HĀMĀKUA
COMMUNITY DEVELOPMENT PLAN

COMMUNITY PROFILE

Draft (December 2010)

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1 Introduction

1.1. Purpose of the Community Profile

The purpose of the community profile is to comprehensively describe the existing conditions of the planning area to provide a fact-based foundation to build policies. The sources of information include previous plans and studies, available mapping data, interviews with agencies, and input from the residents of the area who possess local knowledge. This profile describes the physical, social, cultural, and economic conditions, and also highlights the community's values, stakeholders, and issues.

1.2. Planning Area

The Hāmākua CDP planning area, totaling approximately 1,164 square miles (745,144 acres), encompasses the judicial districts of Hāmākua (57%) and North Hilo (32%), and a portion of South Hilo referred to as Rural South Hilo (11%) ("Planning Area"). The southern boundary follows the Council District 1 boundary, which is located north of Wailuku River and follows an unnamed stream just north of Pukehae Stream, thence along stretches of Waiau and Awehi Streams. The Planning Area includes the communities of Āhualoa, Waipi'o Valley, Kukuihaele, Honoka'a, Kalōpā, Pa'auilo, 'O'ōkala, Laupāhoehoe, Pāpa'aloa, Nīnole, Umauma, Wailea, Hakalau, Honomū, Pepe'ekeō, Pāpa'ikou, Pauka'a, Wainaku, Kaiwiki and other small communities and subdivisions (see Figure 1-1).

1.3. Process Used to Compile the Community Profile

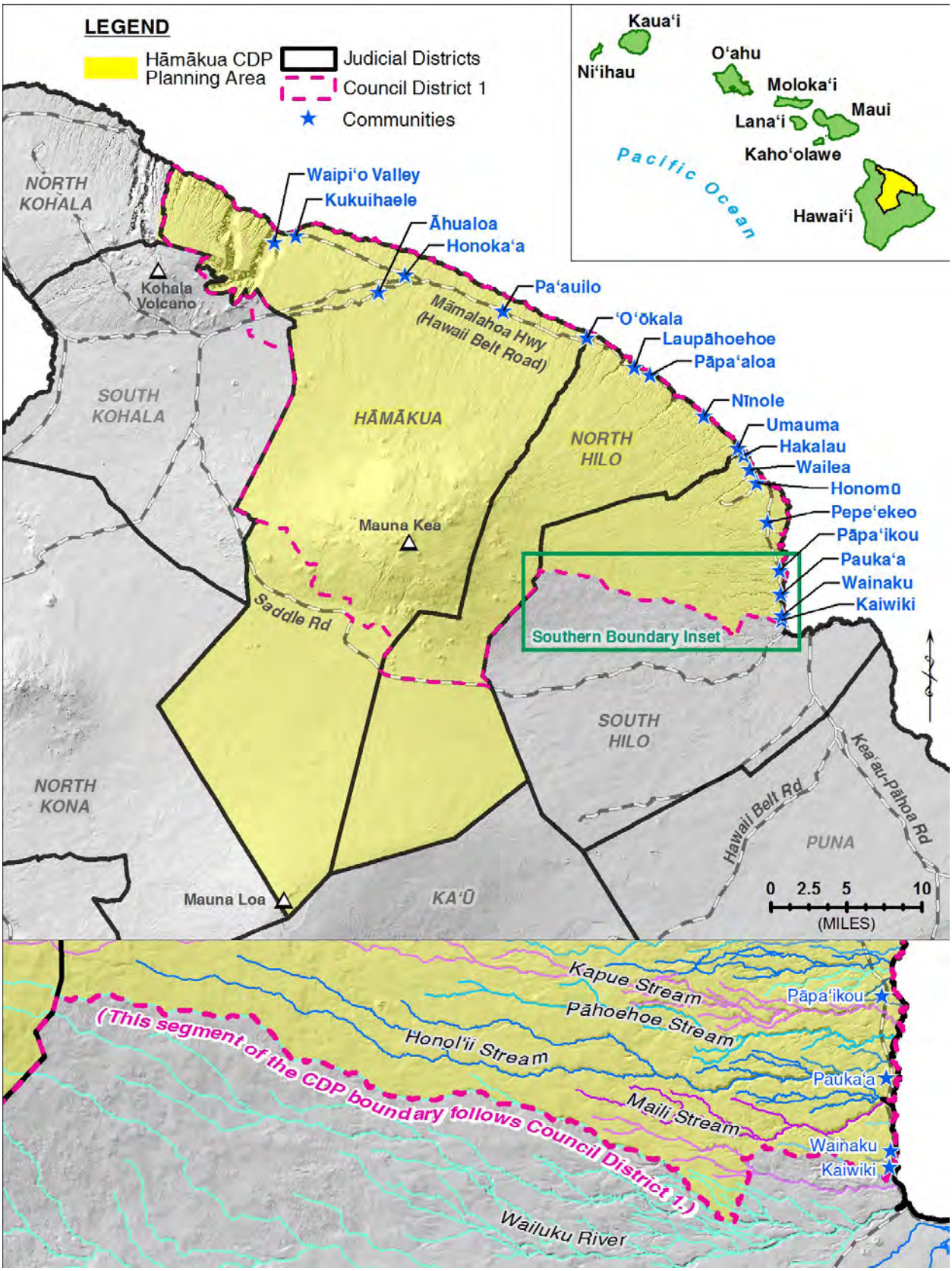
This community profile resulted from the following steps:

