison. On file at Maui Historical Society, AR66.

Familysearch.org, accessed 7/24/09 at  
[http://www.familysearch.org/Eng/Search/AF/individual\\_record.asp?recid=47268815&lds=0&frompage=99](http://www.familysearch.org/Eng/Search/AF/individual_record.asp?recid=47268815&lds=0&frompage=99)

Fornander, Abraham. *Collection of Hawaiian Antiquities and Folk-lore*. Accessed via Ulukau.org 7/1/09

Girvan, James W. *The Master Planter*. Honolulu: Press of the Hawaiian Gazette Co. Ltd., 1910.

Gorham, Gilman D. *A Journal of a Tour of Maui in the Year 1843*. Ms. copy in Maui Historical Society files, AR 67.

Handy, E. S. and E. G. with Mary Kawena Pukui. *Native Planters in Old Hawai'i; Their Life, Lore, & Environment*. Honolulu: Bishop Museum Press, 1972.

Harders, Zelig Rogers. Personal communication. 7/27/09 and 7/29/09

Hawaiian Mission Children's Society (HMCS). Mission Houses Museum includes Wailuku Station report excerpts, minutes of Maui Presbytery and church reports of Hawaii Evangelical Association.

*Ka Lama Hawaii*. Accessed via Ulukau.org 6/26/09.

Kamakau, Samuel Mānaiakalani. *Ruling Chiefs of Hawaii*. Revised Edition. Honolulu: Kamehameha Schools/Bishop Estate, 1992.

Kame`eleihiwa, Lilikalā. *Native Land and Foreign Desires: Pehea Lā E Pono Ai?* Honolulu: Bishop Museum Press. 1992.

Kuykendall, Ralph S. *The Hawaiian Kingdom, Vol. I*. Honolulu: University of Hawai'i Press, 1938.

Kyselka, Will and Ray Lanterman. *Maui: How It Came to Be*. Honolulu: University of Hawai'i Press, 1980.

Maly, Kepā and Onaona. *Wai O Ke Ola: He Wahi Mo'olelo No Maui Hikina*. Kumu Pono Associates, 2001. Includes excerpts from J.S. Green letters published in *The Polynesian*.

*The Maui News*. Wailuku: Maui Publishing Company, 1900-1950.

McLean, Glenn. Personal communication, 7/25/09.

*Pacific Commercial Advertiser*. Microfilm at Hawai'i State Archives, accessed 7/14/09.

*Paradise of the Pacific*. Microfilm at Kahului State Public Library, accessed 6/24/09.

Puku'i, Mary Kawena. *ʻŌlelo Noe`au: Hawaiian Proverbs and Poetical Sayings*. Honolulu: Bishop Museum Press, 1983.

Pukui, Mary Kawena, Samuel H. Elbert and Esther T. Mookini. *Place Names of Hawaii*, 2nd ed. Honolulu: The University Press of Hawai'i, 1974.

Purnell, Nanette Napoleon. *Island of Maui Cemetery (Map & History) Directory*. Wailuku: Maui Historical Society, 1990

Schmitt, Robert C. *The Missionary Censuses of Hawaii*. Honolulu: Bishop Museum, 1973.

Schoofs, Robert, SS.CC. *Pioneers of the Faith*. Honolulu: Louis Boeynaems, SS.CC., 1978

Sterling, Elspeth P. *Sites of Maui*. Honolulu: Bishop Museum Press, 1998.

Silva, Alvin K. *Wailuku Sugar Company Centennial, November 1862-1962: A Century of Progress in Sugar Cane Cultivation*. Wailuku: Wailuku Sugar Co., 1962.

Supreme Court of the Hawaiian Islands. *Reports of Decisions, 1882*. Accessed 7/8/09 at <http://books.google.com/books?id=9cgDAAAAYAAJ&pg=PA541&sig=-yMwsXmpTwPG2STV0tm1iUIVZx8>

Von Tempski, Armine. *Born in Paradise*. Woodbridge, Conn.: Ox Bow Press, 1985 reprint.

Walker, John Cornwell. Personal communication, July 24, 2009.

Wist, Benjamin O. *A Century of Public Education in Hawaii*. Honolulu: The Hawaii Educational Review, 1940.

**APPENDIX B**  
**Botanical and Faunal Surveys**

**BIOLOGICAL RESOURCES SURVEY**  
**for the**  
**WAIKAPU COUNTRY TOWN PROJECT**  
**WAIKAPU, WAILUKU DISTRICT, MAUI**

**by**

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**February 2013**

**Prepared for: Waikapu Properties LLC**

**BIOLOGICAL RESOURCES SURVEY  
WAIKAPU COUNTRY TOWN PROJECT  
Waikapū, Maui, Hawaii**

**INTRODUCTION**

The Waikapū Country Town Project lies on approximately 520 acres of land on the southeast slopes of the West Maui mountains just south of Waikapū Stream and the village of Waikapū (see Figure 1). The project area straddles the Honoapiʻilani Highway and includes the Maui Tropical Plantation facilities and surrounding agriculture and pasture lands, TMKs (2) 3-6-02:003 por., (2) 3-6-04:003 and 006 por. and (2) 3-6-05:007.

**SITE DESCRIPTION**

The project area includes about 70 acres that comprise the facilities of the Maui Tropical Plantation. This is surrounded by 50 acres of vegetable farm. On the slopes above this are 150 acres of cattle pasture, and below the highway are 240 acres in sugar cane production. Elevations range from 250 feet at the lower end up to 800 feet at the top of the pastures. Soils are all deep, well-drained alluvial soils which are classified in the Wailuku Silty Clay, Iao Clay and Pulehu Cobbly Clay Loam soil series (Foote et al, 1972). The vegetation consists of a great variety of ornamental plant species on the grounds of the Maui Tropical Plantation, a diversity of vegetable crop plants, pasture grasses and dense fields of sugar cane. Annual rainfall ranges from 25 inches in the lower end up to 30 inches at the top (Armstrong, 1983).

**SURVEY OBJECTIVES**

This report summarizes the findings of a flora and fauna survey of the proposed Waikapū Country Town Project which was conducted during February 2013. The objectives of the survey were to:

1. Document what plant and animal species occur on the property or may likely occur in the existing habitat.
2. Document the status and abundance of each species.
3. Determine the presence or likely occurrence of any native flora and fauna, particularly any that are Federally listed as Threatened or Endangered. If such occur, identify what features of the habitat may be essential for these species.
4. Determine if the project area contains any special habitats which if lost or altered might result in a significant negative impact on the flora and fauna in this part of the island.



# **BOTANICAL SURVEY REPORT**

## **SURVEY METHODS**

A walk-through botanical survey method was used to cover all of the diverse habitats represented across the entire project area. The riparian strip along Waikapū Stream was examined more intensively because of its special habitat. Specifically excluded from this survey were the ornamental plants in the Maui Tropical Plantation landscape and the numerous crop plants in the farm area.

## **DESCRIPTION OF THE VEGETATION**

The vegetation, excluding the purely ornamental plants and vegetable crop species, was still quite diverse. A total of 130 plant species were recorded during the survey. Seven species were found to be common within the project area: buffelgrass (*Cenchrus ciliaris*), Guinea grass (*Megathyrsus maximus*), sugar cane (*Saccharum officinarum*), smooth rattlepod (*Crotalaria pallida*), cheeseweed (*Malva parviflora*), 'uhaloa (*Waltheria indica*) and Java plum (*Syzygium cumini*). These species are found naturally in Hawaii as well as throughout the tropics nearly worldwide and are common.

Just 3 native species were found on the 520 acre project area: 'uhaloa, koali awahia (*Ipomoea indica*) and popolo (*Solanum americanum*). These species are found naturally in Hawaii as well as throughout the tropics nearly worldwide and are common.

Four plant species found during the survey were introduced over a thousand years ago by Polynesian voyagers: kukui (*Aleurites moluccana*), niu (*Cocos nucifera*), hau (*Talipariti tileaceum*) and 'ihi'ai (*Oxalis corniculata*).

The remaining 123 species were non-native plants including some useful forage grasses, but many are considered to be agricultural or roadside weeds.

The largest portions of this project area are agricultural fields in sugar cane production or are cattle pastures. The narrow Waikapū Stream corridor is another distinctive forested habitat type. The remainder of the project includes the highly manipulated ornamental landscapes of the Maui Tropical Plantation grounds and the ever-changing farm fields, the plant species of which were not deemed important to the purposes of this study and were not included in the plant inventory.

## **DISCUSSION AND RECOMMENDATION**

The vegetation along the project corridor is dominated by non-native species. Only three common indigenous species were found. No federally listed Endangered or Threatened plant species (USFWS, 2012) were found, nor do any plants proposed as candidates for such status occur on the property.

Waikapū Stream is a sensitive environment that needs to be carefully managed, although it is not a special plant habitat in that it has no Endangered or Threatened plants living in or around it. The stream is diverted for agricultural irrigation that contributes to it being periodically dry. Were it not diverted it would almost certainly be a perennial running stream with increased possibilities of harboring native species. As it is now no native plants were found within this riparian channel.

No wetlands occur on the site. Streams are technically not wetlands by federal definition. The remainder of the project area consists of dry upland habitat.

As a result of the above findings it is determined that there is little of botanical concern and that the proposed project is not expected to have a significant negative impact on the botanical resources in this part of Maui. No recommendations with regard to plants are deemed appropriate or necessary.

## **PLANT SPECIES LIST**

Following is a checklist of all those vascular plant species inventoried during the field studies. Plant families are arranged alphabetically within each of four groups: Ferns, Conifers, Monocots and Dicots. Taxonomy and nomenclature are in accordance with Wagner et al. (1999).

For each species, the following information is provided:

1. Scientific name with author citation.
2. Common English or Hawaiian name.
3. Bio-geographical status. The following symbols are used:

endemic = native only to the Hawaiian Islands; not naturally occurring anywhere else in the world.

indigenous = native to the Hawaiian Islands and also to one or more other geographical area(s).

Polynesian = all those plants brought to Hawaii during the course of Polynesian migrations.

non-native = all those plants brought to the islands intentionally or accidentally after western contact.

4. Abundance of each species within the project area:

abundant = forming a major part of the vegetation within the project area.

common = widely scattered throughout the area or locally abundant within a portion of it.

uncommon = scattered sparsely throughout the area or occurring in a few small patches.

rare = only a few isolated individuals within the project area.

SCIENTIFIC NAME	COMMON NAME	STATUS	ABUNDANCE
<b>FERNS</b>			
NEPHROLEPIDACEAE (Sword Fern Family)			
<i>Nephrolepis brownii</i> (Desv.) Hovencamp & Miyamoto	Asian sword fern	non-native	rare
THELYPTERIDACEAE (Marsh Fern Family)			
<i>Christella parasitica</i> (L.) H. Lev.	-----	non-native	rare
<b>CONIFERS</b>			
ARAUCARIACEAE (Araucaria Family)			
<i>Araucaria columnaris</i> (Forst.) J.D. Hooker	Cook pine	non-native	rare
<b>MONOCOTS</b>			
ALOEACEAE (Aloe Family)			
<i>Aloe vera</i> (L.) N.L. Burm	aloe	non-native	rare
ARECACEAE (Palm Family)			
<i>Cocos nucifera</i> L.	coconut	Polynesian	rare
<i>Dypsis lutescens</i> (Wendl.) Beentjie & Dransfield	golden-fruited palm	non-native	rare
ASPARAGACEAE (Asparagus Family)			
<i>Furcraea foetida</i> (L.) Haw.	Mauritius hemp	non-native	rare
<i>Asparagus plumosus</i> J.G. Baker	climbing asparagus fern	non-native	rare
COMMELINACEAE (Dayflower Family)			
<i>Commelina diffusa</i> N.L. Burm.	honohono	non-native	rare
CYPERACEAE (Sedge Family)			
<i>Cyperus involucratus</i> Rottb.	umbrella sedge	non-native	rare
<i>Cyperus rotundus</i> L.	nutsedge	non-native	uncommon
<i>Eleocharis radicans</i> (Poir.) Kunth	pīpīwai	non-native	rare
<i>Kyllinga brevifolia</i> Rottb.	kilio'opu	non-native	rare
POACEAE (Grass Family)			
<i>Bothriochloa pertusa</i> (L.) A. Camus	pitted beardgrass	non-native	rare
<i>Cenchrus ciliaris</i> L.	buffelgrass	non-native	common
<i>Cenchrus echinatus</i> L.	common sandbur	non-native	rare
<i>Cenchrus purpureus</i> (Schumach.) Morrone	Napier grass	non-native	rare
<i>Chloris barbata</i> (L.) Sw.	swollen fingergrass	non-native	uncommon
<i>Coix lacryma-jobi</i> L.	Job's tears	non-native	rare
<i>Cynodon dactylon</i> (L.) Pers.	Bermuda grass	non-native	rare
<i>Digitaria insularis</i> (L.) Mez ex Ekman	sourgrass	non-native	rare
<i>Digitaria violascens</i> Link	kukae pua'a	non-native	rare
<i>Eleusine indica</i> (L.) Gaertn.	wiregrass	non-native	rare
<i>Eragrostis pectinacea</i> (Michx.) Nees	Carolina lovegrass	non-native	rare
<i>Megathyrsus maximus</i> (Jacq.) Simon & Jacobs	Guinea grass	non-native	common
<i>Melinis repens</i> (Willd.) Zizka	Natal redtop	non-native	uncommon
<i>Paspalum conjugatum</i> Bergius	Hilo grass	non-native	uncommon
<i>Saccharum officinarum</i> L.	sugar cane	non-native	common
<i>Setaria verticillata</i> (L.) P. Beauv.	bristly foxtail	non-native	rare
<i>Sorghum halapense</i> (L.) Pers.	Johnson grass	non-native	uncommon
<i>Urochloa subquadrifida</i> (Trin.) R.D. Webster	-----	non-native	rare

SCIENTIFIC NAME	COMMON NAME	STATUS	ABUNDANCE
<b>DICOTS</b>			
<b>ACANTHACEAE (Acanthus Family)</b>			
<i>Asystasia gangetica</i> (L.) T.Anderson	Chinese violet	non-native	rare
<i>Justicia betonica</i> L.	white shrimp plant	non-native	uncommon
<i>Thunbergia fragrans</i> Roxb.	sweet clock-vine	non-native	rare
<b>AMARANTHACEAE (Amaranth Family)</b>			
<i>Alternanthera pungens</i> Kunth	khaki weed	non-native	rare
<i>Amaranthus spinosus</i> L.	spiny amaranth	non-native	uncommon
<i>Atriplex suberecta</i> Verd.	saltbush	non-native	rare
<i>Chenopodium carinatum</i> R. Br.	keeled goosefoot	non-native	rare
<i>Chenopodium murale</i> L.	'āheahea	non-native	rare
<b>ANACARDIACEAE (Mango Family)</b>			
<i>Mangifera indica</i> L.	mango	non-native	uncommon
<i>Schinus terebinthifolius</i> Raddi	Christmas berry	non-native	rare
<b>APIACEAE (Parsley Family)</b>			
<i>Centella asiatica</i> (L.) Urb.	Asiatic pennywort	non-native	rare
<i>Ciclospermum leptophyllum</i> (Pers.) Sprague	fir-leaved celery	non-native	rare
<b>APOYCYNACEAE (Dogbane Family)</b>			
<i>Asclepias physocarpa</i> (E. Mey.) Schlect.	balloon plant	non-native	rare
<i>Calotropis procera</i> (Aiton) Aiton	small crown flower	non-native	rare
<b>ARALIACEAE (Panax Family)</b>			
<i>Schefflera actinophylla</i> (Endl.) Harms	octopus tree	non-native	rare
<b>ASTERACEAE (Sunflower Family)</b>			
<i>Bidens pilosa</i> L.	Spanish needle	non-native	uncommon
<i>Calyptracarpus vialis</i> Less.	-----	non-native	rare
<i>Conyza bonariensis</i> (L.) Cronq.	hairy horseweed	non-native	uncommon
<i>Crassocephalum crepidioides</i> (Benth.) S. Moore	redflower ragleaf	non-native	rare
<i>Emilia fosbergii</i> Nicolson	red pualele	non-native	uncommon
<i>Emilia sonchifolia</i> (L.) DC.	violet pualele	non-native	rare
<i>Flaveria trinervia</i> (Spreng.) C. Mohr	clustered yellowtops	non-native	rare
<i>Lactuca sativa</i> L.	prickly lettuce	non-native	rare
<i>Pluchea carolinensis</i> (Jacq.) G. Don	sourbush	non-native	uncommon
<i>Senecio madagascariensis</i> Poir.	fireweed	non-native	rare
<i>Sonchus oleraceus</i> L.	pualele	non-native	uncommon
<i>Synedrella nodiflora</i> (L.) Gaertn.	nodeweed	non-native	rare
<i>Tridax procumbens</i> L.	coat buttons	non-native	uncommon
<i>Verbesina encelioides</i> (Cav.) Benth. & Hook.	golden crown-beard	non-native	uncommon
<i>Xanthium strumarium</i> L.	kīkānia	non-native	rare
<b>BASELLACEAE (Basella Family)</b>			
<i>Anredera cordifolia</i> (Ten.) Steenis	Madeira vine	non-native	rare
<b>BIGNONIACEAE (Bignonia Family)</b>			
<i>Spathodea campanulata</i> P. Beauv.	African tulip tree	non-native	rare

SCIENTIFIC NAME	COMMON NAME	STATUS	ABUNDANCE
<b>BORAGINACEAE (Borage Family)</b>			
<i>Carmona retusa</i> (Vahl) Masam.	Fukien tea	non-native	rare
<i>Heliotropium aplexicaule</i> Vahl	summer heliotrope	non-native	rare
<i>Heliotropium procumbens</i> Mill.	fourspike heliotrope	non-native	rare
<b>BRASSICACEAE (Mustard Family)</b>			
<i>Lepidium virginicum</i> L.	pepperwort	non-native	rare
<b>CACTACEAE (Cactus Family)</b>			
<i>Hylocereus undatus</i> (Haw.) Britton & Rose	night-blooming cereus	non-native	rare
<b>CASUARINACEAE (She-oak Family)</b>			
<i>Casuarina equisetifolia</i> L.	common ironwood	non-native	uncommon
<b>CLEOMACEAE (Cleome Family)</b>			
<i>Cleome gynandra</i> L.	wild spider flower	non-native	rare
<b>CONVOLVULACEAE (Morning Glory Family)</b>			
<i>Ipomoea indica</i> (J. Burm.) Merr.	koali 'awahia	indigenous	rare
<i>Ipomoea triloba</i> L.	little bell	non-native	uncommon
<i>Merremia aegyptia</i> (L.) Urb.	hairy merremia	non-native	rare
<b>CUCURBITACEAE (Gourd Family)</b>			
<i>Momordica charantia</i> L.	bitter melon	non-native	uncommon
<b>EUPHORBIACEAE (Spurge Family)</b>			
<i>Aleurites moluccana</i> (L.) Willd.	kukui	Polynesian	rare
<i>Euphorbia heterophylla</i> L.	kaliko	non-native	rare
<i>Euphorbia hirta</i> L.	hairy spurge	non-native	rare
<i>Euphorbia hypericifolia</i> L.	graceful spurge	non-native	rare
<i>Euphorbia prostrata</i> Aiton	prostrate spurge	non-native	rare
<i>Macaranga tanarius</i> (L.) Mull. Arg.	parasol leaf tree	non-native	uncommon
<i>Ricinus communis</i> L.	Castor bean	non-native	uncommon
<b>FABACEAE (Pea Family)</b>			
<i>Alysicarpus vaginalis</i> (L.) DC.	alyce clover	non-native	rare
<i>Canavalia cathartica</i> Thouars	maunaloa	non-native	rare
<i>Chamaecrista nictitans</i> (L.) Moench	partridge pea	non-native	uncommon
<i>Crotalaria incana</i> L.	fuzzy rattlepod	non-native	uncommon
<i>Crotalaria pallida</i> Aiton	smooth rattlepod	non-native	common
<i>Crotalaria retusa</i> L.	rattlepod	non-native	rare
<i>Desmanthus pernambucanus</i> (L.) Thellung	slender mimosa	non-native	uncommon
<i>Desmodium tortuosum</i> (Sw.) DC.	Florida beggarweed	non-native	rare
<i>Enterolobium cyclocarpum</i> (Jacq.) Griesbach	elephant earpod	non-native	rare
<i>Indigofera hendecaphylla</i> Jacq.	creeping indigo	non-native	uncommon
<i>Indigofera suffruticosa</i> Mill.	inikō	non-native	uncommon
<i>Leucaena leucocephala</i> (Lam.) de Wit	koa haole	non-native	uncommon
<i>Macroptilium atropurpureum</i> (DC.) Urb.	siratro	non-native	uncommon
<i>Mimosa pudica</i> L.	hilahila	non-native	rare
<i>Neonotonia wightii</i> (Wight & Arnott) Lackey	glycine	non-native	uncommon
<i>Pithecellobium dulce</i> (Roxb.) Benth.	'ōpiuma	non-native	rare



SCIENTIFIC NAME	COMMON NAME	STATUS	ABUNDANCE
<i>Prosopis pallida</i> (Humb. & Bonpl. ex Willd.) Kunth	kiawe	non-native	rare
<i>Samanea saman</i> (Jacq.) Merr.	monkeypod	non-native	rare
<i>Tamarindus indica</i> L.	tamarind	non-native	rare
LAMIACEAE (Mint Family)			
<i>Hyptis pectinanta</i> (L.) Poit.	comb hyptis	non-native	rare
<i>Leonotis nepetifolia</i> (L.) R. Br.	lion's ear	non-native	uncommon
MALVACEAE (Mallow Family)			
<i>Abutilon grandifolium</i> (Willd.) Sweet	hairy abutilon	non-native	uncommon
<i>Malva parviflora</i> L.	cheeseweed	non-native	common
<i>Malvastrum coromandelianum</i> (L.) Garcke	false mallow	non-native	uncommon
<i>Sida rhombifolia</i> L.	Cuban jute	non-native	uncommon
<i>Talipariti tileaceum</i> Fryxell	hau	Polynesian	rare
<i>Waltheria indica</i> L.	'uhaloa	indigenous	common
MELIACEAE (Mahogany Family)			
<i>Melia azedarach</i> L.	pride-of-India	non-native	rare
MORACEAE (Mulberry Family)			
<i>Ficus microcarpa</i> L. fil.	Chinese banyan	non-native	rare
MYRTACEAE (Myrtle Family)		non-native	
<i>Corymbia citriodora</i> (Hook.) Hill & Johnson	lemon gum	non-native	rare
<i>Eucalyptus robusta</i> Sm.	swamp mahogany	non-native	uncommon
<i>Psidium cattleianum</i> Sabine	strawberry guava	non-native	uncommon
<i>Psidium guajava</i> L.	common guava	non-native	rare
<i>Syzygium cumini</i> (L.) Skeels	Java plum	non-native	common
NYCATAGINACEAE (Four-o'clock Family)			
<i>Boerhavia coccinia</i> Mill.	scarlet spiderling	non-native	uncommon
<i>Mirabilis jalapa</i> L.	four-o'clock	non-native	rare
ONAGRACEAE (Evening Primrose Family)			
<i>Ludwigia octovalvis</i> (Jacq.) Raven	primrose willow	non-native	rare
OXALIDACEAE (Wood Sorrel Family)			
<i>Oxalis corniculata</i> L.	'ihi'ai	Polynesian	uncommon
PAPAVERACEAE (Poppy Family)			
<i>Argemone mexicana</i> L.	Mexican poppy	non-native	rare
PORTULACACEAE (Purslane Family)			
<i>Portulaca oleracea</i> L.	pigweed	non-native	rare
SOLANACEAE (Nighthshade Family)			
<i>Datura stramonium</i> L.	jimson weed	non-native	rare
<i>Nicandra physalodes</i> (L.) Gaertn.	apple-of-Peru	non-native	uncommon
<i>Nicotiana glauca</i> R.C. Graham	tree tobacco	non-native	rare
<i>Solanum americanum</i> Mill.	pōpolo	indigenous	rare
<i>Solanum lycopersicum</i> L.	cherry tomato	non-native	rare
<i>Solanum seaforthianum</i> Andr.	Brazilian nightshade	non-native	rare

SCIENTIFIC NAME	COMMON NAME	STATUS	ABUNDANCE
VERBENACEAE (Verbena Family)			
<i>Lantana camara</i> L.	lantana	non-native	rare
<i>Stachytarpheta cayennensis</i> (Rich.) Vahl	nettle-leaved vervain	non-native	rare
ZYGOPHYLLACEAE (Creosote Bush Family)			
<i>Tribulus terrestris</i> L.	puncture vine	non-native	rare

## FAUNA SURVEY REPORT

### SURVEY METHODS

A walk-through survey method was conducted in conjunction with the botanical survey. All parts of the project area were covered. Field observations were made with the aid of binoculars and by listening to vocalizations. Notes were made on species abundance, activities and location as well as observations of trails, tracks scat and signs of feeding. In addition an evening visit was made to the area to record crepuscular activities and vocalizations and to see if there was any evidence of occurrence of the Hawaiian hoary bat (*Lasiurus cinereus semotus*) in the area.

### RESULTS

#### MAMMALS

Four species of non-native mammals were observed during four site visits to the project area. These included: cattle (*Bos Taurus*), small Indian mongoose (*Herpestes javanicus auropunctata*), domestic cat (*Felis sylvestris catus*) and domestic dog (*Canis lupus familiaris*). Taxonomy and nomenclature follow Tomich (1986).

Other non-native mammals one might expect to utilize this area include: rats (*Rattus* spp.), mice (*Mus domesticus*) and axis deer (*Axis axis*). Rats and mice feed on seeds, fruits, eggs and succulent vegetation and are in turn preyed upon by cats and mongoose. Axis deer are expanding their range into this area and small herds are occasionally seen during the evenings.

A special effort was made to look for the native Hawaiian hoary bat by making an evening survey to four sites in the project area: one near the top of the project, one in the middle and two along the Waikapū Stream corridor. When present in an area these bats can be easily identified as they forage for insects, their distinctive flight patterns clearly visible in the glow of twilight. No evidence of such activity was observed though visibility was excellent. In addition a bat detecting device (Bat Box IIID) was used, set to the frequency of 27,000 to 28,000 hertz which is the typical range within which these bats are known to use for echolocation. No activity was detected using this device.

## BIRDS

There was a good diversity of birdlife present on this large project area. Twenty one species were observed during four site visits. This included 20 non-native birds and one migratory bird, the Pacific golden-plover (*Pluvialis fulva*). Four species were common throughout the project area: zebra dove (*Geopelia striata*), common myna (*Acridotheres tristis*), spotted dove (*Streptopelia chinensis*) and chestnut mannikin (*Lonchura malacca*). The remaining 17 species were uncommon or rare of occurrence. Taxonomy and nomenclature follow American Ornithologists' Union (2011).

A few other bird species might be expected in this area and at different times of year. These include the northern mockingbird (*Mimus polyglottos*), the orange-cheeked waxbill (*Estrilda melpoda*) and the barn owl (*Tyto alba*). The indigenous black-crowned night-heron (*Nycticorax nycticorax hoactli*) can occasionally be seen along the stream fishing and roosting in trees when the stream is running. The habitat is also unsuitable for Hawaii's native forest birds that are presently restricted to good quality native forests at higher elevations beyond the range of mosquitoes and the avian diseases they carry and transmit.

## INSECTS

Insect life was moderate in numbers of species as well as in total numbers of individuals. Sixteen insect species were recorded during the survey representing six Orders. Taxonomy and nomenclature follow Nishida et al (1992). Most common were: the dung fly (*Musca sorbens*), the Sonoran carpenter bee (*Xylocopa sonorina*), the long-tailed blue butterfly (*Lampides boeticus*) and the globe skimmer dragonfly (*Pantala flavescens*). Native species recorded included: the indigenous globe skimmer dragonfly, the indigenous green darner dragonfly (*Anax junius*) and the endemic and Endangered Blackburn's sphinx moth (*Manduca blackburni*) of which two eggs were seen on leaves of its preferred host plant, the tree tobacco (*Nicotiana glauca*).

## AMPHIBIANS

One amphibian, the green frog (*Rana clamitans*), was observed in the pond at the Maui Tropical Plantation.

## REPTILES

Two gecko species, the house gecko (*Hemidactylus frenatus*) and the mourning gecko (*Lepidodactylus lugubris*) were observed during the evening survey.

## MOLLUSKS

One mollusk, the giant East African snail (*Achatina fulica*) was seen in various parts of the project area.

## CONCLUSIONS AND RECOMMENDATIONS

The project area encompasses a variety of highly altered areas which have been the focus of large scale agriculture for over 100 years. Only the narrow Waikapū Stream channel shows some resemblance of its original character.

All of the mammals recorded are common non-native species of no particular concern. None of the Endangered native bats were detected during the survey. However, these bats do occur in many parts of Maui and are known to be highly mobile both on a daily (nightly) basis and seasonally. They have been observed from sea level to high elevations. Their movements appear to coincide with surges in insect activities and are thus likely to be tied to food availability for the bats.

Birdlife here, as well, is dominated by widespread introduced species that merit no special environmental protections. The habitat is unsuitable for Hawaii's native forest birds that are presently restricted to native habitats at higher elevations, beyond the range of mosquitoes that are carriers of lethal avian diseases for which these native birds have almost no resistance.

One indigenous waterbird, the auku'u or black-crowned night-heron, while not seen during the survey, often can be found in Waikapū Stream's forested channel when the water is running. They feed on mollusks, crustaceans and small fish. These birds are relatively common throughout Hawaii as well as in the Western USA and Mexico and carry no special protected federal status under the Endangered Species Act.

While no protected seabirds were found on the property, the 'ua'u and 'a'o are known to overfly the area at dawn and dusk to their burrows high in the mountains between the months of March and November. In late fall young birds fledge from their burrows to take their first tentative flights out to sea. These inexperienced birds are easily confused and distracted by bright lights and often crash to the ground where they are particularly vulnerable to being run over by vehicles or killed by predators. It is recommended that any significant outdoor lighting such as street lights or flood lights that are incorporated into the project design be shielded to direct the light downward so that it is not visible from above.

Three native insects were recorded during the survey. The indigenous dragonflies, the globe skimmer and the green darner are both widespread and common both in Hawaii and elsewhere, and are of no particular conservation concern. The Blackburn's sphinx moth, however, is an Endangered species and is of special concern. Just two individuals of its preferred host plants, the tree tobacco, were found on the northern end of the sugar cane fields at the base of a stockpiled sand pile. These two plants were carefully examined for eggs, larvae or signs of feeding. One plant was found to have two mature eggs on separate leaves. The eggs had turned brown, indicating they were ready to hatch out young larvae. Tree tobacco plants are not native to Hawaii, but fall under the protection of the Endangered Species Act (1973) during the period of their association with the Endangered Blackburn's sphinx moth. It is recommended that this occurrence be reported to the U.S. Fish and Wildlife Service so that the required protections and management actions can be clarified.

The occurrences of the non-native amphibians, reptiles and mollusks are of no particular interest or concern.

## ANIMAL SPECIES LIST

Following is a checklist of the animal species inventoried during the field work. Animal species are arranged in descending abundance within six groups: Mammals, Birds, Insects, Amphibians, Reptiles and Mollusks. For each species the following information is provided:

1. Common name
2. Scientific name
3. Bio-geographical status. The following symbols are used:

endemic = native only to Hawaii; not naturally occurring anywhere else in the world.

indigenous = native to the Hawaiian Islands and also to one or more other geographic area(s).

non-native = all those animals brought to Hawaii intentionally or accidentally after western contact.

migratory = spending a portion of the year in Hawaii and a portion elsewhere. In Hawaii the migratory birds are usually in the over wintering/non-breeding phase of their life cycle.

4. Abundance of each species within the project area:

abundant = many flocks or individuals seen throughout the area at all times of day.

common = a few flocks or well scattered individuals throughout the area.

uncommon = only one flock or several individuals seen within the project area.

rare = only one or two seen within the project area.



SCIENTIFIC NAME	COMMON NAME	STATUS	ABUNDANCE
<b>MAMMALS</b>			
<i>Bos taurus</i> L.	cattle	non-native	common
<i>Herpestes javanicus auropunctatus</i> Hodgson	small Asian mongoose	non-native	uncommon
<i>Felis sylvestris catus</i> L.	domestic cat	non-native	rare
<i>Canis lupus familiaris</i> L.	domestic dog	non-native	rare
<b>BIRDS</b>			
<i>Geopelia striata</i> L.	zebra dove	non-native	common
<i>Acridotheres tristis</i> L.	common myna	non-native	common
<i>Streptopelia chinensis</i> Scopoli	spotted dove	non-native	common
<i>Lonchura malacca</i> L.	chestnut mannikin	non-native	common
<i>Padda oryzivora</i> L.	Java sparrow	non-native	uncommon
<i>Passer domesticus</i> L.	house sparrow	non-native	uncommon
<i>Francolinus pondicerianus</i> Gmelin	gray francolin	non-native	uncommon
<i>Carpodacus mexicanus</i> Muller	house finch	non-native	uncommon
<i>Cardinalis cardinalis</i> L.	northern cardinal	non-native	uncommon
<i>Aratinga mitrata</i> Tschudi	mitred conure	non-native	uncommon
<i>Gallus gallus</i> L.	chicken	non-native	uncommon
<i>Lonchura punctulata</i> L.	nutmeg mannikin	non-native	rare
<i>Bubulcus ibis</i> L.	cattle egret	non-native	rare
<i>Columba livia</i> Gmelin	rock pigeon	non-native	rare
<i>Francolinus francolinus</i> L.	black francolin	non-native	rare
<i>Zosterops japonicus</i> Temminck & Schlegel	Japanese white-eye	non-native	rare
<i>Phasianus colchicus</i> L.	Chinese ring-necked pheasant	non-native	rare
<i>Lonchura cantans</i> Gmelin	African silverbill	non-native	rare
<i>Paroaria coronata</i> Miller	red-crested cardinal	non-native	rare
<i>Pluvialis fulva</i> Gmelin	Pacific golden-plover	migratory	rare
<i>Zenaida macroura</i> L.	mourning dove	non-native	rare

SCIENTIFIC NAME	COMMON NAME	STATUS	ABUNDANCE
<b>INSECTS</b>			
Order ARANAE - true spiders			
ARANEIDAE (Orb Weaver Spider Family)			
<i>Gasteracantha mammosa</i> Koch	Asian spiny-backed spider	non-native	rare
Order DIPTERA - flies			
CALLIPHORIDAE (Blow Fly Family)			
<i>Rhinia testacea</i> Robineau - Desvoidy	-----	non-native	rare
MUSCIDAE (House Fly Family)			
<i>Musca domestica</i> L.	house fly	non-native	rare
<i>Musca sorbens</i> Wiedemann	dung fly	non-native	common
SYRPHIDAE (Hoverfly Family)			
<i>Simosyrphus grandicornis</i> Macquart	Australian hoverfly	non-native	rare
Order HETEROPTERA - true bugs			
APHIDIDAE (Aphid Family)			
<i>Aphis craccivora</i> Koch	cow pea aphid	non-native	rare
Order HYMENOPTERA - bees, wasps & ants			
APIDAE (Honey Bee Family)			
<i>Apis mellifera</i> L.	honey bee	non-native	uncommon
<i>Xylocopa sonorina</i> Smith	Sonoran carpenter bee	non-native	common
FORMICIDAE (Ant Family)			
<i>Pheidole megacephala</i> Fabricius	big-headed ant	non-native	uncommon
Order LEPIDOPTERA - butterflies & moths			
LYCAENIDAE (Gossamer-winged Butterfly Family)			
<i>Lampides boeticus</i> L.	long-tail blue butterfly	non-native	common
PAPILIONIDAE (Swallowtail Butterfly Family)			
<i>Papilio xutha</i> L.	Asian swallowtail	non-native	rare
PIERIDAE (White & Sulphur Butterfly Family)			
<i>Phoebis agarithe</i> Boisduval	large orange sulphur butterfly	non-native	rare
<i>Pieris rapae</i> L.	cabbage butterfly	non-native	uncommon
SPHINGIDAE (Sphinx Moth Family)			
<i>Manduca blackburni</i> Butler	Blackburn's sphinx moth	endemic	rare
Order Odonata - dragonflies & damselflies			
AESHNIDAE (Hawker Dragonfly Family)			
<i>Anax junius</i> Drury	green darner	indigenous	uncommon
LIBELLULIDAE (Skipper Dragonfly Family)			
<i>Pantala flavescens</i> Fabricius	globe skimmer	indigenous	common

SCIENTIFIC NAME	COMMON NAME	STATUS	ABUNDANCE
<b>AMPHIBIANS</b>			
<i>Rana clamitans</i> Latreille	green frog	non-native	rare
<b>REPTILES</b>			
<i>Hemidactylus frenatus</i> Schlegel	house gecko	non-native	rare
<i>Lepidodactylus lugubris</i> Dumeril & Bibron	mourning gecko	non-native	rare
<b>MOLLUSKS</b>			
<i>Achatina fulica</i> Ferussac	giant east African snail	non-native	uncommon





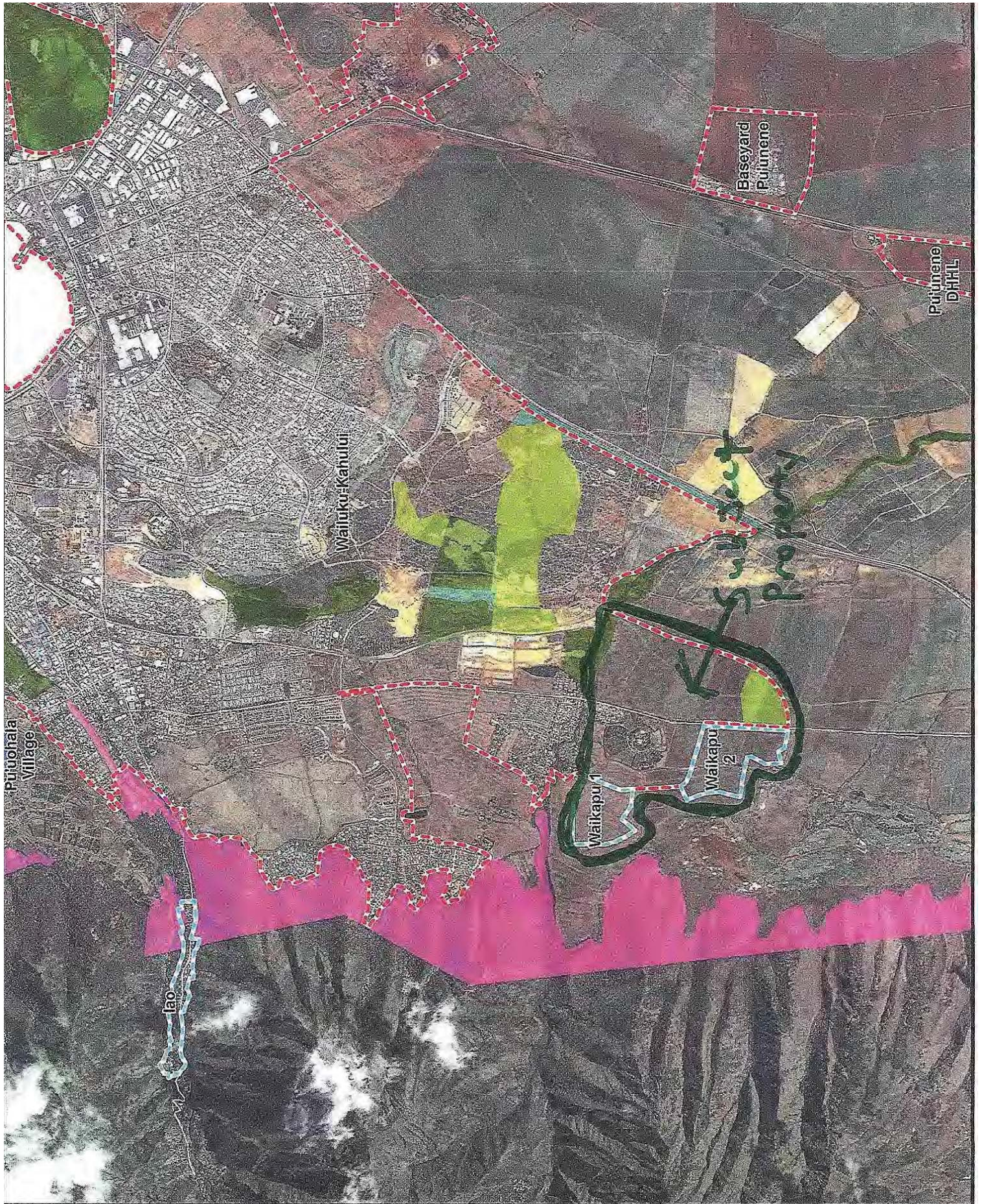






Figure 2 – Entrance to the Maui Tropical Plantation facilities



Figure 3 – An open field alongside the Maui Tropical Plantation





Figure 4 Entrance to the commercial farm



Figure 5 Rows of vegetables in the commercial farm.





Figure 6 – View of the pasture lands in the upper part of the project area.



Figure 7 A portion of fenced pasture land with grazing cattle.





Figure 8 Sugar cane fields in the lower portion of the project area.



Figure 9 A lateral view of the narrow, forested Waikapū stream where it passes through agricultural lands.





Figure 10 Densely forested rocky river bed of Waikapū stream.



Figure 11 A densely grassy section of Waikapu stream with running water following a rain event.





Figure 12 A tree tobacco plant (*Nicotiana glauca*), the preferred host plant for the Blackburn's sphinx moth (*Manduca blackburni*), an Endangered species.



Figure 13 A close up of a tree tobacco leaf with a mature egg of an Endangered Blackburn's sphinx moth.

## **Literature Cited**

- American Ornithologists' Union 2011. Check-list of North American Birds.  
7<sup>th</sup> edition. American Ornithologists' Union. Washington D.C.
- Armstrong, R. W. (ed.) 1983. Atlas of Hawaii. (2<sup>nd</sup>. ed.) University of Hawaii Press.
- Foote, D.E. , E.L. Hill, S. Nakamura, and F. Stephens. 1972. Soil survey of the islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii.  
U.S. Dept. of Agriculture, Soil Conservation Service. Washington, D.C.
- Nishida, G.M., G.A. Samuelson, J.S. Strazanac, K.S. Kami. 1992.  
Hawaiian Terrestrial Arthropod Checklist. Hawaii Biological Survey. Honolulu.
- Tomich, P.Q. 1986. Mammals in Hawaii. Bishop Museum Press, Honolulu.
- U.S. Fish and Wildlife Service. 2012. Endangered and threatened wildlife and Plants.  
Listings and Occurrences for Hawaii. [www.fws.gov/endangered](http://www.fws.gov/endangered)
- U.S. Fish and Wildlife Service. 2000. Endangered and threatened wildlife and plants:  
determination of endangered status for Blackburn's sphinx moth from Hawaii.  
Federal Register 65(21): 4770-4779.
- Wagner, W. L., D.R. Herbst, and S. H. Sohmer. 1999. Manual of the flowering plants of Hawai'i.  
University of Hawai'i Press and Bishop Museum Press. Honolulu.

**APPENDIX C**  
**Agricultural Impact Assessment**

# Waikapu Country Town

## Agricultural Impact Assessment



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*July, 2013*

## Table of Contents

<b>I. EXECUTIVE SUMMARY</b>	<b>1</b>
A. WAIKAPU COUNTRY TOWN MASTER PLAN	1
B. PURPOSE AND SCOPE OF THE AGRICULTURAL IMPACT ASSESSMENT	1
C. STATUS OF HAWAII’S AGRICULTURAL INDUSTRY	2
D. STATE AND COUNTY AGRICULTURAL LANDS	3
E. IMPACT OF DEVELOPING THE PROJECT	3
F. CONSISTENCY WITH STATE AND COUNTY AGRICULTURAL POLICIES	5
<b>II. INTRODUCTION</b>	<b>7</b>
A. BACKGROUND	7
B. THE WAIKAPU COUNTRY TOWN MASTER PLAN	11
C. PURPOSE AND SCOPE OF THE AGRICULTURAL IMPACT ASSESSMENT	20
<b>III. HAWAII’S AGRICULTURAL INDUSTRY</b>	<b>23</b>
A. ECONOMIC SIGNIFICANCE TO THE ECONOMY	23
B. MARKET COMPOSITION	24
C. MARKET SHARE	28
D. INDUSTRY CHALLENGES AND OPPORTUNITIES	32
E. CONCLUSIONS	43



<b>IV. STATE AND COUNTY AGRICULTURAL LANDS</b>	<b>46</b>
A. STATE OF HAWAII	46
B. CURRENT AVAILABILITY OF STATE AGRICULTURAL LANDS	47
C. COUNTY OF MAUI	48
D. AVAILABILITY OF AGRICULTURAL LANDS ON MAUI	50
E. CONCLUSIONS	54
<b>V. AGRICULTURAL IMPACT OF THE PROPOSED PROJECT</b>	<b>56</b>
A. WAIKAPU COUNTRY TOWN’S EXISTING AGRICULTURAL RESOURCES	56
B. PRIOR AGRICULTURAL USE	64
C. CURRENT AGRICULTURAL USE	65
D. IMPACT OF THE PROJECT ON AGRICULTURE	67
E. CONCLUSIONS	71
<b>VI. CONSISTENCY WITH STATE AND COUNTY AGRICULTURAL POLICIES</b>	<b>73</b>
A. STATE AGRICULTURAL LAND USE POLICY	73
B. COUNTY AGRICULTURAL LAND USE POLICY	76
<b>REFERENCES</b>	<b>84</b>

**LIST OF FIGURES**

Figure 1a: Maui Island Plan Directed Growth Map	9
Figure 1b: Maui Island Plan Wailuku / Kahului Planned Growth Areas	10
Figure 2: Regional Location Map	13

Figure 3: Aerial Location Map	14
Figure 4 a-d: TMK Maps	15
Figure 5: State Land Use Designation	19
Figure 6: Conceptual Land Plan	21
Figure 7: Value of Hawaii's Agricultural Production between 1964 and 2003	25
Figure 8: Relative Value of Hawaii's Major Agricultural Crops from 1960 to 2003	25
Figure 9: Value of 2010 Crop Sales (in thousands)	26
Figure 10: Value of Hawaii's Major Crops between 1985 and 2010 (in thousands)	27
Figure 11: Value of Hawaii's Crop Sales between 1995 and 2010 (in thousands)	27
Table 1: 2005 Market Share for Hawaii Agricultural Products	28
Figure 12: Hawaii Market Share in U.S. Mainland Market for Select Products (in thousands)	30
Table 2: Japanese Market Sales between 1995 and 2008 of Select Hawaii Products	31
Figure 13: Cost per Acre of Agricultural Land in Hawaii and the U.S. Mainland	34
Figure 14: Cost per Acre to Rent Agricultural Land in Hawaii and the U.S. Mainland	35
Figure 14:	35
Table 3: Value of Consumption and Production of Select Agricultural Products in Hawaii (in thousands)	36
Figure 15: Hawaii Crop Sales between 1995 and 2010 (in thousands)	37
Figure 16: Value of Hawaii's Seed Crop Sales between 2000 and 2010 (in thousands)	39
Table 4: HCEI Renewable Fuel Goals for 2015	41
Table 6: Hawaii's Important Agricultural Lands by Rating System	47
Table 8: Hawaii's Important Agricultural Lands by Rating System	49
Table 9: Maui Island's LSB Designated Agricultural Lands	49
Table 10: Acreage in Crop in Maui County between 1987 and 2010	51
Figure 17a: Waikapu Country Town LSB Ratings	56
Figure 17b: Waikapu Country Town LSB Map	57
Figure 18a: Waikapu Country Town ALISH Ratings	58
Figure 18b: Waikapu Country Town ALISH Map	59
Figure No.19: Soils Map	61

**LIST OF TABLES**

<b>Table 1: 2005 Market Share for Hawaii Agricultural Products</b>	<b>28</b>
<b>Table 2: Japanese Market Sales between 1995 and 2008 of Select Hawaii Products</b>	<b>31</b>
<b>Table 3: Value of Consumption and Production of Select Agricultural Products in Hawaii (in thousands)</b>	<b>36</b>
<b>Table 4: HCEI Renewable Fuel Goals for 2015</b>	<b>41</b>
<b>Table 5: HCEI Renewable Fuels Goal for 2020</b>	<b>42</b>
<b>Table 6: Hawaii's Important Agricultural Lands by Rating System</b>	<b>47</b>
<b>Table 7: Acreage in Crop in Hawaii between 1960 and 2010</b>	<b>48</b>
<b>Table 8: Hawaii's Important Agricultural Lands by Rating System</b>	<b>49</b>
<b>Table 9: Maui Island's LSB Designated Agricultural Lands</b>	<b>49</b>
<b>Table 10: Acreage in Crop in Maui County between 1987 and 2010</b>	<b>51</b>
<b>Table 11: Waikapu Country Town Soil Types</b>	<b>60</b>

## **I. EXECUTIVE SUMMARY**

### **A. WAIKAPU COUNTRY TOWN MASTER PLAN**

The proposed Waikapu Country Town (WCT) is situated in Central Maui, just south of the small plantation community of Waikapu, at the Maui Tropical Plantation (MTP).

The project area encompasses approximately 14 acres of State Urban District lands and 1,562 acres of State Agricultural District lands (See: Figure No. 5, “State Land Use Designation”). The existing MTP retail shops, restaurant, convention hall, tropical gardens and lagoon are on the urban designated lands. Approximately 488 acres are proposed to be re-designated from the State Agricultural District to the State Urban and Rural Districts.

WCT will be a “complete community,” encompassing a mixture of rural, single- and multi-family residential units, commercial, and civic uses. In accordance with the Maui Island Plan (MIP), WCT includes 1,433 residential units together with neighborhood retail, commercial, a school, parks and open space. The town will be bound by agricultural lands that will be preserved in perpetuity through a conservation easement. WCT will be built both mauka and makai of Honoapiilani Highway. Access to the project will be from Honoapiilani Highway and the proposed Waiale Bypass road.

### **B. PURPOSE AND SCOPE OF THE AGRICULTURAL IMPACT ASSESSMENT**

The Agricultural Impact Assessment (AIA) will assess the long-term impact of the project on the State and County’s Agricultural industry.

The scope of the study includes the following tasks:

- Assessment of the current status of Hawaii’s agricultural industry;
- Assessment of the current availability of agricultural lands;
- Analysis of existing agronomic conditions within the project site;
- Description of the recent agricultural history of the property;
- Assessment of the impact of the project on current agricultural operations; and
- Analysis of the project’s consistency with State and County agricultural policies.

#### C. STATUS OF HAWAII’S AGRICULTURAL INDUSTRY

While agriculture, predominantly sugar and pineapple, dominated Hawaii’s economy from the late 1800s through the 1950s, its overall significance has declined dramatically since the advent of mass market tourism. In 1927, sugar alone created 56,600 jobs, whereas in 2011 the entire agricultural industry employed just 6,900 workers.<sup>i</sup> In 2011, agriculture employed 1,600 Maui County workers, which was 2.4% of the 67,200 wage and salary jobs in the County.<sup>ii</sup>

Hawaii farmers face stiff competition in local, national, and international markets. In the local market, off-shore suppliers dominate the market for most fresh fruits, vegetables, dairy, meat, and poultry products. It has been estimated that 85% of all food consumed in Hawaii statewide is imported.

In the U.S. Mainland market, Hawaii growers have sustained the value of their sales in recent years, but have lost significant export value in sales to Japan. Significant impediments to agricultural development in Hawaii include high labor costs, high transportation costs, high energy costs and high land costs.

Despite major challenges, Hawaii’s growers are competitive in many niche products and opportunities are available. Because 85% of food consumed in Hawaii is imported, a significant



market exists for farmers who can find creative ways to displace imports. Moreover, Hawaii's seed crop industry has demonstrated that Hawaii agriculture can have significant comparative advantage in some sectors. Substituting locally grown biofuels for imported petroleum may also provide opportunities for Hawaii farmers over the coming decades.

#### D. STATE AND COUNTY AGRICULTURAL LANDS

Since 1960, there has been a release of approximately 316,590 acres from crop farming, primarily sugar and pineapple.<sup>iii</sup> While some of these lands have been absorbed by urban development and other agricultural uses, much is fallow and available on Oahu, Maui, Molokai, Lanai and Kauai.

The County of Maui has approximately 402,354 acres within the State Agricultural District. Of these lands, approximately 244,088 acres, or 61%, is located on Maui.<sup>iv</sup> Using the LSB rating system, Maui alone has approximately 82,592 acres that are classified "A", "B", or "C".<sup>v</sup> Since 1960, there has been a release of approximately 64,150 acres from crop farming, primarily sugar and pineapple, within the County.<sup>vi</sup> While some of these lands have been absorbed by urban development and other agricultural uses, much is fallow and available on the islands of Maui, Molokai, and Lanai.

Although there is an abundant supply of productive agricultural land, access to affordable agricultural lots offering long-term tenure remains an impediment to agricultural development in Hawaii. The current shortage of available State and County agricultural park lots is symptomatic of this issue.

#### E. IMPACT OF DEVELOPING THE PROJECT

The Waikapu Country Town, including its adjoining agricultural lands, comprises approximately 1,576 acres, 14 acres of which are within the State Urban District. Over 90% of WCT agricultural

are rated “A” or “B” by the Land Study Bureau (LSB) and “Prime” by the Agricultural Lands of Importance to the State of Hawaii (ALISH) rating systems.

The project will result in the urbanization of approximately 488 acres of prime agricultural land. This represents a very small percentage of agricultural lands statewide and on Maui. There are approximately 2 million acres in the State Agricultural District. The subject development represents just .024% of this area. On Maui, there are approximately 82,582 acres of agricultural lands rated by the LSB as A, B, or C. The subject development represents just 0.59% of these lands. Within Maui County, approximately 64,150 acres has been released from crop production since 1987. The subject development represents just 0.76% of these lands. The MTP’s agricultural component includes nearly 1,100 acres of land that will remain in agricultural use. Of these lands, approximately 800 acres will be permanently dedicated to agricultural use with no residential structures to be permitted. Several hundred acres of MTP’s agricultural lands may be developed as a private agricultural park to help facilitate Maui’s agricultural development.