1. Community Values. Between September 2009 and May 2010, the County of Hawai'i invited the residents in the Planning Area to respond to two questions by survey or during small group "Talk Story" meetings: What do you LOVE about Hāmākua? and What would you like to SEE in Hāmākua in 20 years? Responses to those questions were used to identify the community's values and vision, as discussed in chapter 9 of this profile document.

2. Background Research. The consultant reviewed previous plans and studies, and organized available mapping data into a geodatabase. The references used for the profile are listed at the end of this profile, including the information sources for the mapped information.

3. Consultation with the Community and Agencies. Data gathering workshops open to the public were held in Rural South Hilo, North Hilo, and Hāmākua during October and November 2010. Interviews were also held as necessary with various agencies and stakeholders to followup on more detailed information.

Figure 1-1. Planning Area



4. Regional Workshop. A regional workshop, held in _____ and attended by ___ persons, verified the information gathered from a broader Planning Area-wide geographical perspective.

1.4. Previous Plans

The Planning Area has been the subject of several previous planning efforts:

- A Plan for the Hāmākua District. In 1970, the County prepared a plan for the Hāmākua District (Kasamoto, et al 1970). The succinct style with its focus on pragmatic recommendations and a financing plan provided a useful historical backdrop to understand some of today's patterns of roads and public facilities. The Hāmākua District Development Council played an active role in developing the plan, and the plan encouraged the continued role of this community-based entity to advise the Planning Department. Although not adopted by ordinance or resolution, the plan was intended to be used as a guide, particularly when formulating the capital improvements budget. For this current Community Development Plan, this 1970 plan was used as a historical reference.

- Northeast Hawaii Community Development Plan. In 1979, the County adopted the Northeast Hawaii Community Development Plan by Ordinance No. 445 that encompassed most of the Planning Area (EDAW and Tanaka 1979) (referred to as the "1979 CDP"). This 1979 CDP included urban design plans for Honoka'a (Ordinance No. 463) and Laupāhoehoe (Ordinance No. 444). The 1979 CDP followed the organization of the General Plan into 12 subject elements. Upon review, most of the 1979 recommendations were found in need of update or too general. In contrast, the urban design plans were quite detailed and provided a starting point to update the plans for these areas. The current Community Development Plan, also adopted by ordinance, updates and supersedes the 1979 CDP and companion urban design plans.

- Hāmākua Regional Plan. In 1990, the State and County jointly formed the Hāmākua Steering Committee (not to be confused with the Steering Committee setup for this current Community Development Plan) to prepare a strategic plan to save the sugar industry (Hāmākua Steering Committee 1990). The Steering Committee consisted of representatives from the State, County, union (ILWU), Hāmākua Sugar Company, and the sugar company's lender (Western Farm Credit Bank). The plan encompassed the lands owned by Hāmākua Sugar Company, from Kaiaakea to Kukuihaele. In response to severe financial problems that threatened the shutdown of Hāmākua Sugar Company, the plan sought to develop a coordinated approach to the sale of Hāmākua Sugar Company lands that would generate sufficient capital to repay debts without undermining the continued viability of the sugar industry. The plan included rezoning recommendations to enhance the value of certain lands designated for sale. In spite of the planning effort, Hāmākua Sugar Company went bankrupt. The County rescinded any rezoning approved pursuant to the plan. The 1990 plan was not adopted by resolution or ordinance. The current Community Development Plan only references this regional plan in a historical context.