There are currently three commercial farms farming MTP lands. These include Kumu Farms, Hawaii Taro LLC, and HC&S. The proposed urbanization will require both Kumu Farms and Hawaii Taro LLC to relocate their agricultural operations to the land owners’ proposed agricultural park, which will be located on lands to be preserved in perpetuity by the land owner for agricultural use. The project will also impact a portion of the current lands being leased by HC&S. It is anticipated that these lands will gradually begin to be impacted in about five to ten years. Over the long-term, HC&S may lose approximately 330 acres to urbanization and up to an additional 75 acres to a private agricultural park. According to HC&S General Manager, Mr. Rick Volner, HC&S would desire to continue farming its MTP lands to maximize its current economy of scale in production. However, Mr. Volner acknowledged that HC&S has additional

lands available that are currently fallow and that urbanization of a portion of its MTP leased lands will not significantly impact the Plantation's long-term economic viability.

A significant impediment to agricultural development on Maui, and throughout the state, is the scarcity of agricultural land that is both readily available and affordable for long-term lease to diversified farmers. The establishment of a centrally located agricultural park, with productive lands and affordable irrigation water, should help Maui farmers compete in local, mainland and international markets.

#### F. CONSISTENCY WITH STATE AND COUNTY AGRICULTURAL POLICIES

The Hawaii State Plan and State Functional Plans establish policy to protect the viability of the sugar and pineapple industries, protect agriculturally suitable lands for future agricultural needs, and promote the growth of diversified agriculture.

The Maui County General Plan (County-wide Policy Plan, Maui Island Plan, and Wailuku-Kahului Community Plan) seek to preserve productive agricultural lands and facilitate agricultural self-sufficiency in food production. The plans also recognize the need to provide sufficient land areas to accommodate future population growth. Goal 7.1.1.f of the Maui Island Plan (MIP) states, *"Strongly discourage the conversion of productive and important agricultural lands (such as sugar, pineapple, and other produce lands) to rural or urban use, unless justified during the General Plan update, or when other overriding factors are present."*

The subject land was placed into an Urban Growth Boundary during the General Plan update, when other overriding factors were present. These factors included the land's development suitability, as well as its proximity to existing employment, infrastructure, public facility systems and existing urban development. Moreover, as documented in this report, the urbanization of

the subject lands will not significantly impact the future viability of the sugar or pineapple industries or the growth of diversified agriculture.

The proposed action has been carefully analyzed for its short- and long-term impacts upon the agricultural industry. While the proposed action will result in the loss of prime agricultural lands, it will not significantly impact the short- or long-term viability of agriculture in Hawaii since an abundance of currently fallow land remains available. The project will, however, help to address the current shortage of agricultural park lots by establishing a new park within Central Maui.

The project represents a carefully considered approach to land development that balances the need for urbanization with the desire to protect agricultural lands and other important natural and environmental resources. This approach is consistent with the spirit of existing State and County policies to protect agricultural lands.

## II. INTRODUCTION

### A. BACKGROUND

In December, 2012, the County of Maui adopted the Maui Island Plan (MIP). The MIP establishes goals, objectives, policies and actions to direct growth and development on Maui through the year 2030. The MIP was based upon a comprehensive analysis of population growth, economic conditions, development capacity of existing entitled lands, and extensive community outreach.

To guide development of future urban lands, the MIP sets forth policies requiring higher urban densities, a greater balance between single- and multi-family housing types, mixed-use development, vehicular and pedestrian connectivity between land uses, and the incorporation of parks, schools, open space and affordable housing into future developments.

The MIP's Directed Growth Plan places approximately 502 acres of Waikapu Country Town's (WCT's) 1,576 acres into urban and rural growth boundaries. The remaining 1,074 acres are to remain within the State's Agricultural District. Of these lands, approximately 800 acres will be preserved in perpetuity for agricultural use through a conservation easement, and the remaining 274 acres will be kept in large agricultural lots (See: Figure No. 1a-b, "Maui Island Plan Map Directed Growth Map" and "Maui Island Plan Wailuku/Kahului Planned Growth Areas").

The MIP describes the purpose and intent of the Waikapu Country Town "Planned Growth Area" as follows:

*The Waikapu Tropical Plantation Town planned growth area is situated in the vicinity of the Maui Tropical Plantation, and includes lands on both the mauka and makai sides of Honoapi'ilani Highway. Providing the urban character of a traditional small town, this area will have a mix of single-family and*





*Land Use Planning • Sustainability Services • Community Planning • Development Permits*

---

*multifamily rural residences, park land, open space, commercial uses, and an elementary or intermediate school developed in coordination with the Wai'ale*

# Maui Island Plan Directed Growth Map

Waikapu / Kahului  
C3

## Legend

### Growth Boundaries



Urban



Small Town



Rural

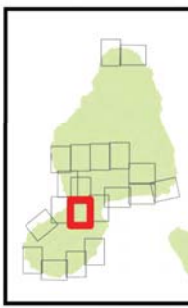
### Reference



2011 Parcels



Primary Roads



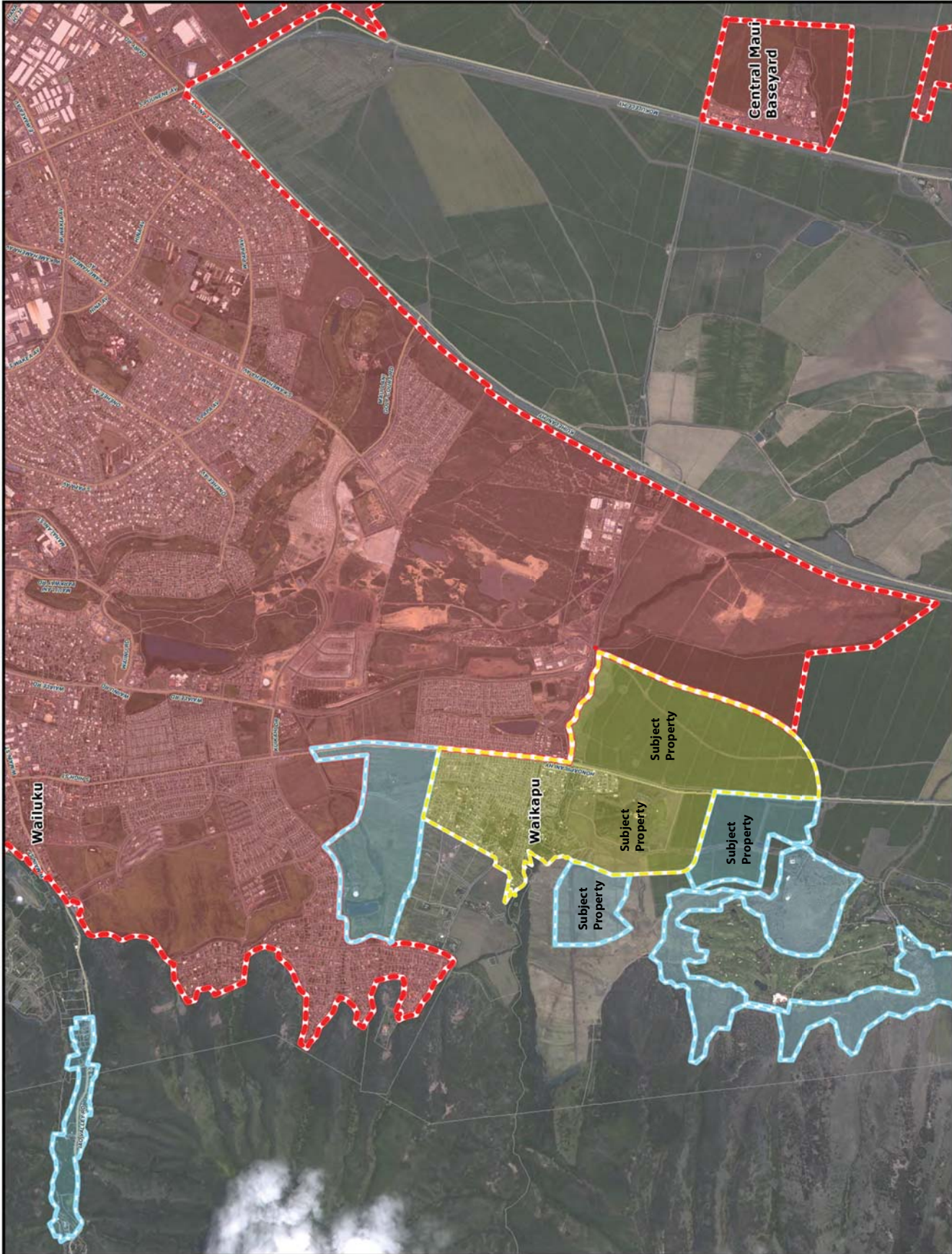
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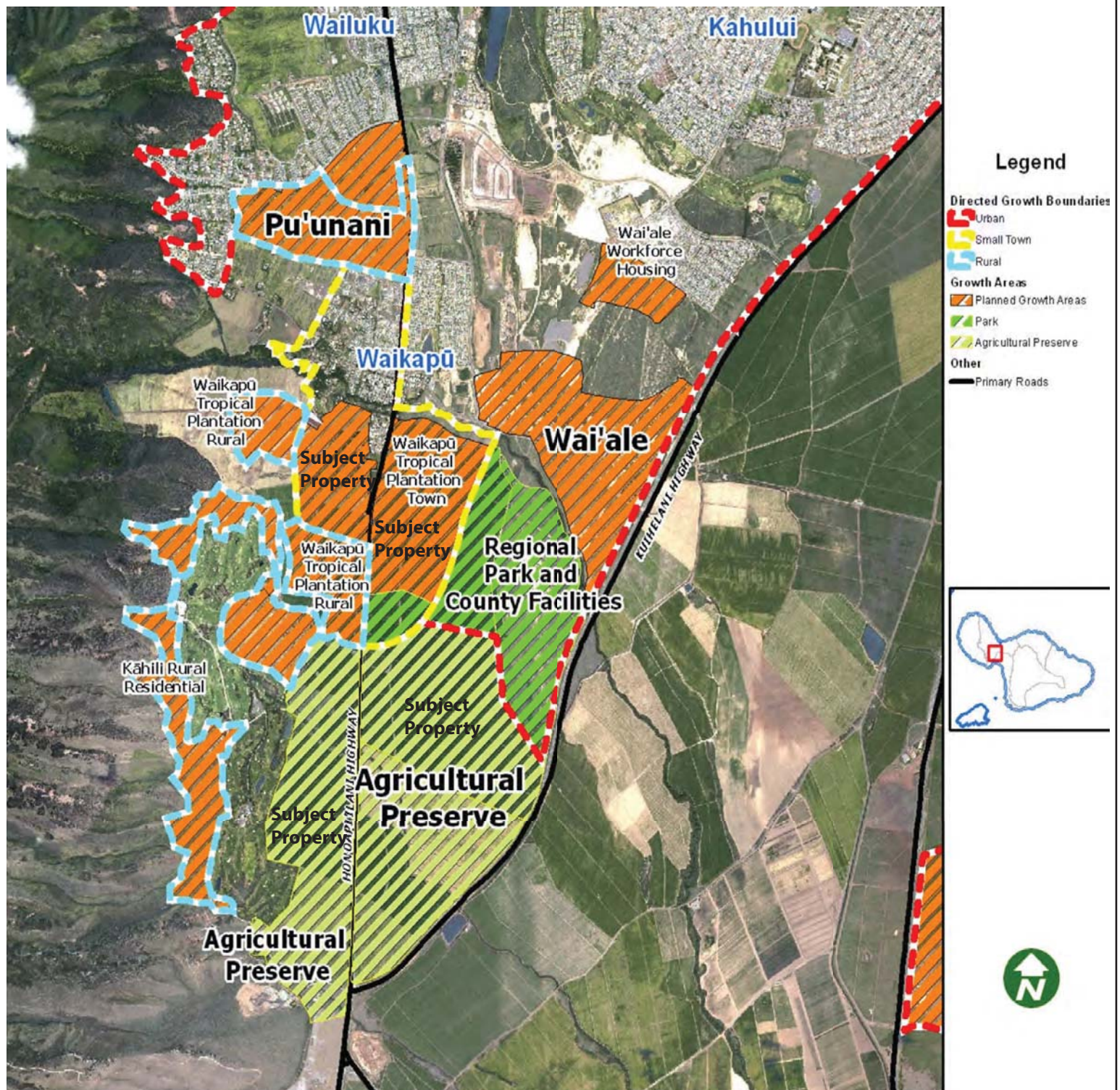


Figure 1a, Waikapu / Kahului Directed Growth Map

Source: Maui Island Plan, Department of Planning, Long-range Planning Division, December 2012







Source: Maui Island Plan, Department of Planning, Long-range Planning Division, December 2012

**Figure 1b**

Maui Island Plan  
Wailuku-Kahului Planning Growth Areas



Not to Scale

WAIKAPU COUNTRY TOWN



PLANNING  
CONSULTANTS  
HAWAII, LLC



*project. The area is located south of Waikapu along Honoapi'ilani Highway, and it will incorporate the integrated agricultural and commercial uses of the existing tropical plantation complex. This area is proximate to the Wai'ale planned growth area, providing additional housing in central Maui within the Wailuku-Kahului Community plan region. As part of this project, parcels to the south of the project (identified as Agricultural Preserve on Figure 8-1) shall be protected in perpetuity for agricultural use through a conservation easement. A portion of this area may be dedicated to the County as an agricultural park administered pursuant to County regulations. Alternatively, this area can be developed as a private agricultural park available to Maui farmers, and executed through a unilateral agreement between the landowner and Maui County. The rural lots mauka of Honoapi'ilani Highway are intended to be developed using a CSD plan. The CSD plan shall provide access to uninterrupted walking and bicycling trails and will preserve mauka and makai views while protecting environmentally sensitive lands both along Waikapu stream and mauka of the subdivision.*

**Planned Growth Area Rationale:**

*Keeping the Waikapu Tropical Plantation as its town core, this area will become a self-sufficient small town with a mix of single-family and multifamily housing units in a walkable community that includes affordable housing in close proximity to Wailuku's employment centers. Schools, parks, police and fire facilities, transit infrastructure, wastewater, water supply resources, and other infrastructure should be developed efficiently, in coordination with neighboring developments including Maui Lani, Kehalani, Pu'unani and Wai'ale. The Waikapu Tropical Plantation Town planned growth area is located on Directed Growth Map #C3 .<sup>vii</sup>*

**B. THE WAIKAPU COUNTRY TOWN MASTER PLAN**

The proposed Waikapu Country Town (WCT) is situated in Central Maui, just south of the small plantation community of Waikapu, at the Maui Tropical Plantation (MTP). The property is identified as TMK Nos. (2) 3-6-5:007; 3-6-002:001 and 003; 3-6-004:003 and 006; and 3-6-



006:036 (See: Figure Nos. 2, 3, and 4a-d, (“Regional Location Map”, “Aerial Location Map”, and “TMK Maps”). The project area encompasses approximately 14 acres of State Urban District lands and 1,562 acres of State Agricultural District lands (See: Figure No. 5, “State Land Use Designation”). The existing MTP retail shops, restaurant, convention hall, tropical gardens and lagoon are on the urban designated lands (TMK No. (2) 3-6-005:007). Approximately 488 acres are proposed to be re-designated from the State Agricultural District to the State Urban and Rural Districts.

WCT will be a “complete community,” encompassing a mixture of single- and multi-family residential units, commercial, and civic uses. In accordance with the MIP, WCT includes 1,433 residential units together with neighborhood retail, commercial, a school, parks and open space. The town will be bound by agricultural lands that will be preserved in perpetuity through a conservation easement. The utilization of conservation subdivision design (CSD) practices will preserve additional rural lands for farming, open space, and open land recreation.

WCT will be built both mauka and makai of Honoapiilani Highway. Development mauka of the highway will focus inward onto a “village center,” incorporating the existing buildings and grounds of the MTP. The Master Plan calls for a diverse mixture of affordable and market priced housing, along with commercial, entertainment, and civic uses within and around the village center.

Development makai of the highway will focus onto a pedestrian-oriented “main street,” a nearby elementary school, and parks. The makai development is bound to the east by the planned extension of the Waiale Road, which will intersect with Honoapiilani Highway. A primary objective of the project is to develop a community where walking and biking are the preferred modes of transportation and recreation for short commutes. Therefore, in addition to proposing mixed-use and more compact development patterns, approximately eight miles of



**Figure 2**

Regional Location



Not to Scale

**WAIKAPU COUNTRY TOWN**



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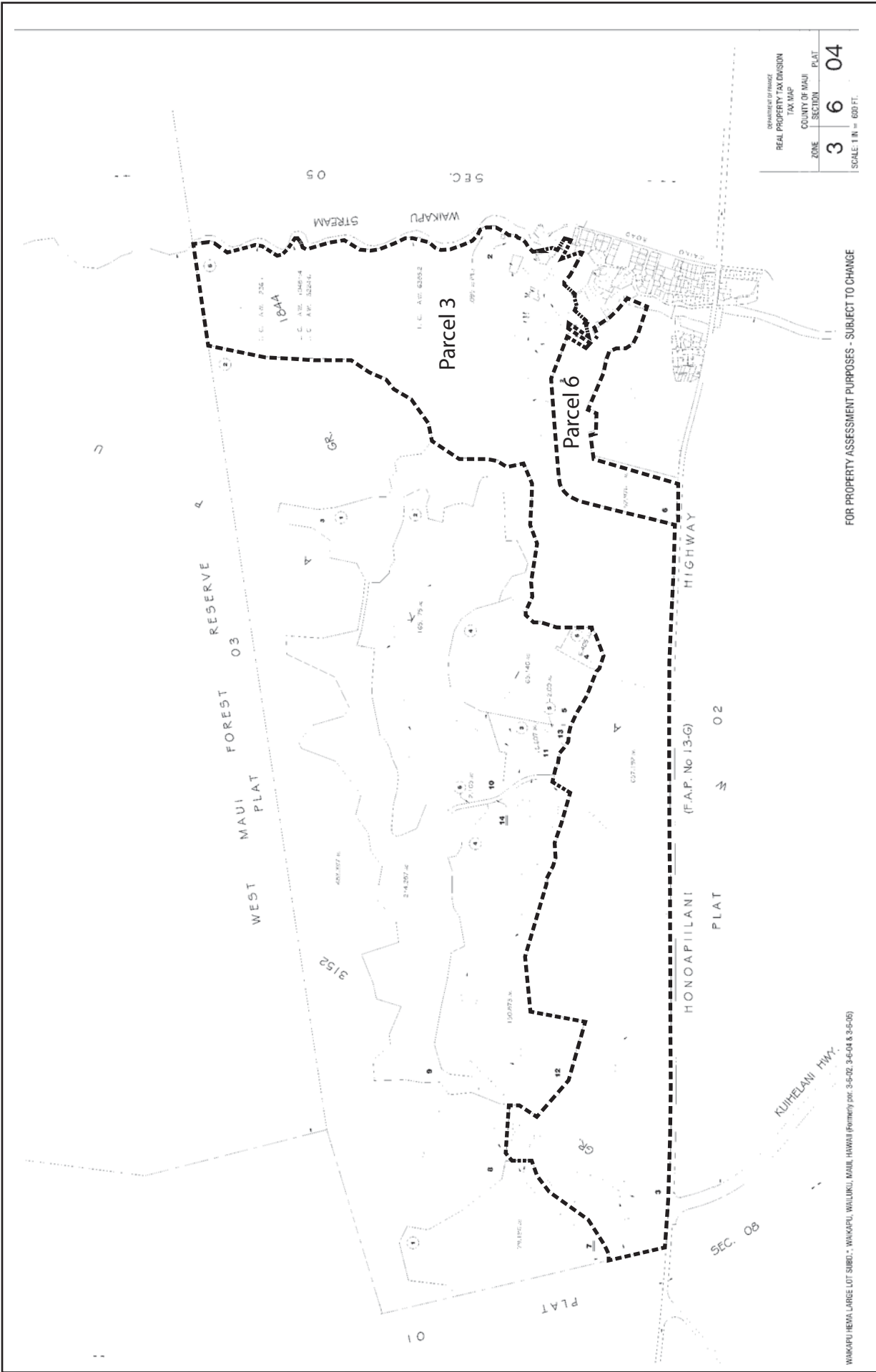
















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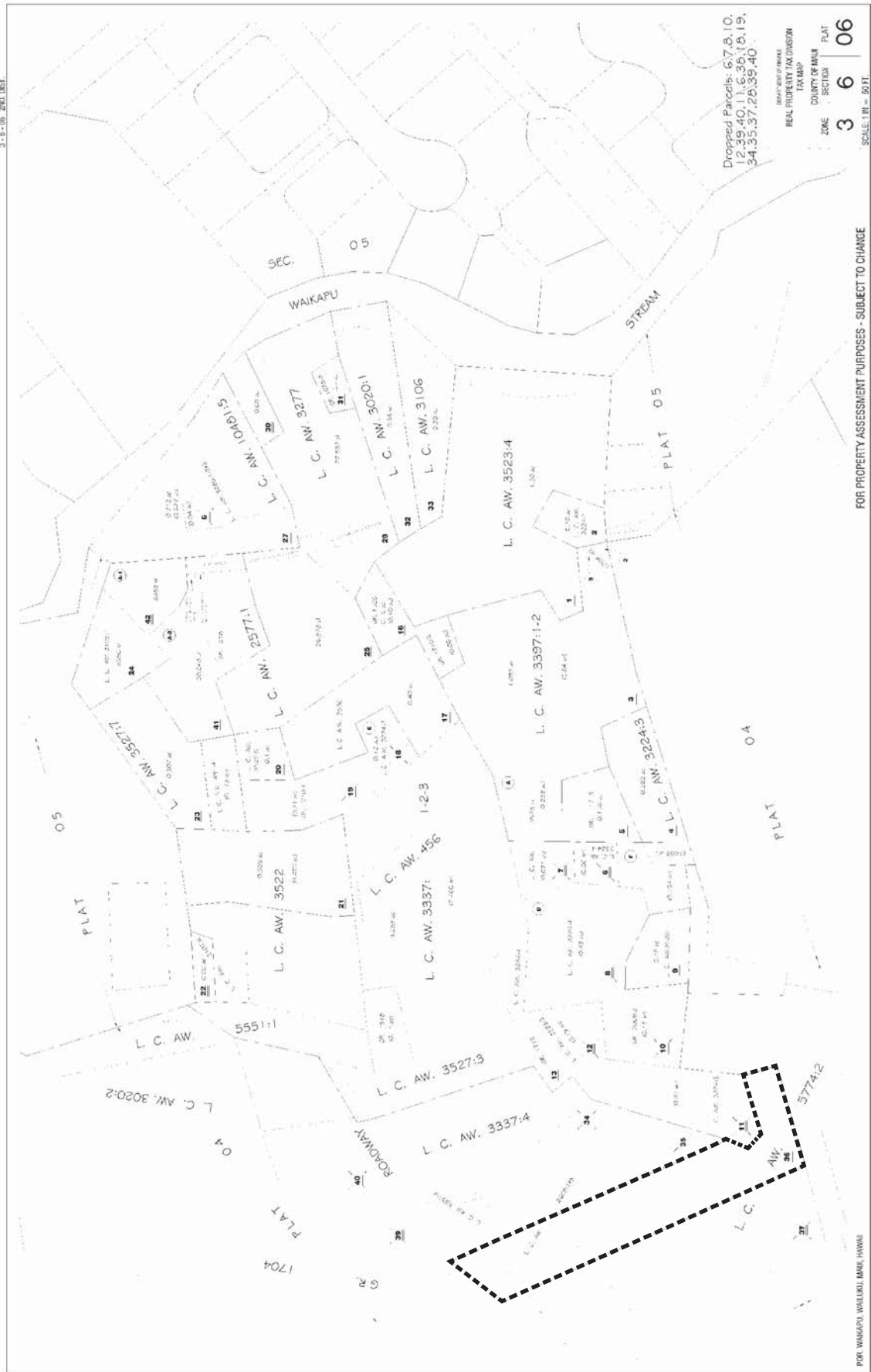
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TMK Nos. (2) 3-6-004: 003 and 006

**Figure 4c**

**TMK MAP**

**WAIKAPU COUNTRY TOWN**



Dropped Parcels: 6.7.8.10.  
12.39.40.11.6.38.18.19.  
34.35.37.28.39.40

DEPARTMENT OF REVENUE  
REAL PROPERTY TAX DIVISION  
TAX MAP

NAME	COUNTY OF MAJOR SECTION	PLAT

SCALE: 1 IN. = 50 FT.

FOR PROPERTY ASSESSMENT PURPOSES - SUBJECT TO CHANGE

PRINTED:



**Figure 4d**  
TMK MAP

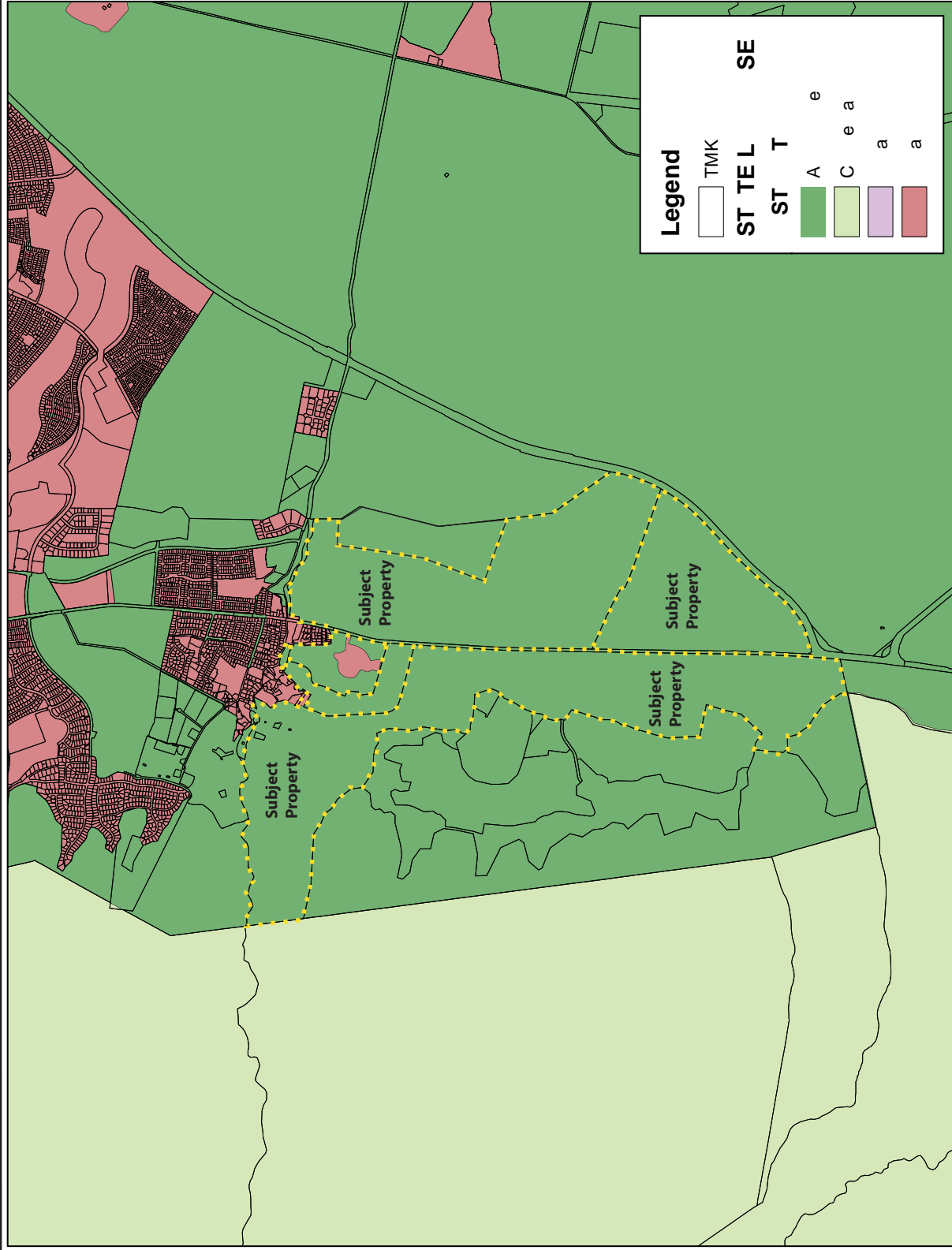
Not to Scale

TMK No. (2) 3-6-006:036

# WAIKAPU COUNTRY TOWN



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HAWAII, LLC**



## FIGURE 5

STATE LAND USE

## DISTRICT BOUNDARIES



Not to Scale

# WAIKAPU COUNTRY TOWN



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CONSULTANTS  
HAWAII, LLC



hiking, biking and walking trails will be incorporated into the project. Public transit will also be accommodated in strategic locations to facilitate the use of transit to jobs-rich areas in Wailuku/Kahului and South and West Maui (See: Figure 6: “Conceptual Land Plan”).