- A Plan for the Hilo Hāmākua Coast. In 2000, the Hilo Hāmākua Community Development Corporation (HHCDC) prepared a plan encompassing an area from the Wailuku River to Waipʻo to revitalize the local economy upon the demise of the sugar industry (Kramer 2000). HHCDC is a 501(c)(3) nonprofit corporation that had the intent of serving as the umbrella organization to unify the Rural South Hilo Community Association, North Hilo Community Council, and the Hāmākua District Development Council, and to serve as the conduit for grants and other financing for these organizations. The current Community Development Plan builds upon and incorporates the recommendations and institutional framework initiated by HHCDC.

- Hāmākua Agriculture Plan. In 2006, the County prepared the Hāmākua Agriculture Plan "to safeguard our precious lands and lifestyle until a CDP covering Hāmākua is adopted and implemented" (County of Hawaiʻi 2006). The planning area encompassed a portion of the Planning Area from Maulua Gulch to Waipiʻo Valley. The current Community Development Plan builds upon, incorporates and supersedes the goals, policies, and implementing actions discussed in that 2006 plan.

This Community Development Plan defers to the plans prepared for the Mauna Kea summit and for Department of Hawaiian Home Lands:

- Mauna Kea Summit. The Comprehensive Management Plan for Mauna Kea provides a management framework for the University of Hawaii's Office of Mauna Kea Management to address existing and future activities on these conservation lands, with the goal of protecting Mauna Kea's significant cultural and natural resources. The UH Board of Regents adopted the plan on _____. Since the lands are in the Conservation District and leased from the State, the Board of Land and Natural Resources (BLNR) reviewed and approved the plan on _____.

- Department of Hawaiian Home Lands (DHHL). DHHL has prepared a Hawaii Island Plan (PBR 2002). Although other parts of the island have more detailed regional plans, there are no such regional plans for DHHL lands within the Planning Area. In the absence of regional plans, the island plan prevails.

2 Physical Environment

Located on the windward side of the island exposed to the northeasterly tradewinds, the Planning Area is a relatively young geology in a wet environment sculpted by the work of water, rain and waves. The elevation ranges from sea level in the few areas where there is access to the ocean, rising to the summit of Mauna Kea (see Figure 2-1).

2.1. Geology & Topography

Geological Formation (Macdonald et al, 1983). The Planning Area includes the northeast portion of the Mauna Loa summit and the entire summit of Mauna Kea. Lava flows from the Kohala Mountain, Mauna Kea, and Mauna Loa formed the Planning Area (see Figure 2-2). The oldest flows are from the Kohala Mountain in the northern part of the Planning Area in the vicinity of Waipi'o Valley. Sea stacks off the coast (Paoakalani and Mokupuka islets) are also remnants of the Kohala flows. The extinct Kohala Mountain has been determined to be older than Mauna Kea, as its southwest flanks are buried under Mauna Kea ash and rocks.

Mauna Kea, 13,796 feet in elevation, is thought to be extinct, showing no evidence of eruption in the last 2,000 years. Mauna Kea's earliest lava flows (Hāmākua Series lower member) are thin beds of pāhoehoe and 'a'ā consisting of tholeitic basalts, olivine basalts and oceanites which are exposed only in the lower part of the sea cliffs north of Hilo. A later flow (Hāmākua Volcanic Series upper member) consisted of slightly different composition (alkali olivine basalts, hawiites, ankaramites) that are well exposed in highway cuts along the Hāmākua Coast. A layer of Pāhala ash covers this upper member with a thickness of over 20' along the Wailuku River that gradually thins northward to about 6' near Pa'auilo. Pāhala Ash is the parent material of good agricultural soil. The latest flows from Mauna Kea (Laupāhoehoe Series) were almost wholly restricted to the upper slopes of the volcano. One small eruption on the lower slope near 'O'ōkala formed a small dome and stubby lava flow. The eruptions during this series produced big cinder cones visible from Saddle Road. Other cinder cones follow the east rift zone formed by late flows of the Hāmākua Series. Remnants of these cones which have been extensively quarried are found at Pepe'ekeo and the north side of Onomea Bay. Kauku is a prominent cone whose flow formed Pepe'ekeo Point.