#### C. PURPOSE AND SCOPE OF THE AGRICULTURAL IMPACT ASSESSMENT

The property owner, Waikapu Properties, LLC, has contracted with a professional consultant team to prepare a consolidated Hawaii Revised Statutes (HRS) Chapter 343 Environmental Impact Statement (EIS), State Land Use Commission District Boundary Amendment, Community Plan Amendment and Change in Zoning Application.

The Agricultural Impact Assessment (AIA) will assess the long-term impact of the project on the state’s agricultural industry.

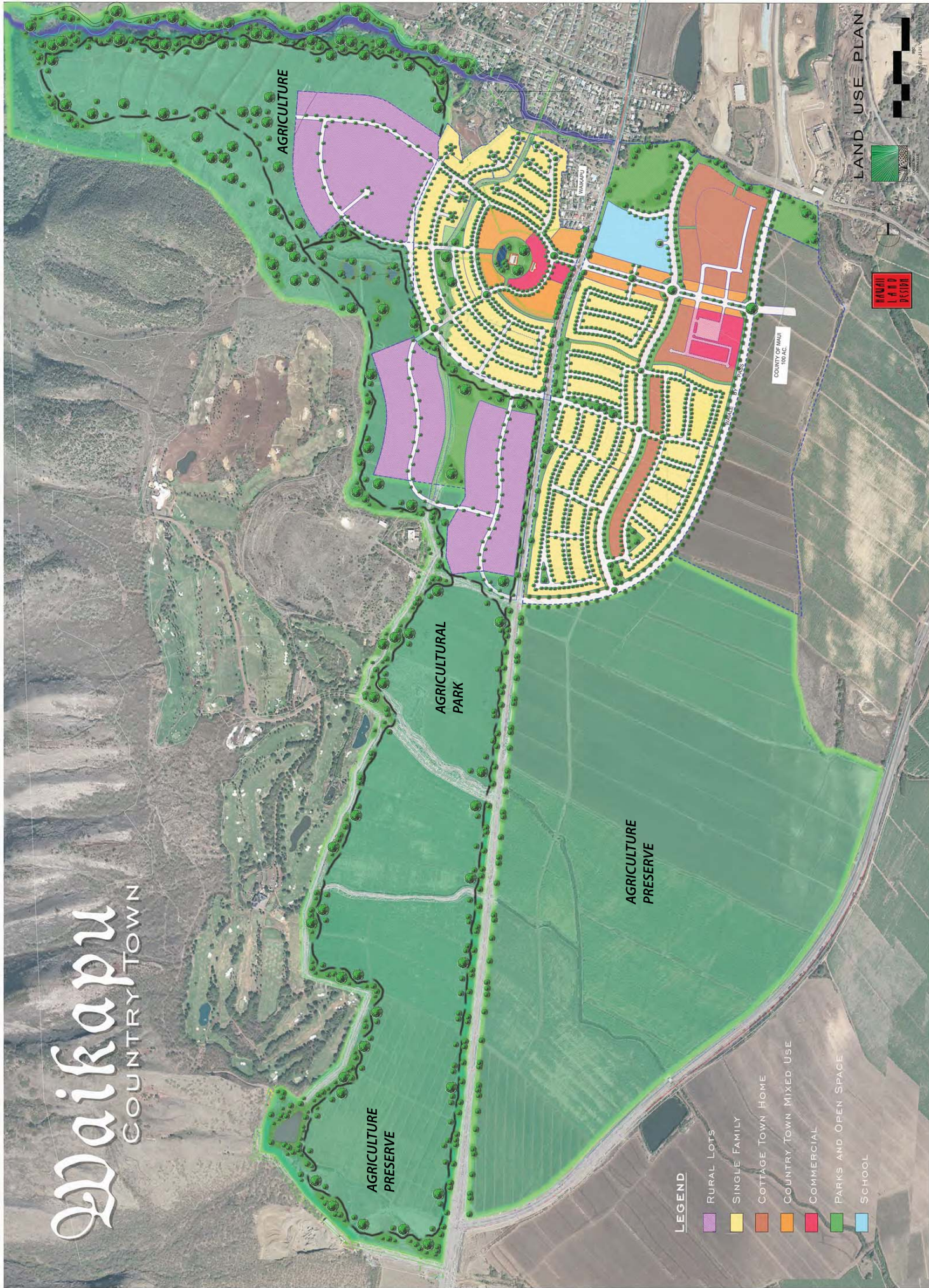
The scope of the study includes the following tasks:

- Assessment of the current status of Hawaii agriculture. This will include an overview of the agricultural industry’s significance to Hawaii’s economy, its current economic standing, its market penetration, and challenges and opportunities.
- Assessment of the current availability of agricultural resources. This will include an assessment of the availability of agricultural lands state-wide and on Maui, current agricultural land use within Maui County, availability of State and County Agricultural Park lots, and agricultural lands proposed for development on Maui.
- Analysis of existing agronomic conditions within the project site. This will include documentation of the following factors: 1) soil types, 2) soil ratings, 3) slopes, 4) solar radiation, 5) rainfall, 6) and existing irrigation systems.
- Description of the recent agricultural history of the property. This will include a description of the past and current operators, including HC&S, Kumu Farms, Maui Tropical Plantation (MTP), Hawaii Taro LLC, and ranching.
- Assessment of the impact of the project on current agricultural operations. This will include an assessment of the project’s impact on the ongoing operations of HC&S, Kumu



# Waikapu

COUNTRY TOWN





Farms, Hawaii Taro LLC and other enterprises actively engaged in farming on the property.

- Analysis of the Project's consistency with State and County Agricultural Policies. This section will identify and discuss the project's consistency with State and County agricultural land use policy.

### **III. HAWAII'S AGRICULTURAL INDUSTRY**

#### **A. ECONOMIC SIGNIFICANCE TO THE ECONOMY**

Agriculture has played a major role in Hawaii's socio-economic development for over 150 years. Hawaii's modern culture, ethnic composition, land use patterns, urban design, and landscapes are all shaped by Hawaii's agricultural history.

However, while agriculture, predominantly sugar and pineapple, dominated Hawaii's economy from the late 1800s through the 1950s, its overall significance has declined dramatically since the advent of mass market tourism. At its peak in 1927, the sugar industry employed 56,600 workers. Shortly thereafter, in 1932, land utilized for sugar peaked at 254,600 acres. By 1957, however, the sugar industry employed just 16,800 workers, a decline of 70% since 1927. Despite its dramatic decline, sugar was still a major contributor to Hawaii's economy in 1957. In that year the leading income generators in Hawaii included these sources:

- Military expenditures at \$308 million;
- Sugar at \$146 million;
- Pineapple at \$110 million; and
- Tourism at \$80 million.<sup>viii</sup>

By 2011, the fortunes of Hawaii agriculture, relative to the total economy, had fallen precipitously. In 2011, the entire agricultural sector in Hawaii employed 6,900 workers, providing 1.15% of wage and salary jobs. Moreover, its share of the gross domestic product (GDP) for all private industries was 0.89%, and, if Federal, State and County government is included, agriculture represented 0.68% of the State's GDP in 2011.<sup>ix</sup>

Likewise, in Maui County, the economic significance of agriculture has fallen. In 2011, agriculture employed 1,600 Maui County workers, which represents 2.4% of the 67,200 wage and salary jobs in the County. In terms of County earnings, in 2008, agriculture generated \$98.55 million as compared to total non-farm earnings of approximately \$3.6 billion.<sup>x</sup>



While agriculture is no longer a dominant industry in Hawaii, it is still important because it creates jobs and facilitates economic diversification. In addition to the 6,900 people that are directly employed by agriculture, the industry creates indirect and induced employment in other sectors of the economy. Using the State of Hawaii's input-output model, it can be estimated that in addition to direct employment, approximately 1,636 indirect jobs were created by agriculture and another 1,695 induced jobs were created by the industry in 2011.<sup>xi</sup>

According to the Maui Agricultural Development Plan (July, 2009), the agricultural industry is important for the following reasons:<sup>xii</sup>

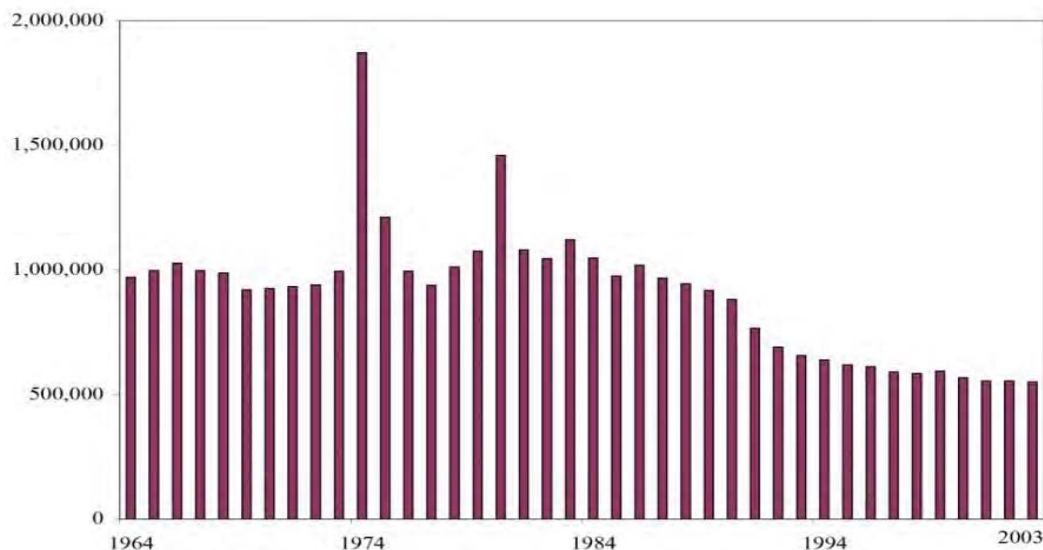
- Agriculture creates jobs;
- Locally grown foods are fresher and of higher quality;
- Locally grown food increases food security;
- Local agriculture provides for Maui's biosecurity;
- Agriculture preserves open space and working agricultural viewscapes; and
- Agriculture contributes to groundwater recharge.

It is because of these reasons that, despite the declining role of agriculture in Hawaii's economy, the State and County maintain strong policies to protect the State's agricultural resources.

## **B. MARKET COMPOSITION**

As noted, agriculture is a far smaller component of Hawaii's economy than it was historically. As Figure 7 shows, the value of agricultural production decreased significantly between 1964 and 2003. The decrease is largely attributed to the closure of sugar plantations throughout the State.

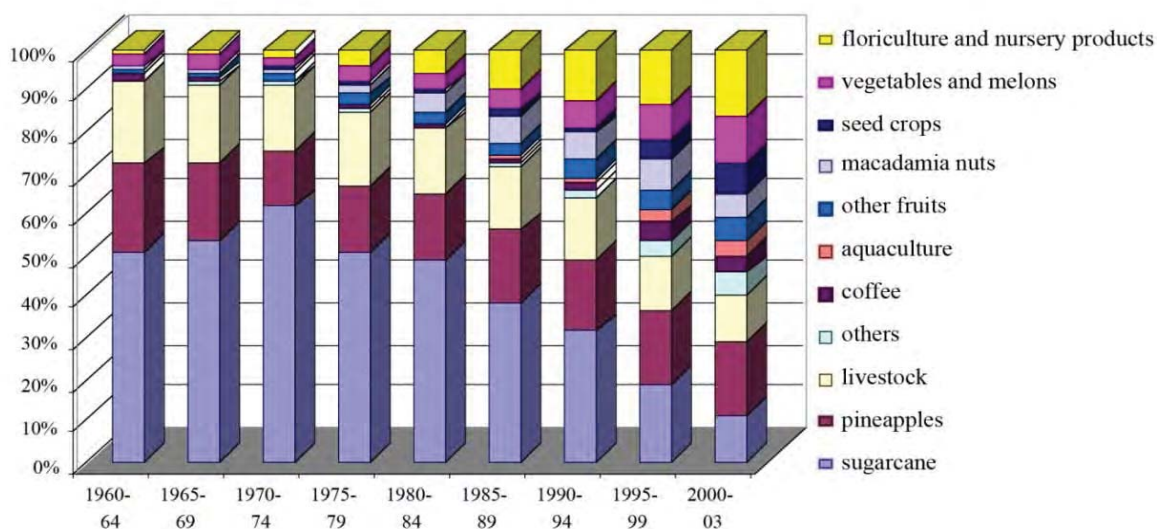
**Figure 7: Value of Hawaii's Agricultural Production between 1964 and 2003**



*Since the mid 1980s, the economic benefits of agricultural production have been in steady decline.*<sup>xiii</sup>

However, since 2003 the market value of crop and livestock sales has increased by 27%, from \$520.47 million in 2003 to \$659.66 million in 2010.<sup>xiv</sup> The increase is largely attributed to the dramatic growth in seed crop sales.

**Figure 8: Relative Value of Hawaii's Major Agricultural Crops from 1960 to 2003**

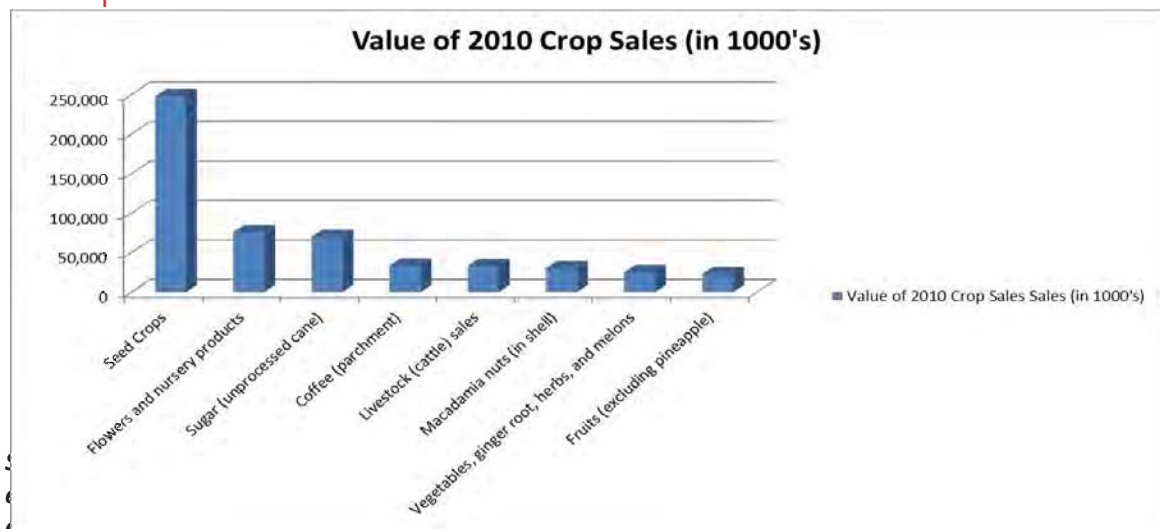


*Agricultural Crop diversification was significant in the years between 1960 and 2003.*<sup>xv</sup>

Figure 8 shows the diversification of Hawaii’s agricultural industry from one dominated by sugar, pineapple and livestock sales during the 1960s to a significantly more balanced and diversified portfolio in 2003. However, as Figure 9<sup>xvi</sup> shows, the explosive growth of the seed crop industry has led to an industry whose value, as measured by sales, is once again dominated by a single crop.

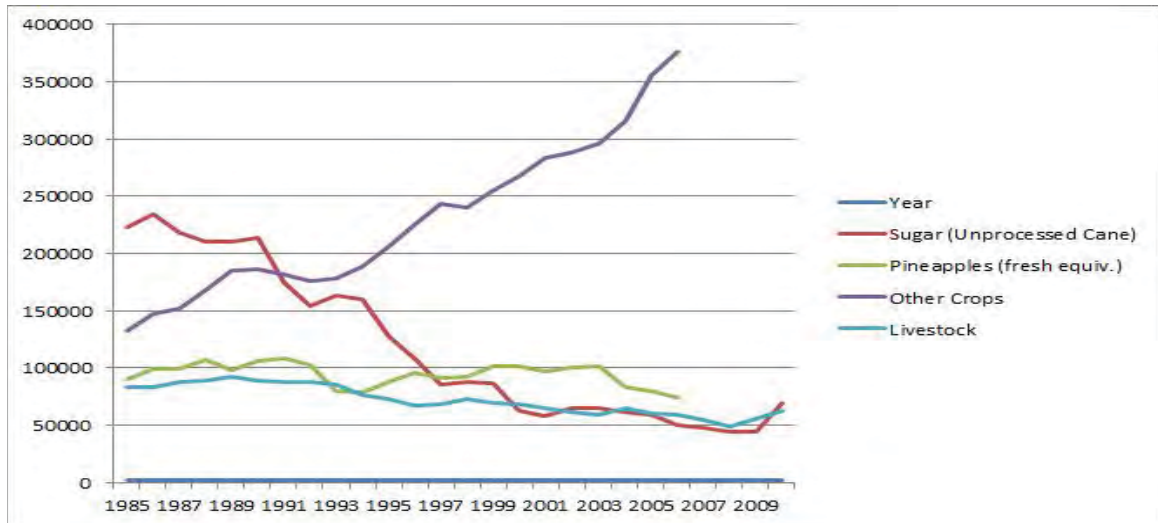
Figures 10 and 11 show the tremendous growth of Hawaii’s seed crop industry and equally dramatic contraction of the sugar industry between 1985 and 2010. During this period, sales of Hawaii coffee, vegetables and melons, macadamia nuts and taro have been relatively flat.<sup>xvii</sup>

**Figure 9: Value of 2010 Crop Sales (in thousands)**



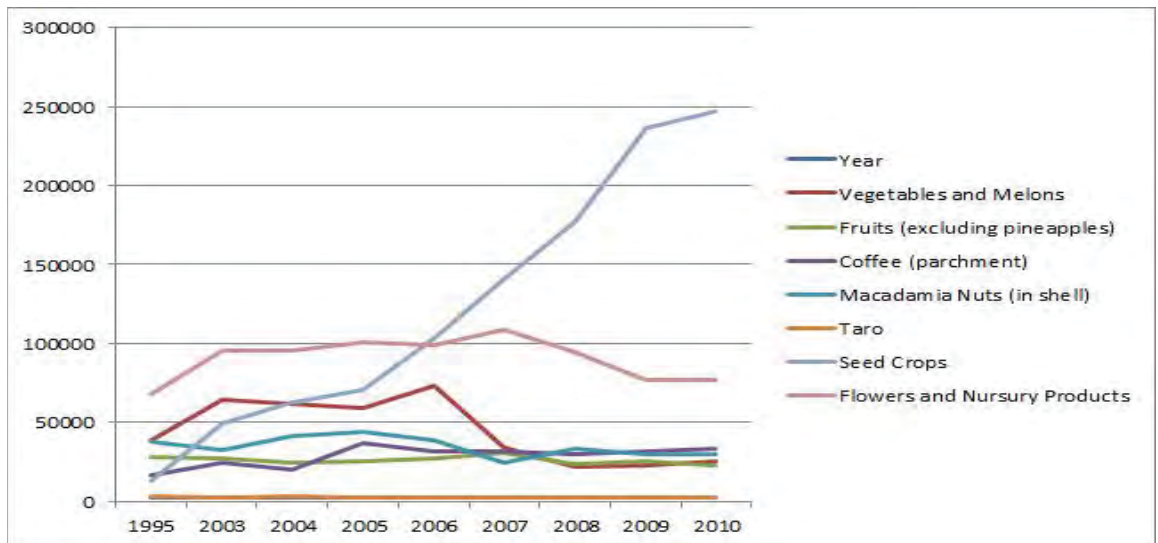
***Seed crop sales far out performed other commodities in 2010.***

**Figure 10: Value of Hawaii's Major Crops between 1985 and 2010 (in thousands)**



*While seed crop sales increased dramatically between 1985 and 2010, sugar sales steadily declined.*

**Figure 11: Value of Hawaii's Crop Sales between 1995 and 2010 (in thousands)<sup>1</sup>**



*Hawaii enjoyed varied crop sales in several different commodities, with seed crops the clear high performer.*

<sup>1</sup> Beginning in 2007 non-published vegetable commodities were not included to avoid disclosure of individual operations. This change produces the sharp decline in vegetable and melon sales as shown in the graph.



## C. MARKET SHARE

### 1. Hawaii Market

It has been well documented that Hawaii farmers face intense competition from U.S. Mainland and International food suppliers for Hawaii market sales. In a 2008 study by the University of Hawaii, College of Tropical Agriculture and Human Resources (UH-CTAHR),<sup>xviii</sup> it was documented that Hawaii food consumption expenditures grew from \$2.6 billion in 1995 to \$3.7 billion in 2005, increasing at a rate of 3.4% annually. Of the food consumed in Hawaii, it further notes that approximately 85% is imported.

For local market sales, one would expect that Hawaii farmers would have a comparative advantage because of lower shipping costs and the ability to deliver fresher product. However, as documented by UH-CTAHR's study, in 2005 off-shore suppliers dominated the local market for fresh fruits and vegetables, beef, pork, chicken, eggs and milk, as is shown in Table 1:

**Table 1: 2005 Market Share for Hawaii Agricultural Products**

<b>Agricultural Product</b>	<b>% of Hawaii market held by off-shore suppliers</b>	<b>% of Hawaii market held by Hawaii suppliers</b>
Beef	95.50	4.50
Pork	96.10	3.90
Eggs	80.00	20.00
Fresh Milk	90.00	10.00
Fresh Fruits	65.22	34.78
Fresh Vegetables	66.50	33.50

*Off-shore suppliers greatly exceeded Hawaiian suppliers for all products in 2005*

According to the study, Hawaii farmers only increased market share in the fresh vegetable market. The UH-CTAHR study notes that the rate of growth in the production of fresh vegetables in Hawaii outpaced consumption at an annual rate of 5.8% to 4.3%,

which means Hawaii is becoming more self-sufficient in vegetables. In beef, Hawaii production and consumption remained stable at an annual growth rate of 4.4%. In fresh fruits, fresh milk, eggs and pork, annual production has decreased and Hawaii has become less self-sufficient.

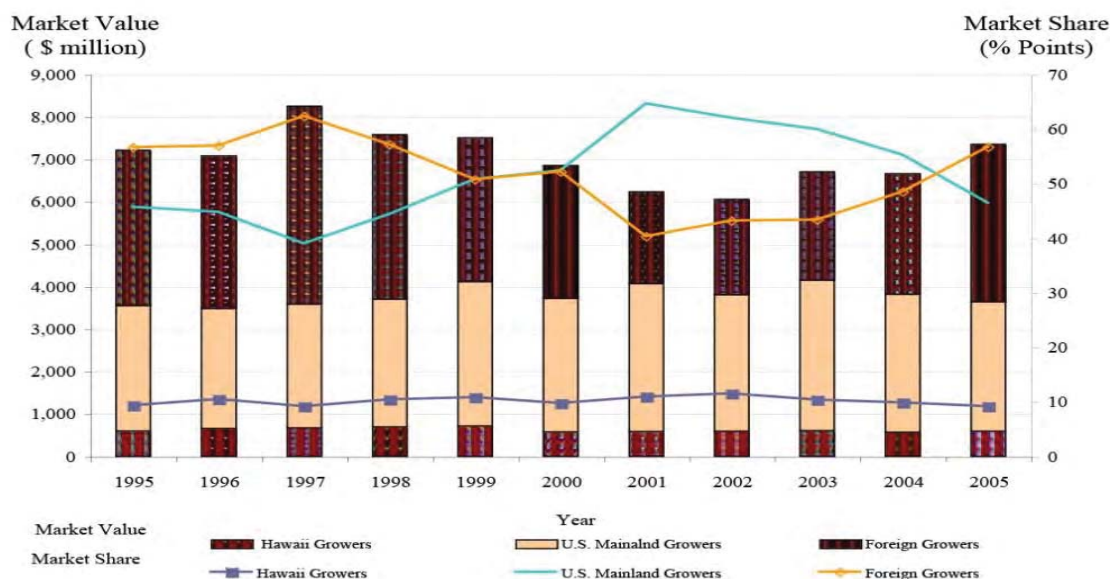
## **2. Mainland Market**

In 2005, UH-CTAHR conducted an analysis of Hawaii's comparative advantage in the US Mainland market for the following eleven export crops:

1. Fresh papaya;
2. Fresh pineapples;
3. Processed pineapples;
4. Coffee;
5. Seed corn;
6. Dendrobium (spray)
7. Cut and potted foliage;
8. Raw sugar (cane);
9. Macadamia nuts;
10. Fresh cut anthuriums; and
11. Potted orchids.

In this study, UH-CTAHR found that Hawaii increased its competitiveness (as measured by market share) in seed corn, coffee and dendrobiums. In five crops – fresh pineapple, processed pine, raw sugar, potted orchids, and foliage – Hawaii became relatively less competitive. In three crops – fresh papayas, macadamia nuts, and anthuriums – Hawaii maintained its comparative advantage.<sup>xix</sup>

Figure 12: Hawaii Market Share in U.S. Mainland Market for Select Products (in thousands)



*Hawaii growers maintained a steady Mainland market share in the 10 years between 1995 and 2005.*

Figure 12 above shows the U.S. Mainland market share controlled by Hawaii growers between 1995 and 2005 for the eleven agricultural products. During the period, Hawaii retained a relatively stable share of the aggregate market value of these products.