Mauna Loa continues to be active, although it is thought to be nearing the end of its shield stage having erupted infrequently over the last 100 years. The mountain rises to over 13,600 feet and is comprised of four series of rocks or ash: Nīnole volcanic series; Kahuku volcanic series which is capped by Pāhala ash; and the most recent, Ka'ū Volcanic series which are most dominant in the Planning Area. The Wailuku River follows the intersection of the Mauna Loa and Mauna Kea flows.

Figure 2-1. Elevation

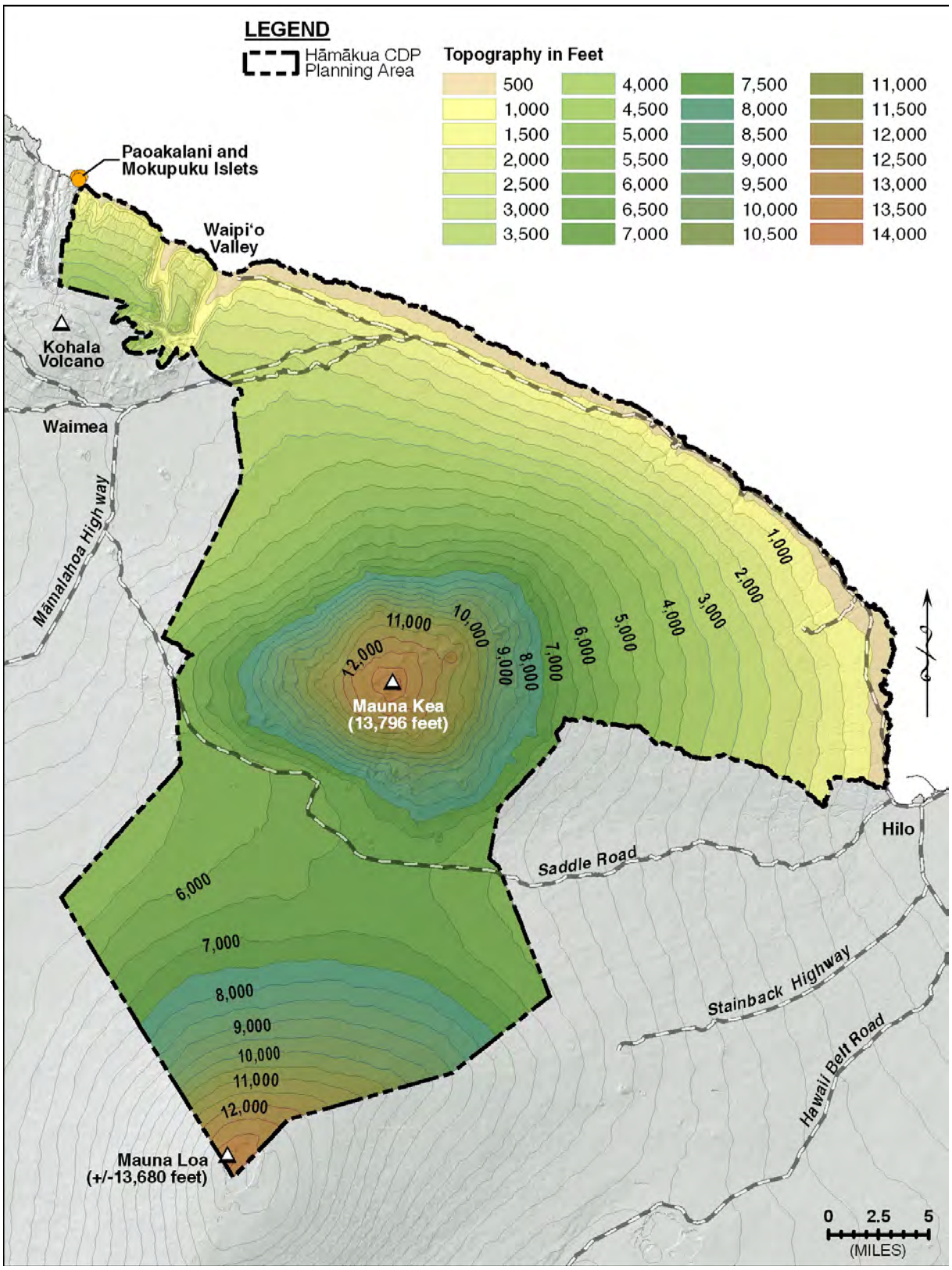
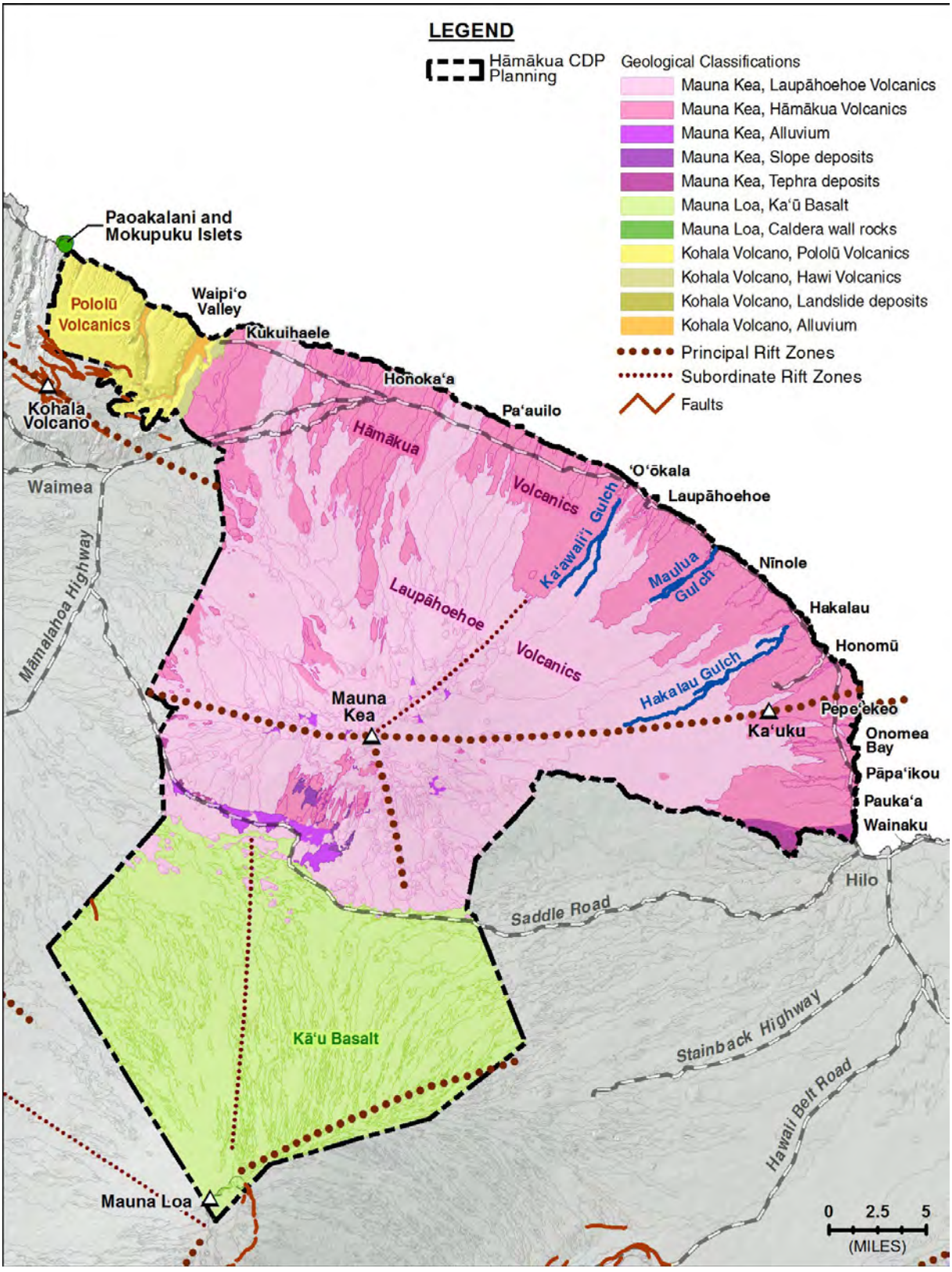


Figure 2-2. Geology



Work of Water (Macdonald et al, 1983)**.** Streams are the predominant sculptors of landscapes in the windward, wetter parts of the Hawaiian islands. The narrow, v-shaped valleys that characterize the Planning Area are in the youth stage of a geomorphic cycle (see Figure 2-3). The initial streamways make use of any existing depressions such as the channels of former lava rivers or depressions following the boundaries of adjacent lava flows. As soon as streams start to flow more or less continuously, they start to cut narrow v-shaped notches into the land surface. As the downcutting meets more resistant substrate, waterfalls form. The turbulence of the water at the foot of a waterfall causes undercutting at the base resulting in repeated collapse of the face of the waterfall as the waterfall erodes its way upstream. As erosion progresses towards the headwaters, one streams cuts into the valley of another. This stream capture results in greater flow for the master stream further accelerating the cutting of the master stream while slowing the cutting of the lower course of the other stream. As the sculpting of the streams in the Planning Area evolves through the geomorphic cycle through the headward retreat of waterfall erosion and stream capturing, steep valley walls and near-vertical semi-circular valley heads, termed amphitheater-headed valleys, will tend to form as they have done in the older islands such as Oahu and Kauai. The steepness of the valley walls is due to the layering of greater and lesser erosion-resistant rock and ash formations, where the more rapid erosion of the less resistant layers cause undercutting of the more resistant layers. The binding effect of vegetation also contributes to the steepness. An exception to the amphitheater-headed formation is Waipi'o Valley. Waipi'o Valley extends inward southwesterly, then abruptly bends at a right angle northwesterly following a fault line. The steep gulches in the Planning Area may have been once deeper, but have become filled by alluvium by their streams and deposits from sea level rise.

Figure 2-3. Youthful Phase of Geomorphic Cycle

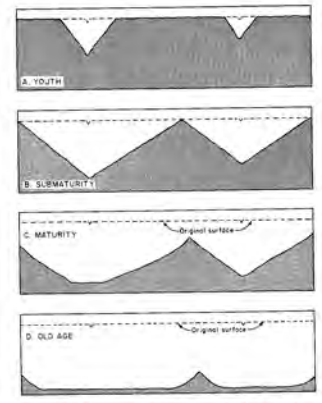


Figure 10.6. Diagrammatic cross sections of ridges and valleys, showing the profiles characteristic of the successive stages in the ideal geomorphic cycle of humid regions.

Figure 10.7. Youthful valleys of consequent streams on the Hamakua Coast, Hawaii. The narrow V-shaped valleys are separated by broad areas, covered with a blanket of ash, that are almost untouched by erosion. The ghosts of an earlier lava-flow topography can be seen through the ash.

The sculpting by wave action is also a dominant feature of the Planning Area due to the exposure to waves generated by the northeasterly trades. Typical of the youth stage of the geomorphic cycle, the stream downcutting has not kept pace with the wave action cutting causing many streams in the Planning Area to plunge down wave-cut cliffs to enter the ocean. There a few major streams that have kept pace and enter the ocean at grade (e.g., Hakalau). Waves erode by abrasion (sand, pebbles, and rock pounded against the rock) and hydraulic action (pressure exerted by the water directly or through trapped and compressed air). The weathering of the rocks by salt spray also increases the susceptibility to wave erosion. Occasionally, waves attacking the sides of a promontory cut a cave completely through it, creating a sea arch. The **Onomea Arch** was cut through an old cinder cone, but its top collapsed in 1958. The remaining isolated rock projecting out of the ocean is called a sea stack.

2.2. Soils

Soil formation is the result of leaching and weathering processes, an integrated influence of the parent material, climate, vegetation, drainage, and time. Mineral decomposition of the parent material occurs relatively rapidly in Hawai'i due to: year-round warm climate for continuous weathering; porous lava surface for infiltration and leaching; and parent materials susceptible to mineral decomposition. Generally, soil forms more rapidly from volcanic ash, followed by 'a'ā, with pāhoehoe the most resistant to weathering. As a result of the leaching and weathering, the primary characteristic distinguishing the classification of tropical soils is the types of secondary minerals formed from the decomposition or transformation of the parent materials (Sherman 1976).