### 3. Japanese Market

In 2010, UH-CTAHR conducted an analysis of Hawaii's competitiveness in the Japanese market for twenty agricultural products.<sup>xx</sup> CTAHR found that between 1995 and 2008 the aggregate average annual value of Hawaii's agricultural exports increased from \$31.46 million (1995-1999) to \$52.82 million (2005-2008). However, the large increase was primarily the result of the tremendous growth in deep sea water sales to Japan. Of the twenty products analyzed, eight are "traditional" crops (i.e., where the fresh product and/or the input into the processed product may be grown by farmers in Hawaii). When analyzing only these eight products, just three, unroasted coffee, roasted coffee and fresh or dried pineapple, increased market share in Japan between 1995 and 2008. The remaining five products, cut flowers/buds, fruits and nuts,

macadamia nuts (fresh or dried), papayas, macadamia nuts (processed), and pineapple (processed) had declining market shares. Table 2 shows the average value of Hawaii exports to Japan in these eight products between 1995 and 2008.

**Table 2: Japanese Market Sales between 1995 and 2008 of Select Hawaii Products**

Product	Average Value (US\$M)		
	1995-1999	2000-2004	2005-2008
Coffee, unroasted	2.22	2.04	3.13
Cut Flowers/Buds	2.63	1.60	0.67
Fruits and Nuts	0.18	0.22	0.15
Macadamia Nuts, Fresh or Dried	0.27	0.03	0.02
Papayas	12.14	6.47	3.50
Pineapples, Fresh or Dried	0.00	0.68	0.45
Coffee Roasted	0.51	1.08	2.04
Macadamia Nuts, Processed	1.80	1.80	1.01
Pineapples, Processed	1.98	0.92	0.53
<b>TOTAL</b>	<b>21.73</b>	<b>14.84</b>	<b>11.5</b>

*As seen, the average annual value of exports to Japan in these eight products decreased from \$21.73 million (1995-1999) to \$11.5 million (2005-2008).*

In conclusion, Hawaii farmers face stiff competition in local, national, and international markets for agricultural products. In the local market, off-shore suppliers dominate the market for fresh fruits and vegetables, beef, pork, chicken, eggs and milk. While Hawaii growers have slightly increased their market share of fresh vegetables and maintained their very small share of the beef market, they have lost market share in pork, chicken, eggs and milk.

In the U.S. Mainland market, Hawaii growers have had varying degrees of success but overall have sustained the aggregate value of export sales between 1995 and 2005. In



the Japanese market, exports of “traditional” agricultural crops, such as pineapple, papaya and cut flowers, have experienced a significant decrease in the value of sales between 1995 and 2008.

#### D. INDUSTRY CHALLENGES AND OPPORTUNITIES

##### 1. Industry Challenges

Some of the more significant impediments to agricultural development in Hawaii are the following economic factors:

- High labor costs;
- High transportation costs;
- High energy costs; and
- High land costs.

In 2012 UH-CTAHR conducted an analysis of the economic performance and cost structure of Hawaii and U.S. Mainland farms for the year 2007.<sup>xxi</sup> Among the study’s significant findings are the following impacts:

- In 2007, average farm sales for Hawaii farms were less than the average cost of inputs. Each dollar spent on Hawaii farms in 2007 generated only \$0.96 of production, whereas each dollar spent on Mainland farms generated \$1.14.
- The average Hawaii farm had a net loss of \$20 per acre. The average mainland farm had a net profit of \$40 per acre.
- Small- to average-sized farms (\$10,000 to \$1,000,000) in Hawaii performed nearly as well as similarly sized mainland farms. Hawaii farms of that size had an output-input ratio of 1.21 while Mainland farms were 1.22.
- Hawaii’s vegetable and melon sector and nursery/floriculture/greenhouse sector achieved net profits, while all other sectors suffered net losses.

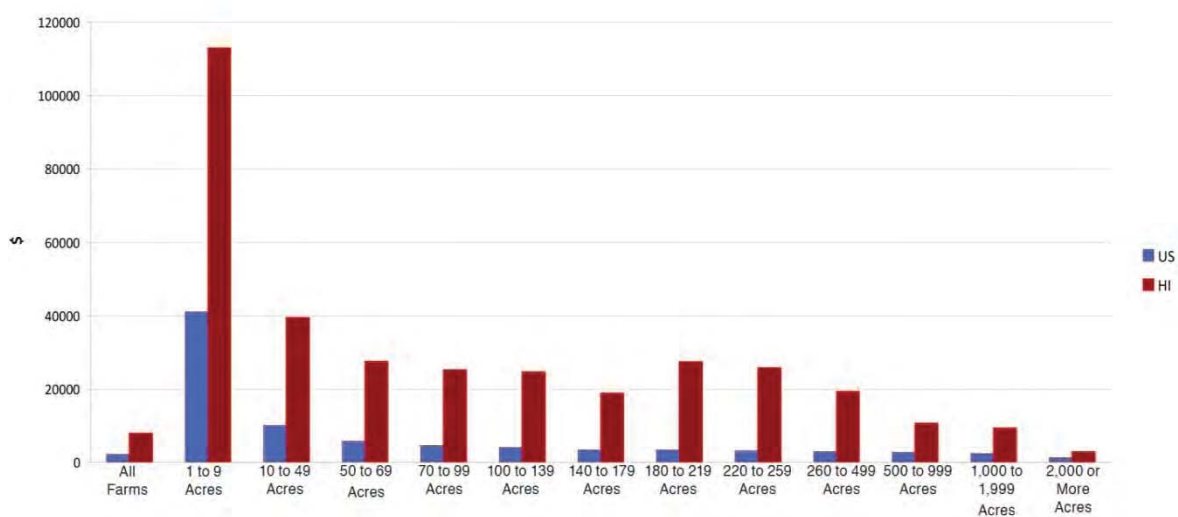
The following are among UH-CTAHR's findings related to cost structure:

- **Labor.** Hawaii labor expenditures were 43% higher than U.S. Mainland farms. For Hawaii farms that hired labor, labor costs equaled about 38% of total sales, while in the U.S. Mainland labor costs were just 9% of sales. Relative to Hawaii's U.S. Mainland market competitors (foreign suppliers), Hawaii has the highest monthly average wage. Compared to its Japanese market competitors, Hawaii has the 3<sup>rd</sup> highest average monthly wage.
- **Transportation costs.** Relative to its U.S. Mainland foreign market competitors, Hawaii has the highest per mile transportation cost to the U.S. Mainland market. Relative to its major Japanese market competitors, Hawaii farmers have the highest transportation cost.

When shipping to the Honolulu market, however, Hawaii farmers have a significant cost advantage. For Oahu farmers, this cost advantage is considerable as no air or ocean shipping is required. For neighbor island farmers, ocean shipping is relatively affordable, while airfreight is expensive. This fact was documented in a 2010 UH-CTAHR study comparing the cost of shipping between Hilo and Honolulu and Los Angeles and Honolulu. The study found the cost for ocean freight was six times less expensive between Hilo and Honolulu than between Los Angeles and Honolulu. However, the study also found that in 2010 air freight between Hilo and Honolulu was nearly twice as expensive as air freight between Los Angeles and Honolulu. At the time of the study, if the same commodity were to be shipped, it was about 114% more expensive to ship by air between Los Angeles and Honolulu than by ocean freight between Hilo and Honolulu.<sup>xxii</sup>

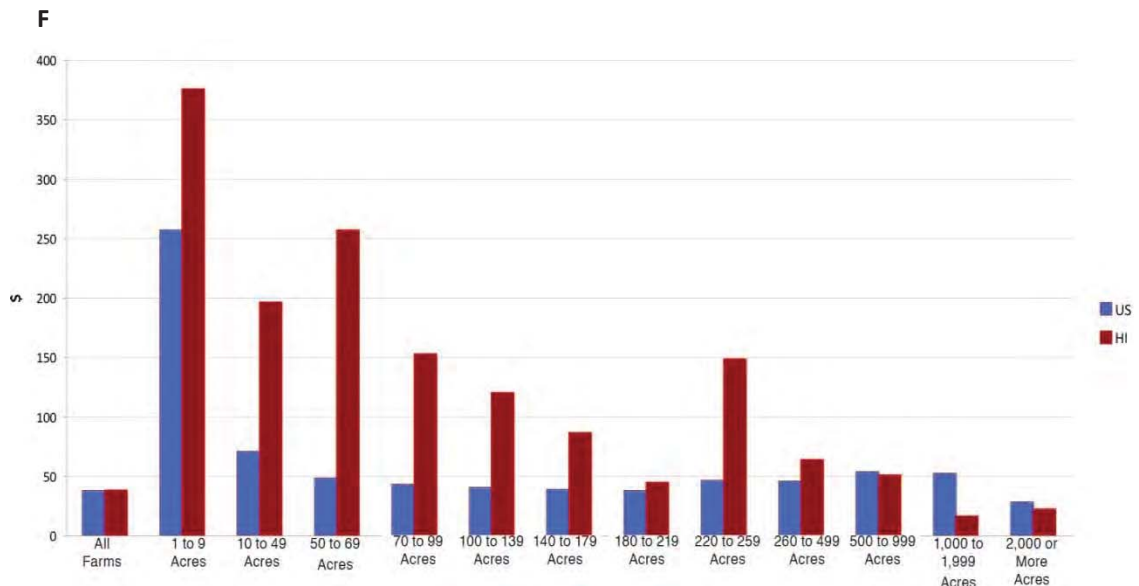
- Energy Costs.** Compared to U.S. Mainland farms, electric/gasoline costs are equivalent to 10% of input costs for Hawaii farmers, whereas they are only 6% for U.S. Mainland farmers. In a comparison of input prices between Hawaii and its major export competitors, it was found that of 52 countries with available data, Hawaii (if assumed to be a separate country) had the 5<sup>th</sup> highest electricity costs. By comparison, the U.S. Mainland was 39<sup>th</sup>.<sup>xxiii</sup>
- Land.** As shown in Figure 13<sup>xxiv</sup>, the value of an acre of agricultural land in Hawaii is considerably higher than the value of an equivalent acre in the U.S. Mainland. As such, it is not surprising, as shown in Figure 14, that for farms that are less than 500 acres the cost per acre to rent is considerably more expensive in Hawaii than on the U.S. Mainland.

**Figure 13: Cost per Acre of Agricultural Land in Hawaii and the U.S. Mainland**



*The cost per acre of agricultural land in Hawaii greatly increases costs for Hawaii growers.*

Figure 14: Cost per Acre to Rent Agricultural Land in Hawaii and the U.S. Mainland



*Rent costs reflect the high cost of agricultural land in Hawaii.*<sup>xxv</sup>

## 2. Industry Opportunities

Although Hawaii farmers face higher input costs than their U.S. Mainland and foreign competition, Hawaii is still a significant supplier of agricultural products. In 2010, the value of all crop and livestock sales in Hawaii was approximately \$660 million,<sup>xxvi</sup> and despite having relatively high input costs, the seed corn industry has demonstrated that Hawaii agriculture can develop comparative advantage in the right niches.

The following discusses the opportunity for Hawaii agriculture in the following three sectors:

- a. Import Replacement;
- b. Seed Crops; and
- c. Biofuel Crops.



**a. Import Replacement**

As noted, approximately 85% of food consumed in Hawaii is imported. Table 3 shows Hawaii's consumption and estimated production in 2005 of the following agricultural products: beef, pork, eggs, fresh milk/cream, fresh fruits, and fresh vegetables.<sup>xxvii</sup>

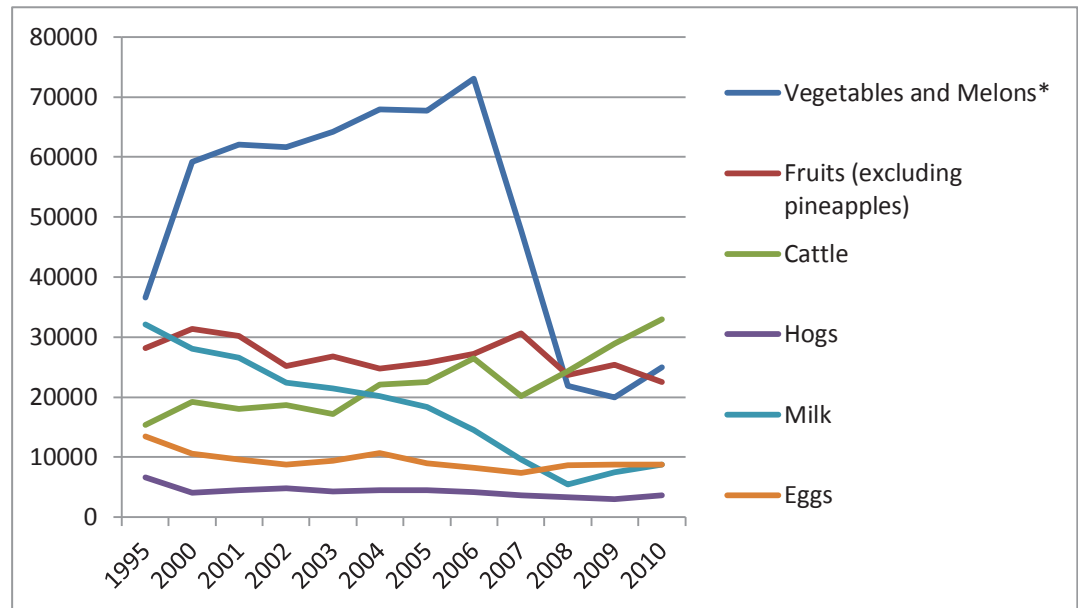
**Table 3: Value of Consumption and Production of Select Agricultural Products in Hawaii (in thousands)**

<b>Agricultural Product</b>	<b>Total Estimated Consumption</b>	<b>Estimated Hawaii Production</b>	<b>Estimated Hawaii Market Share</b>
Beef	112.80	5.08	4.5
Pork	116.74	4.55	3.9
Eggs	44.90	8.98	20.00
Fresh Milk and Cream	183.87	18.39	10.00
Fresh Fruits	61.54	21.40	34.78
Fresh Vegetables	180.87	60.92	33.50

***There is a significant gap between foods consumed in Hawaii and those produced in Hawaii.***

As shown, Hawaii has very low market share in the local beef, pork, eggs and fresh milk markets. However, Hawaii's market share in the fruit and vegetable markets is over 30%. Figure 15 shows sales of the above-referenced products between 1995 and 2010.<sup>xxviii</sup> Despite having the advantage of proximity to the local market and lower shipping costs, Hawaii farmers have been unable to significantly increase the value of their production.

**Figure 15: Hawaii Crop Sales between 1995 and 2010 (in thousands)<sup>2</sup>**



*Hawaii crop sales remained steady between 1995 and 2010. Vegetable and melon sales were not reported between 2007 and 2010.*

In an October 2011 study, UH-CTAHR<sup>xxix</sup> made six recommendations to help address the higher agricultural input costs faced by Hawaii farmers. These recommendations include the following items:

1. **Labor.** Substitute capital, i.e. machinery and equipment, for labor.
2. **Energy/Electricity.** Develop alternative off-grid sources of electricity, such as solar, wind and hydro, to mitigate high electricity costs.
3. **Fertilizer.** Utilize alternative sources of recyclable waste materials in lieu of imported fertilizers.

<sup>2</sup> Beginning in 2007 non-published vegetable commodities were not included to avoid disclosure of individual operations. This change produces the sharp decline in vegetable and melon sales as shown in the graph.

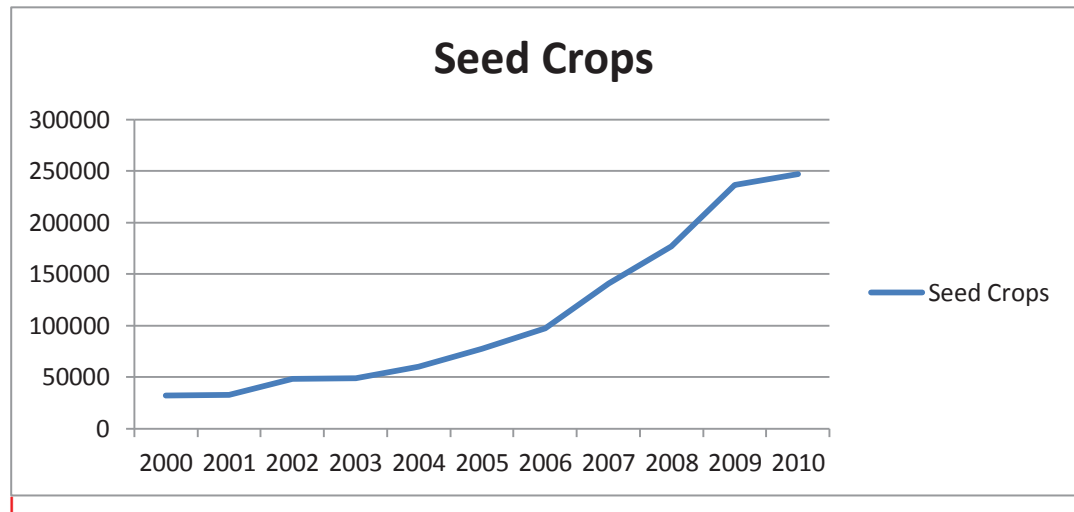
4. **Agricultural Land.** Seek the designation of Important Agricultural Lands (IAL). Place additional acreage in State and County agricultural parks to improve access to affordable farmland and long-term leases.
5. **Transportation Costs.** Encourage the production of crops that can be sold in local markets.

UH-CTAHR also recommends that Hawaii farmers consider shifting production to lower value fruits and vegetables, where a significant percentage of the input costs for these products is transportation costs. They also suggest production of highly perishable and niche products, since quality over price is often a consideration of consumers.

**b. Seed Crops**

The rapid growth of Hawaii's Seed Crop industry demonstrates that agriculture in Hawaii can be profitable. Hawaii's Seed Crop industry is dominated by 10 farms that cultivate seed corn, soybean, wheat, sunflower, and other seed crops. However, seed corn is the dominant crop and in 2011 represented approximately 95.6% of all seed crop sales.<sup>xxx</sup> Figure 16 shows the dramatic growth of the industry from 2000 to 2010.

**Figure 16: Value of Hawaii's Seed Crop Sales between 2000 and 2010 (in thousands)**



***The value of seed crop sales increased 700% from 2000 to 2010.***

As shown in Figure 16, seed crop sales grew by 700%, from \$35.3 million in 2000 to \$247.22 million in 2010. In 2010, seed crop sales represented 37% of all crop and livestock sales in the state. The next largest contributor was flower and nursery products at 11%, then sugar sales at 10.6%. According to most current accounting, the seed crop industry created 1,397 jobs, which is equivalent to 20.2% of statewide agricultural jobs.<sup>xxxi</sup>

According to the February, 2013 report prepared for the Hawaii Farm Bureau Federation and the Hawaii Crop Improvement Association entitled “Hawaii’s Seed Crop Industry: Current and Potential Economic and Fiscal Contributions”, the industry is successful in Hawaii for the following reasons:

- Year-round growing conditions allowing up to four crop cycles per year;
- Availability of a highly skilled agricultural workforce;
- Availability of land and water; and
- A stable political and economic environment.



During the 2005-2006 growing season, there were 4,200 acres harvested that produced 8 million pounds of seed. During the 2010-2011 growing season, there were 7,100 acres harvested that produced 9.77 million pounds of seed.<sup>xxxii</sup> It is expected that the industry will continue to experience growth, but as it matures it is estimated that growth may be at a slower rate than over the past ten years.<sup>xxxiii</sup>

**c. Bio-Fuel Crops.**

The State of Hawaii is one of the most oil dependent states in the Country. In 2008, approximately 85% of its energy came from imported petroleum. In comparison, the national average was 35.7%.<sup>xxxiv</sup> In 2010, the State imported 46.3 million gallons of petroleum at a cost of approximately \$5.09 billion.<sup>xxxv</sup>

In response to the State's dependency upon imported fossil fuels, it adopted Renewable Portfolio Standards in 2001 and established the Hawaii Clean Energy Initiative (HCEI) goals in 2008. The Renewable Portfolio Standards (RPS) established numeric targets for renewable energy use by Hawaii's electric companies. At present, the RPS standards for renewable energy (wind, solar, biomass, bio-fuels, etc.) have the following target dates:<sup>xxxvi</sup>

- 10 percent of net electricity sales by December 31, 2010;
- 15 percent of net electricity sales by December 31, 2015;
- 25 percent of net electricity sales by December 31, 2020; and
- 40 percent of net electricity sales by December 31, 2030).

The HCEI, an agreement between the State and HECO, has a goal of increasing renewables total share of energy generation to 40 percent, while reducing overall demand by 30 percent through conservation by 2030.

HCEI envisions that locally produced bio-fuels will be a significant contributor to Hawaii's renewable energy portfolio. HCEI's fuels strategy includes these objectives:<sup>xxxvii</sup>

- Evaluating local agricultural potential and supporting its development;
- Investing in key logistical infrastructure;
- Evaluating and developing renewable fuel processing infrastructure; and
- Matching potential fuel supply to sources of demand.

In its 2011 strategic plan<sup>xxxviii</sup>, HCEI noted that large scale production of biofuels was approximately five (5) years away from being commercially viable. There are currently several pilot projects underway in the State. These projects are assessing the viability of various crops and bio-refinery technologies. HCEI has established goals for locally produced renewable fuels for the years 2015, 2020, 2025 and 2030. Its 2015 goals are shown in Table 4 below.

**Table 4: HCEI Renewable Fuel Goals for 2015**

Source of Demand	Estimated Total Green Replacement Fuel (2015)
The HECO Companies	45 MGY renewable fuel
KIUC	100,000 gal/year
The Department of Defense	TBD MGY renewable JP8 TBD MGY renewable J5 TBD MGY renewable F76 TBD MGY renewable Diesel Fuel/biodiesel
The Ground Transport Sector	Maintain current E10 standard and biodiesel usage

*Goals for 2015 reflect efforts across the economic sectors.*

Table 5 shows HCEI's renewable fuel goals for 2020. The 2020 goals are predicated on locally produced biofuels being commercially viable and HECO and the Department of Defense implementing plans to accelerate biofuel usage.

**Table 5: HCEI Renewable Fuels Goal for 2020**

Source of Demand	Estimated Total Green Replacement Fuel (2020)
The HECO Companies	80 MGY renewable generation fuel (based off estimated RPS demand)
KIUC	TBD
The Department of Defense	32 MGY renewable fuels
The Ground Transport Sector	50 MGY of renewable fuels

***2020 Renewable Fuels goals show a significant increase over 2015.***

In its strategic plan, HCEI states that the “future price of oil will be the deciding factor, as it will materially impact the bottom line for each of the alternative outcomes under consideration”.

HCEI’s goal is to meet in-state demand for fuel with locally produced bio-fuels (approximately 500 MGY) by 2030. If locally produced bio-fuel is not commercially competitive, HCEI’s preferred alternative is to source such fuel from domestic U.S. suppliers and then from foreign suppliers.

#### **Bio-Fuel Viability in Hawaii**

The most comprehensive assessment of the viability of bio-fuel production in Hawaii was conducted by Black & Veatch and the University of Hawaii for the State of Hawaii’s Department of Business, Economic Development, and Tourism Strategic Industries Division (DBETD).<sup>xxxix</sup> The study was completed in January 2010.

The purpose of the study was to assess the potential feedstocks, technologies, and economics of biofuel production in Hawaii to meet the State of Hawaii’s alternative fuel standards, which mandate 10% of transportation fuels from renewable sources by 2010, 15% by 2015, and 20% by 2020. The study addressed several topics, including the following factors:

- Biomass conversion technology options and issues;
- Biomass residue availability;
- Energy crop potential;
- Evaluation of energy crop economics in Hawaii; and
- Emerging and innovative options for biofuel production.

For the purpose of its analysis, the study identified approximately 300,000 acres of prime irrigated land and 800,000 acres of non-prime rainfed land that would be suitable for energy crops. The study concludes that displacing 20% of the gasoline and diesel fuel consumed in Hawaii in 2007 with bio-fuel from locally grown feedstocks would require about 10%, or 110,000 acres, of the lands studied. Therefore, displacing 100% of all gasoline and diesel fuel consumed in Hawaii would require approximately 550,000 acres.

The study estimates that based on projected future prices of retail gasoline and diesel fuels, together with potential cost improvements in alternative fuel production costs, locally produced biofuels would likely not be competitive until at least 2015 when average U.S. gasoline prices reach \$3.50/gallon or more. It should be noted that the average price of a gallon of regular gasoline in the U.S. as of July 11, 2013 was \$3.518/gallon, while the average price in Hawaii was \$4.307.

#### E. CONCLUSIONS

Hawaii farmers face stiff competition in local, national, and international markets for agricultural products. In the local market, off-shore suppliers dominate the market for fresh fruits and vegetables, beef, pork, chicken, eggs and milk. While Hawaii growers have slightly increased their market share of fresh vegetables and maintained their very small share of the beef market, they have lost market share in pork, chicken, eggs and milk.



In the U.S. Mainland market, Hawaii growers have had varying degrees of success but overall have sustained the aggregate value of export sales between 1995 and 2005. In the Japanese market, exports of “traditional” agricultural crops, such as pineapple, papaya and cut flowers, have experienced a significant decrease in the value of sales between 1995 and 2008.

Significant impediments to agricultural development in Hawaii include high labor costs, high transportation costs, high energy costs and high land costs. Hawaii farms face labor costs that have been documented to be 43% higher than U.S. Mainland farms. Hawaii farmers also have the highest per mile transportation cost to the U.S. Mainland market. However, when shipping to the Honolulu market, Hawaii farmers enjoy a significant cost advantage. The cost of purchasing agricultural land in Hawaii is significantly more expensive than it is in the U.S. Mainland. The cost of renting is also more expensive when the lands being rented are less than 500 acres.

Despite the major challenges that Hawaii farmers face, they are still competitive in many sectors and numerous opportunities are still available. The fact that 85% of food consumed in Hawaii is imported creates opportunities for Hawaii farmers to displace imports, thereby creating jobs and increasing tax revenues in Hawaii. UH-CTAHR recommends that Hawaii farmers consider shifting production to lower value fruits and vegetables, where a significant percentage of the input costs are transportation costs. They also suggest production of highly perishable and niche products, since quality over price is often a consideration of consumers.

Hawaii’s seed crop industry has demonstrated that Hawaii agriculture can have significant comparative advantage in the right sectors. Since 2000, seed crop sales have grown by 700%, from \$35.3 million in 2000 to \$247.22 million, in 2010. According to the industry, Hawaii is successful in this market for the following reasons:

- Year-round growing conditions allowing up to four crop cycles per year;
- Availability of a highly skilled agricultural workforce;
- Availability of land and water; and
- A stable political and economic environment.

Substituting locally grown biofuels for imported petroleum may also provide opportunities for Hawaii farmers over the next several decades. In 2008, approximately 85% of Hawaii's fuel came from imported petroleum. There are many crops, including sugarcane, which can be grown in Hawaii and converted into fuel. The Hawaii Clean Energy Initiative (HCEI) has established aggressive goals for the use of renewable fuels through 2030. One of its primary strategies is to evaluate local agricultural potential for developing bio-fuels. A 2010 study done by Black & Veatch and the University of Hawaii for the State of Hawaii found that displacing 20% of the gasoline and diesel fuel consumed for ground transportation in Hawaii in 2007 with bio-fuel from locally grown feed-stocks would require about 10% of Hawaii's agricultural lands.

## **IV. STATE AND COUNTY AGRICULTURAL LANDS**

### **A. STATE OF HAWAII**

The total land area in the State of Hawaii is 4,112,388 acres, approximately 47% of which, or 1,928,318 acres, is in the State Agricultural District.<sup>xi</sup> Depending upon the agricultural land rating system used, it is estimated that from 21% to 46% of these lands are very productive for agriculture. Within the State of Hawaii there are four agricultural land rating systems:

1. The Land Capability Classification (LCC) system developed by the United States Department of Agriculture in 1972;
2. The Land Study Bureau's (LSB) Detailed Land Classification system developed between 1965 and 1972 by the University of Hawaii;
3. The Agricultural Lands of Importance to the State of Hawaii (ALISH) rating system developed by the State Department of Agriculture, United States Department of Agriculture, and the University of Hawaii College of Tropical Agriculture and Human Resources between 1977 and 1978;
4. The Land Evaluation and Site Assessment (LESA) system developed between 1983 and 1986 by the LESA Commission.

Hawaii Revised Statutes (HRS) Chapter 205 uses the LSB system to regulate certain uses within the State Agricultural District. Maui County Code, Title 19.30A uses the ALISH rating system as criteria to determine lands that should be given the highest priority for preservation.

The LSB system ranks lands on a scale from "A," which is very good, to "E," which is not suitable. The LSB system also provides crop productivity ratings for pineapple, sugar, vegetables, forage, grazing, orchard crops, and timber. The ALISH system groups land into three classifications: Prime, Unique, and Other. Prime lands are considered to have the best soils with physical, chemical and climatic conditions to favor mechanized field crops. Unique agricultural lands are also considered to be productive for high value crops, such as coffee, taro, and vegetables. Other agricultural lands are not as productive as Prime and Unique lands and may need greater

irrigation and field management to be productive. The following table identifies the approximate acreage of productive agricultural lands in Hawaii using the LSB and ALISH rating systems.<sup>xli</sup>

**Table 6: Hawaii’s Important Agricultural Lands by Rating System**

<i><b>Hawaii’s Important Agricultural Lands by Rating System</b></i>	<i><b>Acres</b></i>	<i><b>Percentage of State Ag District</b></i>
University of Hawaii Land Study Bureau (LSB) Lands Lands Rated “A”, “B”, “C”	447,250	24
Agricultural Lands of Importance to the State of Hawaii (ALISH) Prime, Unique, Other	846,363	46

***46% of Hawaii agricultural lands are considered Prime, Unique or Other by ALISH.***

#### B. CURRENT AVAILABILITY OF STATE AGRICULTURAL LANDS

As discussed, there are 1.93 million acres within the State Agricultural District. Of these lands, between 21% and 46% are considered very productive. Using the LSB rating system, there are approximately 447,250 acres that are classified “A”, “B”, or “C”. These lands should be considered very suitable for agriculture. Using the ALISH rating system, there are 846,363 acres of “Prime”, “Unique” or “Other” agricultural lands that are suitable for agriculture.<sup>xlii</sup>

As Table 7 shows, there has been a release of approximately 316,590 acres from crop farming, primarily sugar and pineapple, since 1960. While some of these lands have been absorbed by urban development and other agricultural uses – such as seed crops, forestry crops, macadamia nuts, and floriculture – much of the lands are fallow and are available on Oahu, Maui, Molokai, Lanai and Kauai.<sup>xliii</sup>



**Table 7: Acreage in Crop in Hawaii between 1960 and 2010**

<b>Crop</b>	<b>1960</b>	<b>1989</b>	<b>1999</b>	<b>2010</b>	<b>Difference 1960-2010</b>
Sugarcane	287,400	170,800	67,000	34,500	-252,900
Pineapple	96,500	32,700	21,000	1,350 <sup>xliv</sup>	-96,500
Vegetables and Melons	3,445	5,000	8,200	2,700	-745
Fruits (Excluding Pineapples)	2,142	7,400	8,100	4,100	1,958
Coffee	6,188	3,000	7,700	8,000	+1,812
Macadamia Nuts	3,515	22,300	19,900	17,000	+13,485
All other crops	NA	4,800	16,200	21,100	+16,300
<b>TOTAL ACRES</b>					<b>-316,590</b>

*Coffee, fruits and macadamia nuts have shown an increase in acreage use since 1960.*

According to Decision Analysts Hawaii, Inc., “the acreage released from plantation agriculture has far outpaced the demand for land for diversified crops. The net decrease of land in crop amounts to about 229,900 acres. While some of the released land has been converted or is scheduled to be converted to urban uses and tree plantations, an estimated 160,000+ acres remain available for diversified crops.”<sup>xlv</sup>

#### C. COUNTY OF MAUI

The County of Maui has approximately 402,354 acres within the State Agricultural District, approximately 244,088 of which, or 61%, are located on Maui).<sup>xlvi</sup>

Table 8 identifies the approximate acreage of productive agricultural lands on the island of Maui using the LSB and ALISH rating systems:<sup>xlvii</sup>

**Table 8: Hawaii's Important Agricultural Lands by Rating System**

<i>Hawaii's Important Agricultural Lands by Rating System</i>	<i>Acres</i>	<i>Percentage of State Ag District Lands on Maui</i>
University of Hawaii Land Study Bureau (LSB) Lands Lands Rated "A", "B", "C"	82,592	34
Agricultural Lands of Importance to the State of Hawaii (ALISH) Prime, Unique, Other	149,242	61

**61% of the agricultural lands on Maui are rated Prime, Unique or Other by ALISH.**

Table 9 identifies the amount of zoned agricultural acreage on Maui in each of the five LSB classifications, historical use of these lands, ALISH and LESA ratings, and other suitable agricultural uses.<sup>xlviii</sup>

**Table 9: Maui Island's LSB Designated Agricultural Lands**

LSB Overall Productivity Rating	Acres	Dominant Historical Crop (s)	Other Historical Crop (s)	Other Ratings ALISH / LESA		Crop Suitability (P, V, S, O, F) <sup>3</sup>	Grazing Suitability
A	31,650	Sugarcane	Field Crops	Yes	Yes	Very Suitable Highly	Very Highly Suitable
B	17,378	Sugarcane	Pineapple, Orchards, Field Crops, Animal Husbandry	Yes	Yes	Highly Suitable	Highly Suitable
C	33,554	Pineapple	Sugarcane, Orchards, Field Crops	Yes	Yes	Suitable	Highly Suitable
D	39,029	Animal Husbandry, Field Crops	Pineapple, Sugarcane	Yes; No	Yes; No	Somewhat Suitable	Suitable
E	114,845	Animal Husbandry	Sugarcane	Yes; No	Yes; No	Limited Suitability	Suitable

**82,582 Acres, almost 35%, of Maui Island's LSB designated acreage is classified as A, B, or C.**

<sup>3</sup> Pineapple, Vegetable, Sugarcane, Orchards, and Forestry

#### D. AVAILABILITY OF AGRICULTURAL LANDS ON MAUI

As discussed, in Maui County there are 402,354 acres within the State Agricultural District and 61% of these lands, or 244,088 acres, are on Maui. Using the LSB rating system, on Maui alone there are approximately 82,592 acres that are classified “A”, “B”, or “C”. These lands should be considered very suitable for agriculture. Using the ALISH rating system, there are 82,592 acres of “Prime”, “Unique” or “Other” agricultural lands on Maui.<sup>xlix</sup>

As Table 10 shows, there has been a release of approximately 64,150 acres from crop farming, primarily sugar and pineapple, since 1960 within Maui County.<sup>i</sup> While some of these lands have been absorbed by urban development and other agricultural uses – such as seed crops, forestry crops, macadamia nuts, and floriculture – much of this land is fallow and is spread throughout the islands of Maui, Molokai, and Lanai.

On the island of Maui, there were three sugar plantations in operation until the 1980s: Wailuku Sugar Company, Pioneer Mill and Hawaiian Commercial & Sugar Company (HC&S). In 1988, Wailuku Sugar Company harvested its last crop of sugar. Of the approximate 4,500 acres it had in sugar in 1979, approximately 1,350 were planted in macadamia nuts, some was urbanized, and much of the remainder was fallow, in sugar or diversified crops. Pioneer Mill had about 6,867 acres in production until 1999, when the last crop was harvested.<sup>ii</sup> Today, much of the 6,867 acres of former cane land remains fallow but is under pressure for urbanization and the development of two-acre rural/residential lots. In December 2009, Maui Land & Pineapple Company harvested its last pineapple crop. Of the approximate 20,000 acres that were in pineapple production in 1995, only about 1,350 acres are in pineapple production today.<sup>iii</sup> Of the lands released from pineapple, a small amount has been transitioned to diversified crops and some has been developed as rural/residential lots or is planned for urban use. However, much of this former pineapple land is available for agricultural use in West, East and Upcountry Maui.

**Table 10: Acreage in Crop in Maui County between 1987 and 2010**

<b>Crop</b>	<b>1960</b>	<b>1987</b>	<b>1997</b>	<b>2010</b>	<b>Difference 1960-2010</b>
Sugarcane	53,700	43,900	43,100	34,500	-19,200
Pineapple	48,900	23,700	9,100	1,350	-47,550
Vegetables and Melons	N/A	2,200	1,400	700	-1,500
Fruits (Excluding Pineapples)	N/A	100	300	600	+500
Coffee	N/A	NA	NA	NA	NA
Macadamia Nuts	N/A	1,300 (wai ag)	NA	NA	Na
All other crops	NA	1,600	1,200	5,200	+3,600
<b>TOTAL ACRES</b>					<b>-64,150</b>

***64,150 acres of agricultural land in Maui County has come out of production since 1960.***

As discussed, within Maui County a significant amount of land once planted in sugar and pineapple is now fallow. Much of this land is available for diversified agriculture. On the island of Maui, HC&S is still farming over 34,000 acres of sugarcane. Most of the release of agricultural lands over the past two decades has come from the closure of Wailuku Sugar Company and Pioneer Mill and the dramatic reduction in land used for pineapple production. While some of the lands released from sugar and pineapple have been urbanized or are planned for urban development, most of this agricultural land is available for new crops.

### **1. Agricultural Parks in Maui County**

The State Department of Agriculture currently manages 10 agricultural parks in Hawaii. These parks are located on Oahu, Kauai, Hawaii and Molokai. The County of Maui operates Maui's only agricultural park. The purpose of agricultural parks is to facilitate diversified agriculture by offering high quality agricultural lots for long-term lease at affordable rents. According to the State Department of Agriculture's website, of the State's ten agricultural parks, which comprise 3,123 acres and 227 lots, only 2 lots are currently available. These lots are at the Waianae Agricultural Park on Oahu.<sup>liii</sup>



There are two public Agricultural Parks in Maui County:

- Kula Agricultural Park.

The Kula Agricultural Park comprises 445 acres in Upcountry Maui and is the only agricultural park on Maui. The Park provides farm lots that range from 10 to 30 acres. According to the County's Office of Economic Development, the Park's purpose is to "promote the development of diversified agriculture by providing appropriately sized agricultural lots at reasonable rent with long-term tenure thereby contributing to the economic growth of our agricultural industry".<sup>liv</sup> There are currently 26 farmers leasing land at the park. However, there are no lots available at the park.

- Molokai Agricultural Park

The State Department of Agriculture manages the only agricultural park on Molokai. The Molokai Agricultural Park comprises 753 acres that are subdivided into 22 lots. According to the State Department of Agriculture website, there are no lots available at the park.

## **2. Agricultural Lands Proposed for Urban Development in the MIP**

In December, 2012, Maui County adopted the Maui Island Plan (MIP)<sup>lv</sup> to plan for, manage and direct growth through the year 2030. The MIP's housing projections were based on population projections prepared by the State Department of Business Economic Development & Tourism (DBEDT) and a detailed land use forecast prepared by Plan Pacific, Inc. and the Department of Planning's Long-range Planning Division. According to the Land Use Forecast, there is demand for an additional 29,589 housing units through 2030. Of these units, approximately 18,744 are already entitled (i.e. have the appropriate zoning, and 10,845 are not yet entitled).

To accommodate the projected population growth through 2030, the MIP places approximately 7,718<sup>4</sup> acres of State Agricultural District lands into “Urban” and “Rural” growth boundaries.

### **3. Impact of the MIP on Agricultural Land Availability**

Despite the MIP’s planned long-term urbanization of agricultural lands, there is still a considerable amount of agricultural land that will be available for farming and ranching on Maui. The MIP’s planned urbanization represents just three (3) percent of the agricultural lands on Maui and just 1.9% of all agricultural lands within the County. Moreover, as discussed in the prior section, since 1960 approximately 64,000 acres of productive agricultural lands have been taken out of crop production, mostly from sugar and pineapple. Much of these lands remain fallow or are being used for grazing and other low intensity agricultural uses.

The Maui Agricultural Development Plan (July, 2009), prepared by the Maui County Farm Bureau in association with the County of Maui, Office of Economic Development states in part,

“Since much of Maui’s most productive lands are used for land extensive sugarcane, pineapple<sup>5</sup>, and ranching, and much of what remains has experienced tremendous land value appreciation due to urban encroachment of residential uses, access to affordable long-term tenure is a significant impediment to industry growth.”

“For Maui’s agricultural industry to realize sustained growth, existing farmers wishing to expand their operations and new farmers desiring to

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<sup>4</sup> This includes the 502 acres of WCT lands placed within Urban and Rural growth boundaries

<sup>5</sup> Since the publication of the Agricultural Development Plan, much of the production of pineapple on Maui has ceased. As noted, of the 9,100 acres of land in pineapple in 1997, just 1,350 acres remain in pineapple.

enter the market must have access to land at a cost and terms that will allow a reasonable opportunity for profitability”.

“Land must also be available with long-term tenure so that high up-front capital costs in new crops, equipment, and infrastructure can be amortized over many growing seasons.”<sup>lvi</sup>

While there is an abundant supply of currently fallow and productive agricultural land on Maui and within the State of Hawaii, providing long-term and affordable tenure to these lands for small and medium sized farmers impedes agricultural development on Maui. The current shortage of available agricultural park lots is symptomatic of this issue.

#### E. CONCLUSIONS

There are 1.93 million acres within the State Agricultural District. Since 1960, there has been a release of approximately 316,590 acres from crop farming, primarily sugar and pineapple. While some of these lands have been absorbed by urban development and other agricultural uses – such as seed crops, forestry crops, macadamia nuts, and floriculture – much of the lands are fallow and are available on Oahu, Maui, Molokai, Lanai and Kauai.<sup>lvii</sup>

The County of Maui has approximately 402,354 acres within the State Agricultural District, approximately 244,088 of which, or 61%, are located on Maui.<sup>lviii</sup> Using the LSB rating system, on Maui alone there are approximately 82,592 acres that are classified “A”, “B”, or “C”. These lands should be considered very suitable for agriculture. Using the ALISH rating system, there are 82,592 acres of “Prime”, “Unique” or “Other” agricultural lands on Maui.<sup>lix</sup> Since 1960, here has been a release of approximately 64,150 acres from crop farming, primarily sugar and pineapple, within Maui County.<sup>lx</sup> While some of these lands have been absorbed by urban development and other

agricultural uses – such as seed crops, forestry crops, macadamia nuts, and floriculture – much of this land is fallow and is spread throughout the islands of Maui, Molokai, and Lanai.

According to the State Department of Agriculture’s website, of the state’s ten agricultural parks, which comprise 3,123 acres and 227 lots, only 2 lots are currently available. These lots are on Oahu. Within Maui County, there are no agricultural lots available at either Molokai Agricultural Park or at the County owned and managed Kula Agricultural Park.

To accommodate the projected population growth through 2030, the MIP places approximately 7,718<sup>6</sup> acres of State Agricultural District lands into “Urban” and “Rural” growth boundaries. Despite the MIP’s planned long-term urbanization of agricultural lands, there is still a considerable amount of agricultural land that will be available for farming and ranching on Maui. The MIP’s planned urbanization represents just three (3) percent of the agricultural lands on Maui and just 1.9% of all agricultural lands within the County.

While there is an abundant supply of currently fallow and productive agricultural land on Maui and within the State of Hawaii, providing long-term and affordable tenure to these lands for small and medium sized farmers impedes agricultural development on Maui. The current shortage of available agricultural park lots is symptomatic of this issue.

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<sup>6</sup> This includes the 502 acres of WCT lands placed within Urban and Rural growth boundaries



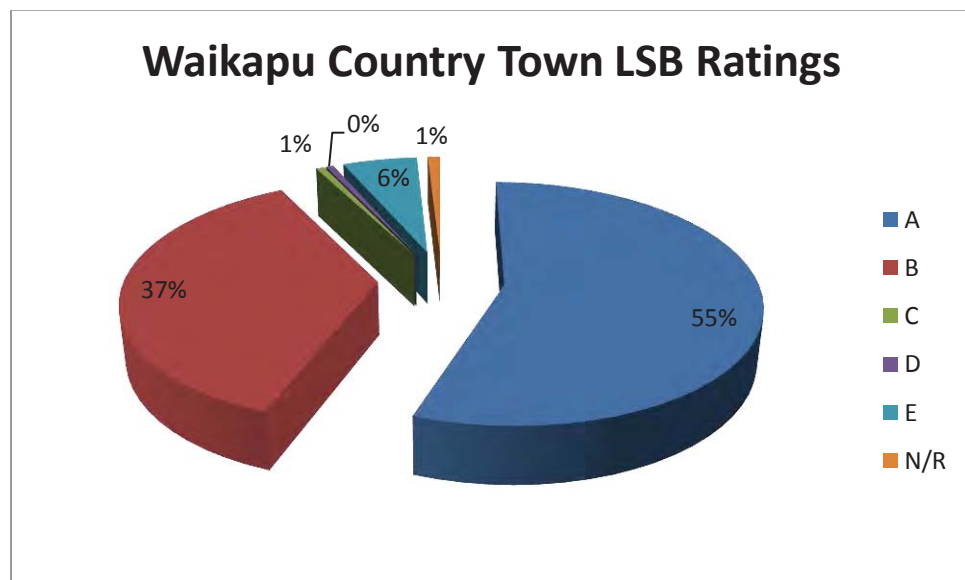
## V. AGRICULTURAL IMPACT OF THE PROPOSED PROJECT

### A. WAIKAPU COUNTRY TOWN'S EXISTING AGRICULTURAL RESOURCES

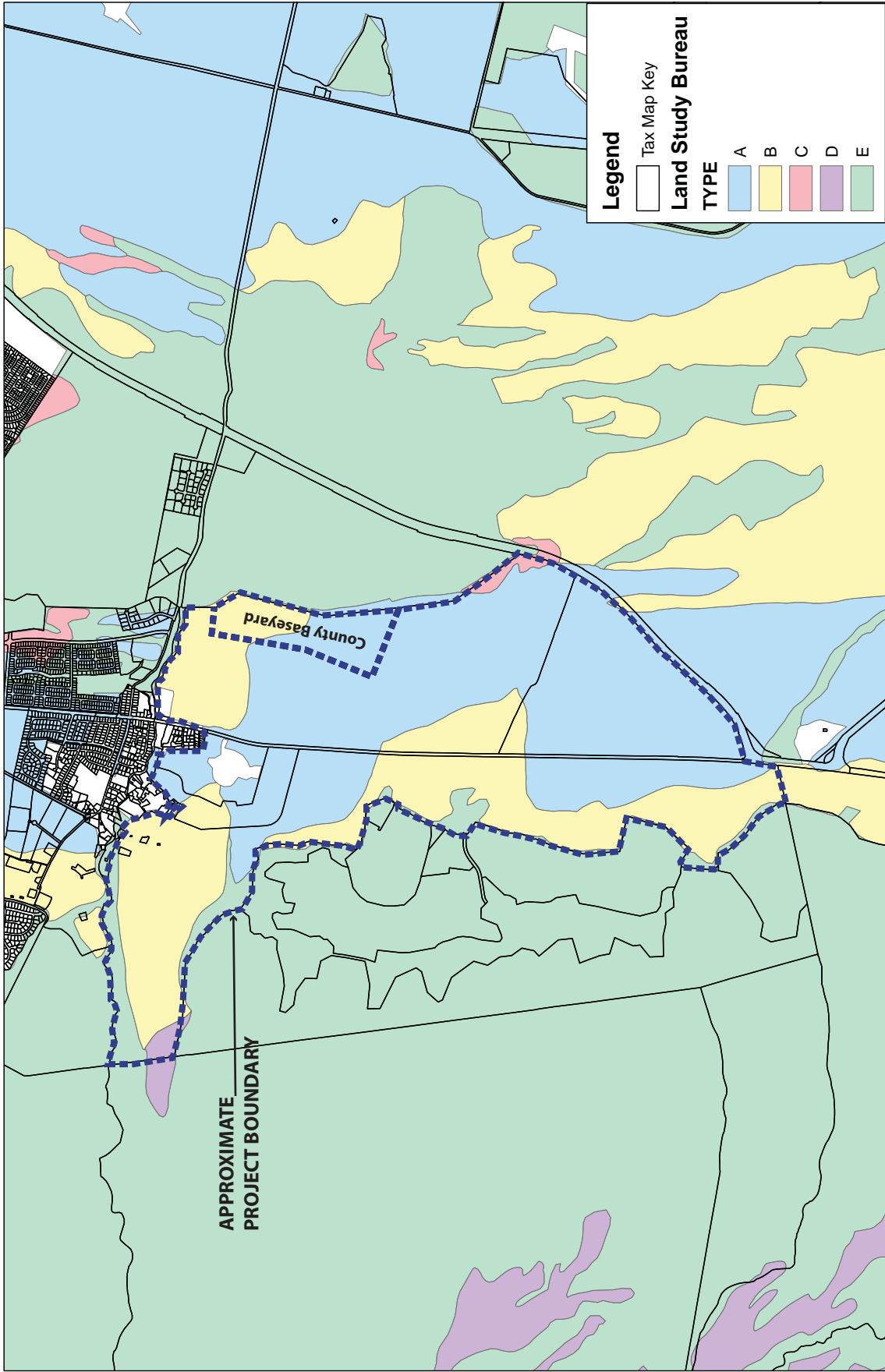
#### 1. Land

The Waikapu Country Town comprises approximately 1,576 acres, 14 acres of which are within the State Urban District, and the remaining land is within the State Agricultural District. As Figures 17a-b and 18a-b show, WCT agricultural lands are rated very highly by the LSB and ALISH rating systems. Approximately 92% of WCT agricultural lands, or 1,437 acres, are rated “A” or “B” by the LSB. According to the ALISH rating system, 97%, or 1,515 acres, is “Prime” agricultural land.

Figure 17a: Waikapu Country Town LSB Ratings



*Approximately 92% of WCT agricultural lands are rated A or B by LSB.*

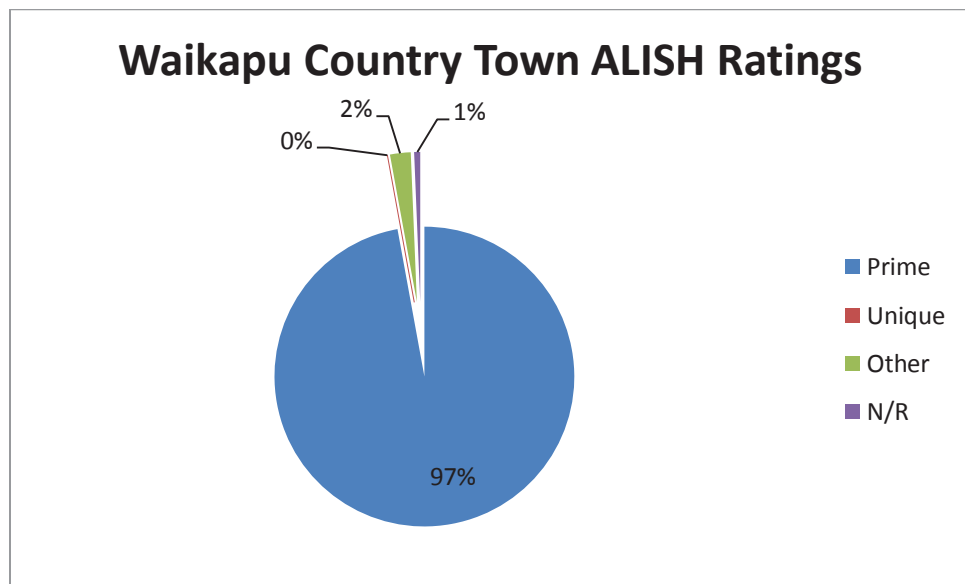


**FIGURE 17b**  
 LAND STUDY BUREAU  
 DETAILED LAND CLASSIFICATION

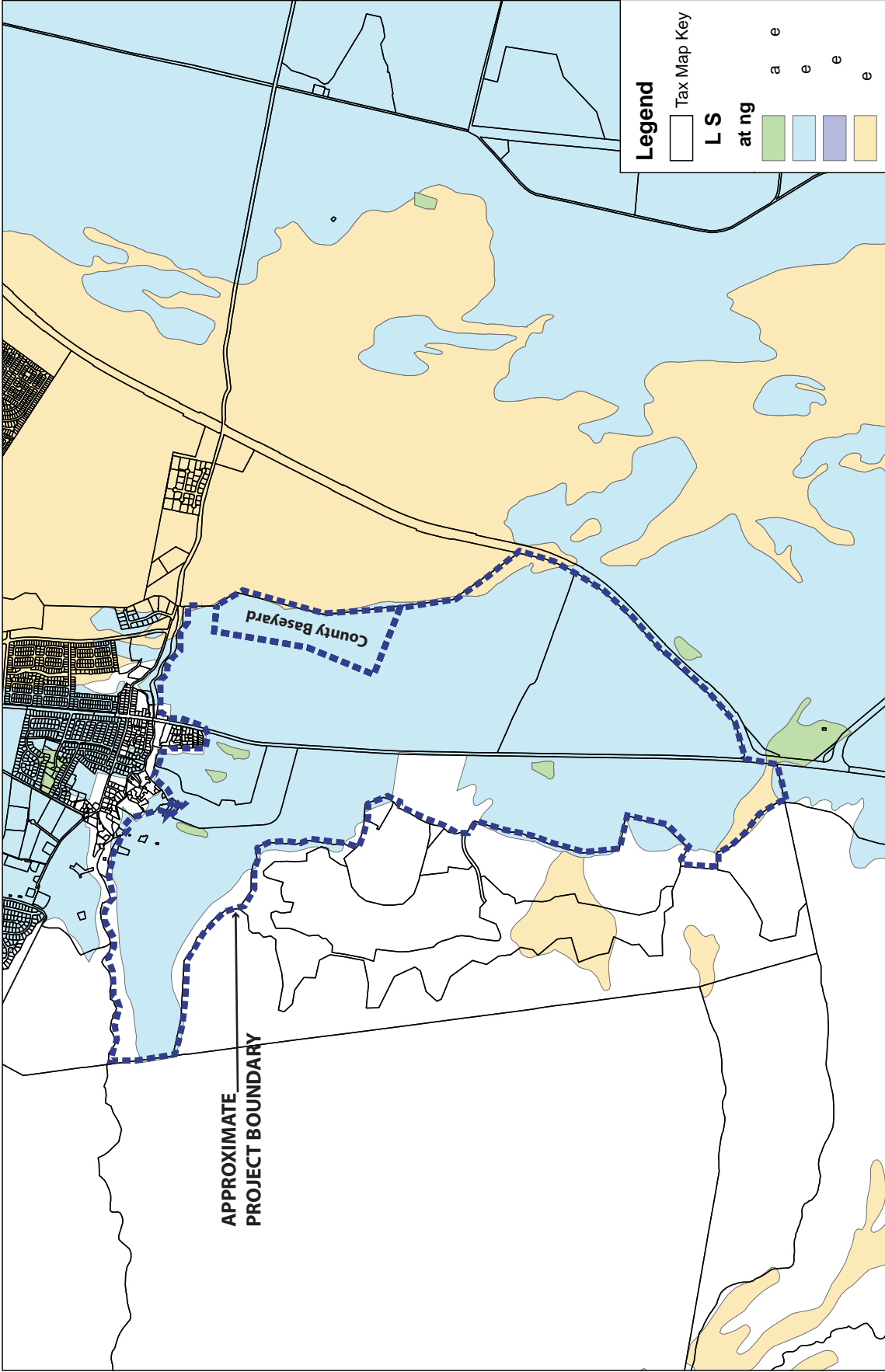


Not to Scale

Figure 18a: Waikapu Country Town ALISH Ratings



*97% of Waikapu Country Town agricultural acres are designated Prime by ALISH.*



**FIGURE 18b**

AGRICULTURAL LANDS OF  
IMPORTANCE TO THE STATE OF HAWAII

**WAIKAPU COUNTRY TOWN**



Not to Scale



PLANNING  
CONSULTANTS  
HAWAII, LLC



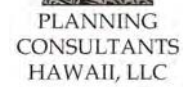
## 2. Soil Types

As shown in Figure 19, the project site consists of 11 soil types. Table 11 describes each soil type.<sup>lxi</sup>

**Table 11: Waikapu Country Town Soil Types**

<b>Waikapu Country Town Soils Types</b>	
<b>Ewa silty clay, 3 to 7 percent slopes (ESB)</b>	
This is considered prime farmland if irrigated. It occurs at elevations of 0 to 150 feet with slopes that range from 3 to 7 percent. It is a well-drained soil that is more than 80 inches in depth. The typical soil profile is 0 to 18 inches of Silty clay and 18 to 60 inches of Silty clay loam. The available water capacity is moderate at about 7.8 inches.	
<b>lao clay, 3 to 7 percent slopes</b>	
This is considered prime farmland if irrigated. It occurs at elevations of 100 to 500 feet with slopes that range from 3 to 7 percent. It is a well-drained soil that is more than 80 inches in depth. The typical soil profile is 0 to 15 inches of Clay, 15 to 48 inches of Clay, and 48 to 60 inches of Silty clay. The available water capacity is moderate at about 8.4 inches.	
<b>Pulehu silt loam, 0 to 3 percent slopes (PpA)</b>	
This is considered prime farmland if irrigated. It occurs at elevations of 0 to 300 feet with slopes that range from 0 to 3 percent. It is a well drained soil that is more than 80 inches in depth. The typical soil profile is 0 to 21 inches of Silt loam and 21 to 60 inches of Silty clay loam. The available water capacity is moderate at about 8.4 inches.	
<b>Pulehu silt loam, 3 to 7 percent slopes (PpB)</b>	
This is considered prime farmland if irrigated. It occurs at elevations of 0 to 300 feet with slopes that range from 3 to 7 percent. It is a well drained soil that is more than 80 inches in depth. The typical soil profile is 0 to 21 inches of Silt loam and 21 to 60 inches of Silty clay loam. The available water capacity is moderate at about 8.4 inches.	







<b>Pulehu cobbly silt loam, 3 to 7 percent slopes (PrB)</b>
This is considered prime farmland if irrigated. It occurs at elevations of 0 to 300 feet with slopes that range from 3 to 7 percent. It is a well drained soil that is more than 80 inches in depth. The typical soil profile is 0 to 21 inches of Cobbly silt loam and 21 to 60 inches of Silty clay loam. The available water capacity is moderate at about 7.5 inches.
<b>Pulehu clay loam, 0 to 3 percent slopes (PsA)</b>
This is considered prime farmland if irrigated. It occurs at elevations of 0 to 300 feet with slopes that range from 0 to 3 percent. It is a well drained soil that is more than 80 inches in depth. The typical soil profile is 0 to 21 inches of Clay loam and 21 to 60 inches of Silty clay loam. The available water capacity is moderate at about 8.4 inches.
<b>Pulehu cobbly clay loam, 0 to 3 percent slopes (PtA)</b>
This is considered prime farmland if irrigated. It occurs at elevations of 0 to 300 feet with slopes that range from 0 to 3 percent. It is a well drained soil that is more than 80 inches in depth. The typical soil profile is 0 to 21 inches of Cobbly clay loam and 21 to 60 inches of Silty clay loam. The available water capacity is moderate at about 7.5 inches.
<b>Pulehu cobbly clay loam, 3 to 7 percent slopes (PtB)</b>
This is considered prime farmland if irrigated. It occurs at elevations of 0 to 300 feet with slopes that range from 3 to 7 percent. It is a well drained soil that is more than 80 inches in depth. The typical soil profile is 0 to 21 inches of Cobbly clay loam and 21 to 60 inches of Silty clay loam. The available water capacity is moderate at about 7.5 inches.
<b>Water &gt; 40 acres (W)</b>
Water bodies greater than 40 acres.
<b>Wailuku silty clay, 3 to 7 percent slopes</b>

This is considered prime farmland if irrigated. It occurs at elevations of 50 to 1000 feet with slopes that range from 3 to 7 percent. It is a well drained soil that is more than 80 inches in depth. The typical soil profile is 0 to 12 inches of Silty clay and 12 to 60 inches of Silty clay. The available water capacity is moderate at about 8.4 inches.

**Wailuku silty clay, 7 to 15 percent slopes**

This is considered prime farmland if irrigated. It occurs at elevations of 50 to 1000 feet with slopes that range from 7 to 15 percent. It is a well drained soil that is more than 80 inches in depth. The typical soil profile is 0 to 12 inches of Silty clay and 12 to 60 inches of Silty clay. The available water capacity is moderate at about 8.4 inches.

### **3. Elevation and Slopes**

The project site generally slopes from west to east with a high elevation of approximately 200-feet at the northwest corner of the property to a low point of approximately 20-feet above mean sea level at the southeastern corner of the property.

Slopes across most of the property are mild and range from 3% to 7%. At the higher elevations the slopes increase to about 10%.

### **4. Solar Radiation**

The project site receives a significant amount of sunshine throughout the year. The average daily solar radiation received across the project site ranges from a low of approximately 350 solar calories per square centimeter per day at the higher elevations to a high of 450 solar calories per square centimeter per day at the lower elevations.

### **5. Rainfall**

The project site receives its highest rainfall during the winter and lowest rainfall during the summer. Throughout the year rainfall is relatively low, averaging approximately 20- to 30-inches per year, with the monthly average ranging from 0.25 inches in August to approximately 5-inches in January.



## **6. Temperatures**

Central Maui's coldest month is February when the average nighttime temperature drops to 63.1°F. The warmest month is September with the average day time temperature rising to 88.1°F.

## **7. Winds**

The project site experiences relatively strong trade winds that blow from north to south across the isthmus and out to sea. At 30-feet above the ground, wind speeds across the site range from approximately 5.5 meters per second to 7.5 meters per second, which is approximately 12 to 17 miles per hour.

## **8. Irrigation Water**

The MTP currently receives its agricultural water from the Wailuku Water Company (WWC). WWC delivers water to MTP and HC&S from the Iao-Waikapu Ditch via the Waihee Ditch, the Waihee Ditch below the Hopoi Chute, and the South Waikapu Ditch. Water to irrigate HC&S's fields that are leased from the Atherton Group, approximately 1,230 acres known as the "Iao-Waikapu Fields", is from the Iao Stream via the Iao-Waikapu Ditch and Waikapu Stream via the South Waikapu Ditch and Waihee Ditch. HC&S reportedly uses between 8 and 10 mgd of ditch water to irrigate its Iao-Waikapu fields.

## **9. Road Access**

Access to the property is from Honoapiilani Highway. Within the highway, agricultural roads provide access throughout the site.

## **B. PRIOR AGRICULTURAL USE**

Historically, WCT's lands were owned by Wailuku Agribusiness before being sold to the current owner in 2006. WCT land has been farmed since pre-contact, with taro cultivation occurring along the Waikapu Stream. During the sugar boom of the late 1800s, WCT land was placed into

sugar production. Wailuku Sugar Company grew sugarcane on the lands until 1988. Thereafter, the Maui Land & Pineapple Company leased land for pineapple production and HC&S leased land both mauka and makai of Honoapiilani Highway to supplement its sugar production. Pineapple ceased to be farmed on the property in about 1997. Meanwhile, HC&S continues to lease 1,230 acres for sugarcane.

## C. CURRENT AGRICULTURAL USE

### 1. HC&S.

Alexander & Baldwin (A&B), owners of HC&S, began producing sugar in Central Maui as far back as 1870. Today, HC&S is Hawaii's sole sugar plantation and the state's largest farm, with over 36,000 acres in cultivation and approximately 754 employees. The firm's business pursuits include growing and milling sugar cane, producing raw sugar and specialty food grade sugars, producing molasses and generating and selling electricity generated from cane fiber.

In 2010, HC&S produced 171,800 tons of raw sugar, which was equivalent to 5% of the U.S. production. The farm also produced 52,800 tons of molasses, which it sells as feedstock for the livestock industry. HC&S also generates power by burning residual cane fiber in its generating plants

HC&S owns 32,400 acres and leases 1,450 acres from the State and approximately 1,230 acres from the Applicant (Waikapu Properties LLC and Waiale 905 Partners LLC). HC&S is a major water user using approximately 200 million gallons per day (MGD) for irrigation.

### 2. Kumu Farms

Kumu Farms was established in Hawaii in 1980. Its founder and owner, Mr. Gram Schmlle, first established the farm on Oahu's North Shore, but quickly moved his operation to the Molokai Agricultural Park.

Today, Kumu Farms is one of the largest certified organic producers in the State of Hawaii and the only exporter of fresh organic papaya to the U.S. Mainland Market. The Molokai farm spreads over 120 acres and produces over 20,000 pounds of papayas, 4,000 pounds of sweet basil, 500 pounds of fresh herbs, and specialty fruit and vegetable crops. Kumu Farms also produces value added products, including lotion and a pesto line. Kumu products are sold on Maui, Oahu and the U.S. Mainland. Products are marketed directly to consumers at the Farm's on-site store as well as on-line. Products are also sold to wholesalers and retailers such as Armstrong Produce and Whole Foods.

In 2012 Mr. Schmlle expanded his farm to the MTP. The MTP farm is on 75 acres and grows mixed-fruits, vegetables, and herbs. Like the Molokai farm, the MTP's products are sold on-site at a farm stand as well as on-line and directly and indirectly to restaurants and retail stores.

### **3. Hawaii Taro Farm LLC**

Hawaii Taro Farm LLC is owned by Robert Pahia. Mr. Pahia was an agricultural researcher at the University of Hawaii for over 20 years. He has 20 years of farming experience in a variety of crops, including taro, vegetables, banana, sweet potato and melons.

Hawaii Taro Farm LLC has been at the MTP since 2009. The 68 acre farm is producing dry-land taro, sweet potato, and banana. Its primary market is Maui, but products are also sold on Oahu.

### **4. Mr. Michael Atherton, Coffees of Hawaii; Cerro de Jesus Coffee Plantation Nicaragua; Part Owner of the MTP and abutting Agricultural Lands**

Mr. Atherton comes from a farming and ranching family in northern California. He established the Cerro de Jesus (Jesus Mountain) coffee plantation in Nicaragua in 1972. The plantation produces specialty coffee, including several Arabica varieties, like Bourbon, Caturra, Catuai Rojo and Pacamara, on approximately 1,000 acres with over a million trees

planted. Mr. Atherton also owns Coffees of Hawaii, which sells coffee from Molokai, Maui and Kona, as well as blends that utilize his Nicaraguan beans. Mr. Atherton owns approximately 100 acres of coffee trees on Molokai.

In addition to coffee farming, Mr. Atherton has experience raising cattle. Mr. Atherton has a small herd of Texas Long-horn cattle that graze on the MTP.

#### D. IMPACT OF THE PROJECT ON AGRICULTURE

##### 1. Loss of State and County Agricultural Lands

As discussed, the project will result in the conversion of approximately 488 acres of prime agricultural land to urban and rural use. It should be assumed that once urbanized the opportunity to use these lands for commercial agriculture will be irrevocably lost.

As described, the loss of approximately 488 acres of prime agricultural land caused by the subject development represents a very small percentage of agricultural lands statewide and on Maui, as is shown below:

- There are approximately 2 million acres in the State Agricultural District. The subject development represents just .024% of this area.
- There are approximately 846,363 acres of agricultural lands state-wide rated by ALISH as Prime, Unique or Other. The subject development represents just .058% of these lands.
- There are approximately 447,250 acres of agricultural lands state-wide rated by the LSB as A, B, or C. The subject development represents just .11% of these lands.
- On Maui, there are approximately 82,582 acres of agricultural lands rated by the LSB as A, B, or C. The subject development represents just .59% of these lands.



- Within Maui County, approximately 64,150 acres has been released from crop production since 1987. The subject development represents just .76% of these lands.

However, to mitigate the loss of prime agricultural lands caused by urbanization, the Applicant will permanently protect 800 acres of prime farm land through a conservation easement. As noted above and in Sections III.B and IV of this report, there is a considerable amount of agricultural land throughout the state that is fallow. However, despite the availability of land, the ability of farmers to secure access to affordable lands for long-term tenure is still an impediment to agricultural development. High land costs, coupled with high labor costs, transportation costs, and energy costs are among the most significant barriers to Hawaii's agricultural development.

By establishing an agricultural park on agricultural lands surrounding the proposed Waikapu Country Town, the project will provide farmers with long-term access to agricultural land at an affordable rate. As noted, there are 3,123 acres and 227 lots within the State of Hawaii's agricultural parks, but only two lots are currently available. In Maui County there are no agricultural park lots available at either the Molokai Agricultural Park or the Kula Agricultural Park. The proposed agricultural park will expand the opportunity for Maui farmers to gain access to highly productive Central Maui agricultural lands. These lands provide easy market access to Maui's primary population centers and to major air and seaport facilities.

## 2. Impact of the Project on Existing Agricultural Operations

On May 17, 2013, Kumu Farms, Hawaii Taro LLC, and land owner and farmer Michael Atherton were interviewed to determine the potential impact of the project upon their agricultural operations. On June 26, 2013, an interview was conducted with HC&S to discuss the impact of the project on their sugar business.

During the interview it was explained that no lands would be urbanized for at least three years while entitlements and building permits are being obtained. Thereafter, urbanization would occur in phases at a rate determined by market demand. It was acknowledged that lands currently being farmed could be impacted by the development over the next five to 10 years.

Both Kumu Farms and Hawaii Taro LLC desire to shift their farms to the MTP's private agricultural park as urban development is phased in. They anticipate that, together with other farmers, the Park could encompass several hundred acres. Most of each farm's future production will be sold to the Maui market, but production is also expected to be shipped to Oahu and the Mainland.

Land owner Michael Atherton is grazing Texas Long-Horn cattle on the property. Mr. Atherton indicated that the herd will likely remain on the mauka agricultural lands above the existing MTP even after urbanization occurs on the makai lands. Mr. Atherton also intends to plant an orchard of coffee trees. The orchard will be located outside of the urban and rural growth boundaries on existing agricultural lands. The beans will be marketed and sold under the Coffees of Hawaii label.

HC&S is farming 1,230 acres of MTP lands. These lands are leased on a 10-year term, which is due to expire for some of the lands, but is being renegotiated for a new 10-year term. MTP leased lands comprise approximately 3.6% of HC&S lands that are in production. Of the 1,230 acres leased by HC&S, approximately 330 acres will eventually be urbanized over an approximate 20-year build-out. In addition, about 75 acres currently in cane production may be used to establish a portion of the agricultural park discussed in this report. The agricultural park would also comprise agricultural lands not currently in cane production, which are located mauka (west) and south of the existing MTP.

HC&S desires to continue farming MTP lands. The farm's General Manager, Mr. Rick Volner, noted that MTP lands are highly productive with access to a reliable source of water. Mr. Volner noted that the amount of acres to be urbanized is very small relative to the total number of acres being farmed by HC&S. However, since HC&S is a commodity farmer the profitability of the plantation depends upon having sufficient economy of scale in its production. The incremental loss of agricultural land is therefore a concern to the plantation; however, Mr. Volner noted that HC&S has access to other, currently fallow, lands and that the Plantation's viability will not be significantly impacted by the urbanization of the subject MIP lands.

An additional concern of the Plantation is urban development that is located within close proximity of its fields. Land use conflicts, such as the impact of dust, noise, and smoke from cane burning, can be a problem if not carefully managed. However, Mr. Volner noted that the subject property is upwind of its fields and that the consistent trade winds will help to mitigate such impacts. Mr. Volner also noted that cane burning is carefully managed in order to minimize its impact to neighboring residential communities.

### 3. Impact of the Project on Future Agricultural Opportunities

As discussed in this report, the impact of the proposed urbanization on future agricultural opportunities should be minimal since other lands are currently available throughout the State and County.

As noted, a significant impediment to agricultural development on Maui, and throughout the State, is the scarcity of affordable agricultural land that is readily available and affordable for long-term lease to diversified farmers. The project's agricultural component includes nearly 1,100 acres of agricultural land, 800 acres of which will be permanently dedicated to agricultural use with no residential structures to be permitted. The long-term vision for this land is to establish a private agricultural

park. This park will be anchored by highly qualified farmers, such as Kumu Farms, Coffees of Hawaii and Hawaii Taro LLC. Future agricultural users will have the opportunity to grow crops ranging from fresh vegetables and fruits, to taro, coconuts, coffee and kakau. It is expected that sugarcane, bio-fuels or cattle will also be major agricultural land users.

#### E. CONCLUSIONS

The Waikapu Country Town comprises approximately 1,576 acres, of which 14 acres are within the State Urban District and the remaining land is within the State Agricultural District. Approximately 92% of WCT agricultural lands, or 1,437 acres, are rated “A” or “B” by the LSB. According to the ALISH rating system, 97%, or 1,515 acres, is “Prime” agricultural land. The MTP, and surrounding HC&S fields, currently receive agricultural water from WWC. HC&S’s lao-Waikapu fields, which are leased from the Atherton Group, reportedly use between 8 to 10 mgd of irrigation water.

The loss of approximately 488 acres of prime agricultural land caused by the subject development represents a very small percentage of agricultural lands statewide and on Maui. There are approximately 2 million acres in the State Agricultural District. The subject development represents just .024% of this area. On Maui, there are approximately 82,582 acres of agricultural lands rated by the LSB as A, B, or C. The subject development represents just .59% of these lands. Within Maui County, approximately 64,150 acres has been released from crop production since 1987. The subject development represents just .76% of these lands.

There are currently three commercial farms farming MTP lands. These include Kumu Farms, Hawaii Taro LLC, and HC&S. The proposed urbanization will require both Kumu Farms and Hawaii Taro LLC to relocate their agricultural operations to the proposed agricultural park. It is anticipated that this might occur in about five to ten years. The



project will also impact the current lands being leased by HC&S. It is anticipated that these lands will gradually begin to be impacted in about five to ten years. Over the long-term, HC&S may lose approximately 330 acres to urbanization and up to 75 acres for a private agricultural park. According to HC&S General Manager Mr. Rick Volner, HC&S would desire to continue farming its lands to maximize its current economy of scale in production. However, Mr. Volner acknowledged that HC&S has additional lands available that are currently fallow and the subject project will not impact the Plantation's long-term viability.

A significant impediment to agricultural development on Maui, and throughout the State, is the scarcity of affordable agricultural land that is readily available and affordable for long-term lease to diversified farmers. The project's agricultural component includes nearly 1,100 acres of agricultural land, 800 acres of which will be permanently dedicated to agricultural use with no residential structures to be permitted. Several hundred acres of MTP agricultural lands may be developed as a private agricultural park to help facilitate Maui's agricultural development. The establishment of a strategic and centrally located agricultural park, with the availability of highly productive agricultural land and affordable irrigation water, should significantly bolster the ability of Maui farmers to compete in local, mainland and international markets.

## VI. CONSISTENCY WITH STATE AND COUNTY AGRICULTURAL POLICIES

### A. STATE AGRICULTURAL LAND USE POLICY

#### 1. Hawaii State Plan and Hawaii State Functional Plans

The Hawaii State Plan and Hawaii State Functional Plans establish policy to protect the viability of the State's sugar and pineapple industries, support the growth of diversified agriculture, and protect productive agricultural lands from development. Hawaii State Plan policies that are directly relevant to the proposed action include those listed below:

<b>Hawaii State Plan, Chapter 226, HRS Part 1. Overall Themes, Goals, Objectives and Policies</b>
<b><u>Chapter 226-7 Objectives and policies for the economy-agriculture.</u></b>
<b><u>Objectives:</u></b> Planning for the State's economy with regard to agriculture shall be directed toward achievement of the following objectives:
<b>Objectives:</b>
(1) Viability of Hawaii's sugar and pineapple industries.
(2) Growth and development of diversified agriculture throughout the State.
(3) An agriculture industry that continues to constitute a dynamic and essential component of Hawaii's strategic, economic, and social well-being.
(10) Assure the availability of agriculturally suitable lands with adequate water to accommodate present and future needs.
(12) Expand Hawaii's agricultural base by promoting growth and development of flowers, tropical fruits and plants, livestock, feed grains, forestry, food crops, aquaculture, and other potential enterprises.
(13) Promote economically competitive activities that increase Hawaii's agricultural self-sufficiency.
<b>(c) Priority guidelines to promote the continued viability of the sugar and pineapple industries:</b>
<b>Priority Guidelines:</b>
(1) Provide adequate agricultural lands to support the economic viability of the sugar and pineapple industries.

(d) Priority guidelines to promote the growth and development of diversified agriculture and aquaculture:
(1) Identify, conserve, and protect agricultural and aquacultural lands of importance and initiate affirmative and comprehensive programs to promote economically productive agricultural and aquacultural uses of such lands.
(7) Encourage the development and expansion of agricultural and aquacultural activities which offer long-term economic growth potential and employment opportunities.
(8) Continue the development of agricultural parks and other programs to assist small independent farmers in securing agricultural lands and loans.
(10) Support the continuation of land currently in use for diversified agriculture.
<b><u>Chapter 226-104, HRS, Population Growth and Land Resources Priority Guidelines</u></b>
<b>(a) Priority guidelines to effect desired statewide growth and distribution:</b>
<b>Priority Guidelines:</b>
(2) Make available marginal or nonessential agricultural lands for appropriate urban uses while maintaining agricultural lands of importance in the agricultural district.
<b><u>Chapter 226-106 Affordable housing. Priority guidelines for the provision of affordable housing:</u></b>
<b>Priority guidelines for the provision of affordable housing:</b>
(1) Seek to use marginal or nonessential agricultural land and public land to meet housing needs of low- and moderate-income and gap-group households.

The Hawaii State Plan directs State agencies to prepare functional plans for their respective program areas. There are fourteen (14) State Functional Plans that serve as the primary implementing vehicle for goals, objectives and policies of the Hawaii State Plan. Hawaii State Functional Plan policies directly relevant to the proposed action include those listed below:

<b>Hawaii State Functional Plans</b>
<b>Agriculture State Functional Plan</b>
Objectives:

- |   |
|---|
| g. Achievement of effective protection and improved quality of Hawaii's land, water, and air.         |
| h. Achievement of productive agricultural use of lands most suitable and needed for agricultural use. |

**Analysis:** The Hawaii State Plan and State Functional Plans establish policy to protect the viability of the sugar and pineapple industries, protect agriculturally suitable lands for future needs, and promote the growth of diversified agriculture.

The proposed action will result in the urbanization of approximately 450 acres of productive agricultural land that are currently in sugar production. However, as documented in this report, the following provides sufficient justification for the proposed action:

- Approximately 245 acres, or 54% of the area, will be impacted by the County's planned Waiale By-pass Road. Once constructed, the by-pass road will make large-scale sugar farming considerably more difficult on those lands.
- A considerable amount of sugar and pineapple land throughout the State and within Maui County has been released from sugar and pineapple production over the last two decades. Within Maui County, the acreage released from crop production since 1987 is approximately 64,150 acres. The subject development represents just .76% of these lands. Thus, alternative agricultural lands are available to support future agricultural development.
- In consultation with HC&S, the Plantation's General Manager indicated that HC&S's financial viability will not be significantly impacted by the development and that other A&B lands, as well as former pineapple lands, can be utilized to make up for the lost sugar production.
- The recently adopted Maui Island Plan places the subject property within an urban growth boundary because of its proximity to infrastructure, public facilities, and employment. The Plan's population projections and land use forecast demonstrate a need for additional urban land through 2030.

- The land owner has committed to establishing an agricultural conservation easement, or similar mechanism, to permanently protect approximately 800 acres of prime agricultural land adjoining the south and western boundaries of the subject development; an additional 300 acres will remain within the State agricultural district and will be restricted to large lots.
- The land owner intends to establish a private agricultural park. The agricultural park will offer affordable and highly productive agricultural lots to diversified farmers.
- The existing diversified farmers, Kumu Farms and Hawaii Taro LLC, will be relocated to the agricultural park as development is phased in over the next 10 to 20 years.

## B. COUNTY AGRICULTURAL LAND USE POLICY

The County of Maui's General Plan is comprised of the County-wide Policy Plan, Maui Island Plan and nine Community Plans. The County-wide Policy Plan is the overarching policy document for the County. The Maui Island Plan is a regional plan for the Island of Maui and is responsible for directing the island's future population growth, protecting the Island's natural and cultural resources, and locating large-scale intraregional infrastructure and public facility investments. The Community Plans define the character of community development, priority of sub-regional infrastructure and public facility investments, and needed policies and actions to protect sensitive environmental and cultural resources within each community plan area.

### 1. County-wide Policy Plan

The County-wide Policy Plan establishes a list of county-wide goals, objectives, policies, and implementing actions related to key strategies. The following County-wide Policy Plan goals, objectives and actions are directly relevant to the proposed action:

<b>Countywide Policy Plan</b>
<b>Objective:</b>



(2) Diversify and expand sustainable forms of agriculture and aquaculture.
<b>Policies:</b>
b. Prioritize the use of agricultural land to feed the local population, and promote the use of agricultural lands for sustainable and diversified agricultural activities.
d. Assist farmers to help make Maui County more self-sufficient in food production.
e. Support ordinances, programs, and policies that keep agricultural land and water available and affordable to farmers.
<b>Implementing Actions:</b>
c. Create agricultural parks in areas distant from genetically modified crops.
<b><u>J. Promote Sustainable Land Use and Growth Management</u></b>
<b>Goal:</b> Community character, lifestyles, economies, and natural assets will be preserved by managing growth and using land in a sustainable manner.
(2) Improve planning for and management of agricultural lands and rural areas.
<b>Policies:</b>
a. Protect prime, productive, and potentially productive agricultural lands to maintain the islands' agricultural and rural identities and economies.
<b>Implementing Actions:</b>
a. Inventory and protect prime, productive, and potentially productive agricultural lands from competing non-agricultural land uses.

## 2. Maui Island Plan

The Maui Island Plan serves as the regional plan for the Island of Maui. The Plan is comprised of the following ten elements: 1) Population; 2) Heritage Resources; 3) Natural Hazards; 4) Economic Development; 5) Housing; 6) Infrastructure and Public Facilities; 7) Land Use; 8) Directed Growth Plan; 9) Long Range Implementation Plan; and 10) Monitoring and Evaluation. Each element contains goals, objectives, policies and implementing actions. The Directed Growth Plan is intended to guide the location and general character of future urban

development and will direct zoning changes and guide the development of the County's short-term and long-term capital improvement plan budgets.

Maui Island Plan policies directly relevant to the proposed action include those listed below:

**GOAL, OBJECTIVES, POLICIES, AND ACTIONS**

**Goal:**

**4.3** Maui will have a diversified agricultural industry contributing to greater economic, food, and energy security and prosperity.

**Objective:**

**4.3.1** Strive for at least 85 percent of locally-consumed fruits and vegetables and 30 percent of all other locally-consumed foods to be grown in-State.

**Policies:**

**4.3.1.a** Strive to substitute food/agricultural product imports with a reliable supply of locally produced food and agricultural products.

**4.3.1.b** Facilitate and support the direct marketing/sale of the island's agricultural products to local consumers, through farmers markets and similar venues.

**4.3.1.c** Encourage growing a diverse variety of crops and livestock to ensure the stewardship of our land while safeguarding consumer safety.

**Implementing Actions:**

**4.3.1-Action 1** Encourage the development of community gardens, including gardens on greenbelts that separate communities.

**Objective:**

**4.3.2** Maintain or increase agriculture's share of the total island economy.

**Policies:**

**4.3.2.c** Encourage the continued viability of sugar cane production, or other agricultural crops, in central Maui and all of Maui Island.

## **GOAL, OBJECTIVES, POLICIES, AND ACTIONS**

### **Goal:**

**7.1** Maui will have a prosperous agricultural industry and will protect agricultural lands.

### **Objective:**

**7.1.1** Significantly reduce the loss of productive agricultural lands.

**7.1.1.e** Focus urban growth, to the extent practicable, away from productive and important agricultural lands.

**7.1.1.f** Strongly discourage the conversion of productive and important agricultural lands (such as sugar, pineapple, and other produce lands) to rural or urban use, unless justified during the General Plan update, or when other overriding factors are present.

### **Implementing Actions:**

7.1.1-Action 1 Implement the Maui Island Directed Growth Strategy.

### **Objective:**

**7.1.2** Reduction of the island's dependence on off-island agricultural products and expansion of export capacity.

### **Policies:**

**7.1.2.c** Actively look to acquire land and provide infrastructure to expand agricultural parks and establish new agricultural parks.

**7.1.2.g** Consider appropriate subdivision requirements (gravel roads, above-ground utilities, etc.) in those subdivisions creating Agricultural Parks where lots are limited to agricultural production with no dwellings.

### **Implementing Actions:**

7.1.2-Action 1 Identify and acquire productive and community agricultural lands that are appropriate for the development of agricultural parks and community gardens in each community plan area.

### **3. Wailuku-Kahului Community Plan**

Within Maui County, there are nine (9) community plan regions. Each region is governed by a Community Plan. The Waikapu Country Town is located within the Wailuku-Kahului Community Plan region that was adopted by Ordinance No. 3061 on June 5, 2002. Wailuku-Kahului Community Plan policies directly relevant to the proposed action include those listed below:

#### **GOAL, OBJECTIVES, POLICIES, AND IMPLEMENTING ACTIONS**

##### **ECONOMIC ACTIVITY**

###### **Goal:**

A stable and viable economy that provides opportunities for growth and diversification to meet long-term community and regional needs and in a manner that promotes agricultural activity and preserves agricultural lands and open space resources.

###### **Objectives and Policies:**

1. Support agricultural production so agriculture can continue to provide employment and contribute to the region's economic well-being.
9. Support the establishment of agricultural parks for truck farming, piggery operations, bee keeping and other diversified agricultural operations within larger unsubdivided agricultural parcels and in locations that are compatible with residential uses.

##### **ENVIRONMENT**

###### **Goal:**

A Clean and attractive physical and natural environment in which man-made developments or alterations to the natural environment relate to sound environmental and ecological practices, and important scenic and open space resources are maintained for public use and enjoyment.

###### **Objectives and Policies:**

1. Preserve agricultural lands as a major element of the open space setting that borders the various communities within the planning region. The close relationship between open space and developed areas is an important characteristic of community form.

## **HOUSING**

### **Goal:**

A sufficient supply and choice of attractive, sanitary and affordable housing accommodations for the broad cross section of residents, including the elderly.

### **Objectives and Policies:**

2. Provide sufficient land areas for new residential growth which relax constraints on the housing market and afford variety in type, price, and location of units. Opportunities for the provision of housing are presently constrained by a lack of expansion areas. This condition should be relieved by a choice of housing in a variety of locations, both rural and urban in character.
3. Seek alternative residential growth areas within the planning region, with high priority given to the Wailuku and Kahului areas. This action should recognize that crucial issues of maintaining important agricultural lands, achieving efficient patterns of growth, and providing adequate housing supply and choice of price and location must be addressed and resolved.

## **LAND USE**

### **Goal:**

An attractive, well-planned community with a mixture of compatible land uses in appropriate areas to accommodate the future needs of residents and visitors in a manner that provides for the social and economic well-being of residents and the preservation and enhancement of the region's environmental resources and traditional towns and villages.

### **Objectives and Policies:**

1. Ensure that adequate lands are available to support the region's present and future agricultural activities.
2. Identify prime or productive agricultural lands, and develop appropriate regulations for their protection.
6. Establish an adequate supply of urban land use designations to meet the needs of the community over the next 20 years.



**Analysis:** The Maui County General Plan (County-wide Policy Plan, Maui Island Plan, and Wailuku-Kahului Community Plan) seek to preserve productive agricultural lands and facilitate agricultural self-sufficiency in food production. The Plans also recognize the need to provide sufficient land areas to accommodate future population growth. Goal 7.1.1.f of the Maui Island Plan states, *“Strongly discourage the conversion of productive and important agricultural lands (such as sugar, pineapple, and other produce lands) to rural or urban use, unless justified during the General Plan update, or when other overriding factors are present.”* Although the area to be urbanized is considered prime farmland, other overriding considerations include the desire to locate future growth within close proximity of the Central Maui employment center; and to take advantage of existing and planned infrastructure and public facility improvements, such as the proposed Waiale Bypass road that bisects the subject property, the County’s proposed 100-acre Central Maui baseyard located along the eastern boundary of the project, and the approximate 200-acre Central Maui regional park proposed on abutting A&B lands along Kuhilani Highway. Other important factors include the availability of potable and non-potable water on-site to serve the development, the suitability of the land and its location for affordable housing, and the project’s close proximity to the small town of Waikapu and A&B Properties’ proposed Waiale Development. Moreover, the landowner’s willingness to permanently protect approximately 800 acres of prime agricultural lands to serve as a permanent open space separation between Waikapu and the small coastal community of Maalaea was an important consideration.

In addition, as documented in this report, the urbanization of the subject lands will not significantly impact the future viability of the sugar or pineapple industries or the growth of diversified agriculture. As noted, there has been a tremendous amount of land released from sugar and pineapple over the last thirty years. Much of this land is available for agricultural use. Moreover, the land owners desire to establish an agricultural park will directly address the difficulty that many farmers have when trying to lease productive agricultural lands at an affordable rate for long-term tenure. With successful diversified farmers, such as Kumu Farms and Hawaii Taro LLC, being key tenants at the Park, the island of Maui should be able to become

more self-sufficient in food production, while also diversifying and growing the island's agricultural economy.

## REFERENCES

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<sup>i</sup> Capital in Hawaiian Sugar: Its Formation and Relation to Labor and Output, 1870-1957. Prepared by J. A. Mollet. Hawaii Agricultural Experiment Station, College of Tropical Agriculture, University of Hawaii in cooperation with the Agricultural Experiment Stations of the Western States. Agricultural Economics Bulletin 21. June 1961.

2011 State of Hawaii Data Book. Prepared by the State of Hawaii, Department of Business Economic Development & Tourism, Research & Analysis Division. 2011.

<sup>ii</sup> 2011 State of Hawaii Data Book; Prepared by the State of Hawaii, Department of Business Economic Development & Tourism, Research & Analysis Division. 2011.

<sup>iii</sup> 2011 State of Hawaii Data Book. Prepared by the State of Hawaii, Department of Business Economic Development & Tourism, Research & Analysis Division. 2011.

Statistical Abstract of Hawaii. Prepared by the State of Hawaii, Department of Planning & Research, Honolulu, Hawaii. May 1962.

<sup>iv</sup> Maui County Data Book 2011. Prepared by the County of Maui, Office of Economic Development. Hawaii Small Business Development Center. Hawaii Business Research Library. December 2011.

<sup>v</sup> Agricultural Resources Technical Issue Paper, June 2007. Prepared by Chris Hart & Partners, Inc. Prepared for County of Maui, Department of Planning, Long-range Planning Division.

<sup>vi</sup> Maui County Data Book 2011. Prepared by the County of Maui, Office of Economic Development. Hawaii Small Business Development Center. Hawaii Business Research Library. December 2011.

Statistical Abstract of Hawaii. Prepared by the State of Hawaii, Department of Planning & Research, Honolulu, Hawaii. May 1962.

Maui County Data Book 1993. Prepared by the County of Maui, Office of Economic Development and the Maui County Economic Development Board. December 1993.

Maui County Data Book 2000. Prepared by the County of Maui, Office of Economic Development. Hawaii Small Business Development Center. Hawaii Business Research Library. December 2000.

<sup>vii</sup> Maui Island Plan. Prepared by County of Maui, Department of Planning, Long-range Planning Division. December 2012.

<sup>viii</sup> Capital in Hawaiian Sugar: Its Formation and Relation to Labor and Output, 1870-1957; Prepared by J. A. Mollet. Hawaii Agricultural Experiment Station, College of Tropical Agriculture, University of Hawaii in cooperation with the Agricultural Experiment Stations of the Western States. Agricultural Economics Bulletin 21. June 1961.

<sup>ix</sup> 2011 State of Hawaii Data Book. Prepared by the State of Hawaii, Department of Business Economic Development & Tourism, Research & Analysis Division. 2011.

<sup>x</sup> Maui County Data Book 2011. Prepared by the County of Maui, Office of Economic Development. Hawaii Small Business Development Center. Hawaii Business Research Library. December 2011.

<sup>xi</sup> Web Soil Survey. United States Department of Agriculture, Natural Resources Conservation Service.

<sup>xii</sup> Maui Agriculture Development Plan. Maui County Farm Bureau in association with the County of Maui, Office of Economic Development. July 2009.

<sup>xiii</sup> Growth and Stability of Agricultural Production in Hawaii: A Portfolio Analysis. Economic Issues April 2009 EI-6. Prepared by Junning Cai and PingSun Leung, Department of Molecular Biosciences and Bioengineering. Published by the College of Tropical Agriculture and Human Resources (CTAHR) and issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture. Andrew G. Hashimoto, Director/Dean, Cooperative Extension Service/CTAHR, University of Hawai'i at Mānoa, Honolulu, Hawai'i.

<sup>xiv</sup> 2011 State of Hawaii Data Book. Prepared by the State of Hawaii, Department of Business Economic Development & Tourism, Research & Analysis Division. 2011.

<sup>xv</sup> Growth and Stability of Agricultural Production in Hawaii: A Portfolio Analysis. Economic Issues April 2009 EI-6. Prepared by Junning Cai and PingSun Leung, Department of Molecular Biosciences and Bioengineering. Published by the College of Tropical Agriculture and Human Resources (CTAHR) and issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture. Andrew G. Hashimoto, Director/Dean, Cooperative Extension Service/CTAHR, University of Hawai'i at Mānoa, Honolulu, Hawai'i.

<sup>xvi</sup> 2011 State of Hawaii Data Book. Prepared by the State of Hawaii, Department of Business Economic Development & Tourism, Research & Analysis Division. 2011.

<sup>xvii</sup> 2011 State of Hawaii Data Book. Prepared by the State of Hawaii, Department of Business Economic Development & Tourism, Research & Analysis Division. 2011.

2006 State of Hawaii Data Book. Prepared by the State of Hawaii, Department of Business Economic Development & Tourism, Research & Analysis Division. 2011.

<sup>xviii</sup> Economic Impacts of Increasing Hawai'i's Food Self-Sufficiency. Economic Issues, December 2008 EI-16. Prepared by PingSun Leung and Mathew Loke, CTAHR College of Molecular Biosciences and Bioengineering and Hawai'i Department of Agriculture. Published by the College of Tropical Agriculture and Human Resources (CTAHR) and issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture. Andrew G. Hashimoto, Director/Dean, Cooperative Extension Service/CTAHR, University of Hawai'i at Mānoa, Honolulu, Hawai'i.

<sup>xix</sup> Comparative Advantage Trends of Selected Hawai'i's Agricultural Products. Economic Issues, February 2008 EI-14. Prepared by Run Yu, Junning Cai, PingSun Leung, and Matthew K. Loke, Department of Molecular Biosciences and Bioengineering, Hawai'i Department of Agriculture, Published by the College of Tropical Agriculture and Human Resources (CTAHR) and issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture. Andrew G. Hashimoto, Director/Dean, Cooperative Extension Service/CTAHR, University of Hawai'i at Mānoa, Honolulu, Hawai'i.

<sup>xx</sup> Competitiveness of Hawai'i's Agricultural Products in Japan. Economic Issues, June 2010 EI-19. Prepared by Hazel Parcon, Run Yu, Matthew Loke, and PingSun Leung, Department of Natural Resources and Environmental Management, Agricultural Development Division, Hawai'i Department of Agriculture. Published by the College of Tropical Agriculture and Human Resources (CTAHR) and issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture. Andrew G. Hashimoto, Director/Dean, Cooperative Extension Service/CTAHR, University of Hawai'i at Mānoa, Honolulu, Hawai'i.

<sup>xxi</sup> Comparison of Cost Structure and Economic Performance of Hawai'i and U.S. Mainland Farms, Economic Issues, March 2012 EI-21 Prepared by Shawn Arita, Emiko Naomasa, and PingSun Leung, Department of Natural Resources and Environmental Management, College of Tropical Agriculture and Human Resources, University of Hawai'i at Mānoa, Department of Economics, University of Hawai'i at Mānoa. Published by the College of Tropical Agriculture and Human Resources (CTAHR) and issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture. Andrew G. Hashimoto, Director/Dean, Cooperative Extension Service/CTAHR, University of Hawai'i at Mānoa, Honolulu, Hawai'i.

<sup>xxii</sup> Cost of Transporting Fresh Fruits and Vegetables to Honolulu from Hilo and Los Angeles. Economic Issues, March 2010 (slightly revised June 2010) EI-18. Prepared by Hazel Parcon, Matthew Loke, and PingSun Leung CTAHR Department of Natural Resources and Environmental Management UH Department of Economics. Agricultural Development Division, Hawai'i Department of Agriculture. Published by the College of Tropical Agriculture and Human Resources (CTAHR) and issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture. Andrew G. Hashimoto, Director/Dean, Cooperative Extension Service/CTAHR, University of Hawai'i at Mānoa, Honolulu, Hawai'i.

<sup>xxiii</sup> A Comparison of Agricultural Input Prices: Hawai'i vs. Its Major Export Competitors. Economic Issues, October 2011 EI-20. Prepared by Hazel Parcon, Shawn Arita, Matthew Loke, and PingSun Leung, Department of Natural Resources and Environmental Management, College of Tropical Agriculture and Human Resources, University of Hawai'i at Mānoa, School of Economics, De La Salle University, Agricultural Development Division, Hawai'i Department of Agriculture. Published by the College of Tropical Agriculture and Human Resources (CTAHR) and issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture. Andrew G. Hashimoto, Director/Dean, Cooperative Extension Service/CTAHR, University of Hawai'i at Mānoa, Honolulu, Hawai'i.

<sup>xxiv</sup> Cost of Transporting Fresh Fruits and Vegetables to Honolulu from Hilo and Los Angeles. Economic Issues, March 2010 (slightly revised June 2010) EI-18. Prepared by Hazel Parcon, Matthew Loke, and PingSun Leung CTAHR Department of Natural Resources and Environmental Management UH Department of Economics. Agricultural Development Division, Hawai'i Department of Agriculture. Published by the College of Tropical Agriculture and Human Resources (CTAHR) and issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture. Andrew G. Hashimoto, Director/Dean, Cooperative Extension Service/CTAHR, University of Hawai'i at Mānoa, Honolulu, Hawai'i.

<sup>xxv</sup> Comparison of Cost Structure and Economic Performance of Hawai'i and U.S. Mainland Farms, Economic Issues, March 2012 EI-21 Prepared by Shawn Arita, Emiko Naomasa, and PingSun Leung, Department of Natural Resources and Environmental Management, College of Tropical Agriculture and Human Resources, University of Hawai'i at Mānoa, Department of Economics, University of Hawai'i at Mānoa. Published by the College of Tropical Agriculture and Human Resources (CTAHR) and issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture. Andrew G. Hashimoto, Director/Dean, Cooperative Extension Service/CTAHR, University of Hawai'i at Mānoa, Honolulu, Hawai'i.

<sup>xxvi</sup> 2011 State of Hawaii Data Book. Prepared by the State of Hawaii, Department of Business Economic Development & Tourism, Research & Analysis Division. 2011.

<sup>xxvii</sup> Economic Impacts of Increasing Hawai'i's Food Self-Sufficiency. Economic Issues, December 2008 EI-16. Prepared by PingSun Leung and Mathew Loke, CTAHR College of Molecular Biosciences and Bioengineering and Hawai'i Department of Agriculture. Published by the College of Tropical Agriculture and Human Resources



(CTAHR) and issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture. Andrew G. Hashimoto, Director/Dean, Cooperative Extension Service/CTAHR, University of Hawai'i at Mānoa, Honolulu, Hawai'i.

<sup>xxviii</sup> 2011 State of Hawaii Data Book. Prepared by the State of Hawaii, Department of Business Economic Development & Tourism, Research & Analysis Division. 2011.

2006 State of Hawaii Data Book. Prepared by the State of Hawaii, Department of Business Economic Development & Tourism, Research & Analysis Division. 2011.

<sup>xxix</sup> A Comparison of Agricultural Input Prices: Hawai'i vs. Its Major Export Competitors. Economic Issues, October 2011 EI-20. Prepared by Hazel Parcon, Shawn Arita, Matthew Loke, and PingSun Leung, Department of Natural Resources and Environmental Management, College of Tropical Agriculture and Human Resources, University of Hawai'i at Mānoa, School of Economics, De La Salle University, Agricultural Development Division, Hawai'i Department of Agriculture. Published by the College of Tropical Agriculture and Human Resources (CTAHR) and issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture. Andrew G. Hashimoto, Director/Dean, Cooperative Extension Service/CTAHR, University of Hawai'i at Mānoa, Honolulu, Hawai'i.

<sup>xxx</sup> Hawaii's Seed Crop Industry: Current and Potential Economic and Fiscal Contributions. Prepared by Thomas Laudat, PhD, President TAL Associates and Prahlad Kasturi, PhD, Professor Economics Department Radford University, Radford, Virginia. February 2013. Published by the Hawaii Farm Bureau Federation and the Hawaii Crop Improvement Association.

<sup>xxxi</sup> Hawaii's Seed Crop Industry: Current and Potential Economic and Fiscal Contributions. Prepared by Thomas Laudat, PhD, President TAL Associates and Prahlad Kasturi, PhD, Professor Economics Department Radford University, Radford, Virginia. February 2013. Published by the Hawaii Farm Bureau Federation and the Hawaii Crop Improvement Association.

<sup>xxxii</sup> 2011 State of Hawaii Data Book. Prepared by the State of Hawaii, Department of Business Economic Development & Tourism, Research & Analysis Division. 2011.

2006 State of Hawaii Data Book. Prepared by the State of Hawaii, Department of Business Economic Development & Tourism, Research & Analysis Division. 2011.

<sup>xxxiii</sup> Hawaii's Seed Crop Industry: Current and Potential Economic and Fiscal Contributions. Prepared by Thomas Laudat, PhD, President TAL Associates and Prahlad Kasturi, PhD, Professor Economics Department Radford University, Radford, Virginia. February 2013. Published by the Hawaii Farm Bureau Federation and the Hawaii Crop Improvement Association.

<sup>xxxiv</sup> Renewable Energy in Hawaii June 2011. Hawaii Economic Issues. Prepared by State of Hawaii, Department of Business Economic Development & Tourism, Research & Economic Analysis Division.

<sup>xxxv</sup> 2011 State of Hawaii Data Book. Prepared by the State of Hawaii, Department of Business Economic Development & Tourism, Research & Analysis Division. 2011.

<sup>xxxvi</sup> Renewable Energy in Hawaii June 2011. Hawaii Economic Issues. Prepared by State of Hawaii, Department of Business Economic Development & Tourism, Research & Economic Analysis Division.

<sup>xxxvii</sup> HCEI Road Map 2011 Edition. Prepared by Ralph Braccio and Patrick Finch, Booz Allen Hamilton, Inc. McLean Virginia. Prepared by the National Renewable Energy Laboratory (NREL), a national laboratory of the U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy. NREL is operated by the Alliance for Sustainable Energy, LLC. August 2011.

<sup>xxxviii</sup> HCEI Road Map 2011 Edition. Prepared by Ralph Braccio and Patrick Finch, Booz Allen Hamilton, Inc. McLean Virginia. Prepared by the National Renewable Energy Laboratory (NREL), a national laboratory of the U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy. NREL is operated by the Alliance for Sustainable Energy, LLC. August 2011.

<sup>xxxix</sup> The Potential for Biofuels Production in Hawai'i. Prepared by Black and Veatch. January 2010. Prepared for the State of Hawaii, Department of Business Economic Development & Tourism.

<sup>xl</sup> 2011 State of Hawaii Data Book. Prepared by the State of Hawaii, Department of Business Economic Development & Tourism, Research & Analysis Division. 2011.

<sup>xli</sup> Agricultural Land Rating Systems Presentation by Earl Yamamoto, State Department of Agriculture, February 5, 2000.

<sup>xlii</sup> Agricultural Land Rating Systems Presentation by Earl Yamamoto, State Department of Agriculture, February 5, 2000.

<sup>xliii</sup> 2000 State of Hawaii Data Book. Prepared by the State of Hawaii, Department of Business Economic Development & Tourism, Research & Analysis Division. 2000.

Ma'alaea Mauka Residential Subdivision: Impact on Agriculture. Prepared by Decision Analysts Hawai'i, Inc.. Prepared for Maalaea Properties, LLC. January 2007.

2011 State of Hawaii Data Book. Prepared by the State of Hawaii, Department of Business Economic Development & Tourism, Research & Analysis Division. 2011.

<sup>xliv</sup> Maui Gold Website. <http://www.pineapplemaui.com/history.php>.

<sup>xlvi</sup> Ma'alaea Mauka Residential Subdivision: Impact on Agriculture. Prepared by Decision Analysts Hawai'i, Inc.. Prepared for Maalaea Properties, LLC. January 2007.

<sup>xlvii</sup> Maui County Data Book 2011. Prepared by the County of Maui, Office of Economic Development. Hawaii Small Business Development Center. Hawaii Business Research Library. December 2011.

<sup>xlviii</sup> Agricultural Resources Technical Issue Paper, June 2007. Prepared by Chris Hart & Partners, Inc. Prepared for County of Maui, Department of Planning, Long-range Planning Division.

<sup>xlviii</sup> Agricultural Resources Technical Issue Paper, June 2007. Prepared by Chris Hart & Partners, Inc. Prepared for County of Maui, Department of Planning, Long-range Planning Division.

<sup>xlix</sup> Agricultural Resources Technical Issue Paper, June 2007. Prepared by Chris Hart & Partners, Inc. Prepared for County of Maui, Department of Planning, Long-range Planning Division.

<sup>l</sup> Statistical Abstract of Hawaii. Prepared by the State of Hawaii, Department of Planning & Research, Honolulu, Hawaii. May 1962.

Maui County Data Book 1993. Prepared by the County of Maui, Office of Economic Development and the Maui County Economic Development Board. December 1993.

Maui County Data Book 2000. Prepared by the County of Maui, Office of Economic Development. Hawaii Small Business Development Center. Hawaii Business Research Library. December 2000.

Maui County Data Book 2011. Prepared by the County of Maui, Office of Economic Development. Hawaii Small Business Development Center. Hawaii Business Research Library. December 2011.

<sup>li</sup> Sugar Islands: The 165-Year Story of Sugar in Hawaii. By William H. Dorrance and Francis S. Morgan. Mutual Publishing. June 2001.

<sup>lii</sup> 2001 State of Hawaii Data Book. Prepared by the State of Hawaii, Department of Business Economic Development & Tourism, Research & Analysis Division. 2011.

Maui Gold Website. <http://www.pineapplemaui.com/history.php>.

<sup>liii</sup> State of Hawaii, Department of Agriculture Website. <http://hdoa.hawaii.gov/arm/agricultural-parks/>.

<sup>liv</sup> State of Hawaii, Department of Agriculture Website. <http://hdoa.hawaii.gov/arm/agricultural-parks/>.

<sup>lv</sup> Maui Island Plan. Prepared by County of Maui, Department of Planning, Long-range Planning Division. December 2012.

<sup>lvi</sup> Maui Agriculture Development Plan. Maui County Farm Bureau in association with the County of Maui, Office of Economic Development. July 2009.

<sup>lvii</sup> Statistical Abstract of Hawaii. Prepared by the State of Hawaii, Department of Planning & Research, Honolulu, Hawaii. May 1962.

2000 State of Hawaii Data Book. Prepared by the State of Hawaii, Department of Business Economic Development & Tourism, Research & Analysis Division. 2000.

2011 State of Hawaii Data Book. Prepared by the State of Hawaii, Department of Business Economic Development & Tourism, Research & Analysis Division. 2011.

<sup>lviii</sup> Maui County Data Book 2011. Prepared by the County of Maui, Office of Economic Development. Hawaii Small Business Development Center. Hawaii Business Research Library. December 2011.

<sup>lix</sup> Agricultural Land Rating Systems Presentation by Earl Yamamoto, State Department of Agriculture, February 5, 2000.

<sup>lx</sup> Statistical Abstract of Hawaii. Prepared by the State of Hawaii, Department of Planning & Research, Honolulu, Hawaii. May 1962.

Maui County Data Book 1993. Prepared by the County of Maui, Office of Economic Development and the Maui County Economic Development Board. December 1993.

Maui County Data Book 2000. Prepared by the County of Maui, Office of Economic Development. Hawaii Small Business Development Center. Hawaii Business Research Library. December 2000.

Maui County Data Book 2011. Prepared by the County of Maui, Office of Economic Development. Hawaii Small Business Development Center. Hawaii Business Research Library. December 2011.

<sup>lxi</sup> Web Soil Survey. United States Department of Agriculture, Natural Resources Conservation Service.