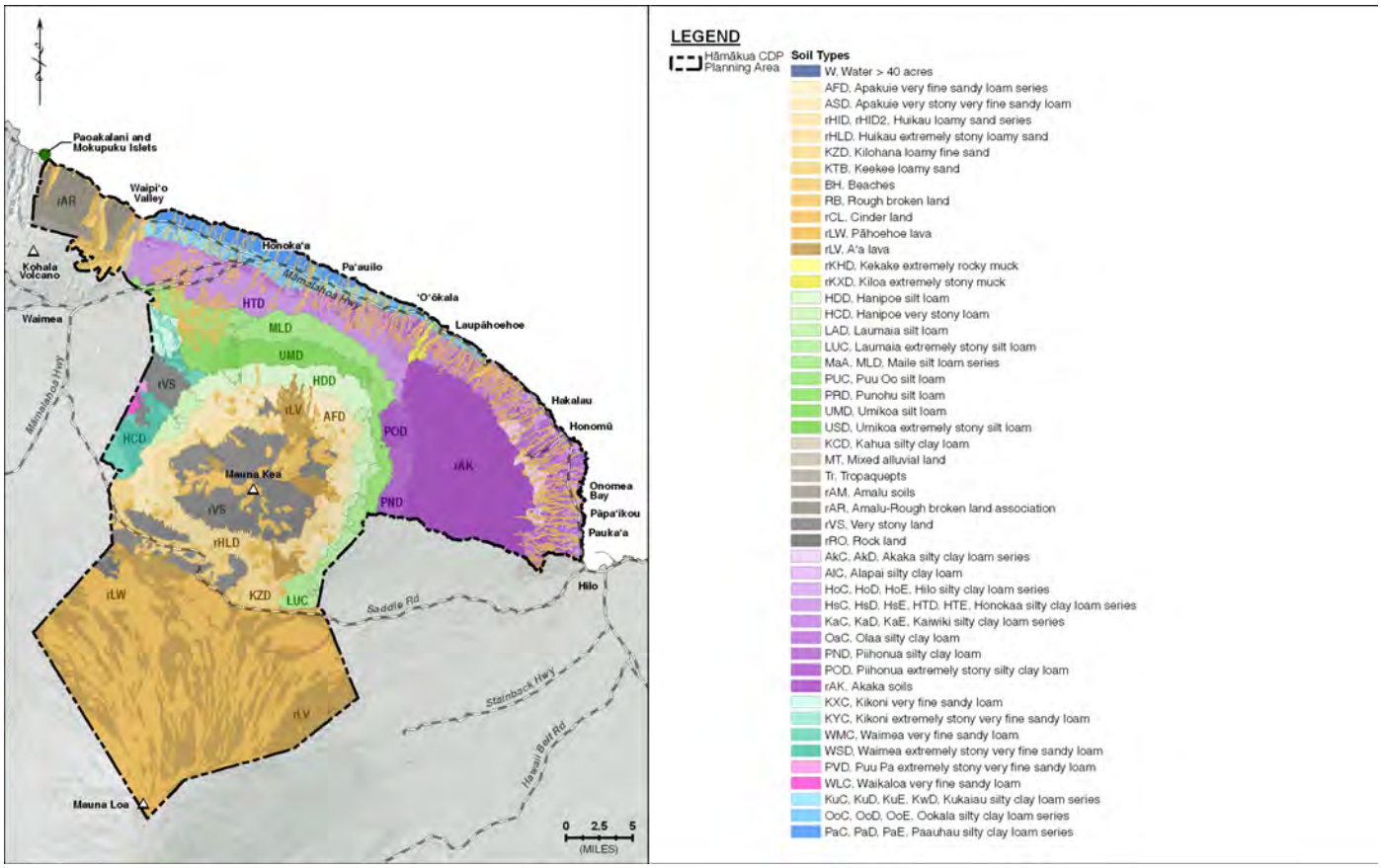
Soil Types. Within the Planning Area, the soils predominantly fall into four soil association groups (USDA 1973). A soil association is a landscape that has a distinctive proportional pattern of soils consisting of one or more major soils and at least one minor soil.

- Akaka-Hookaa-Kaiwiki Soil Association. These soils are generally deep, gently sloping to steep, moderately well-drained and well-drained soils that have a moderately fine textured subsoil formed in volcanic ash. These soils are high in organic-matter content, are very porous, and are continuously wet. They are located on uplands at elevations ranging from sea level to 6,000 feet and receive from 80 to more than 200 inches of rainfall annually. Within the Planning Area, the soils within this association are located in mauka lands of Pāpa'ikou and Honomū and include Akaka Silty Clay Loam, 0-10% slopes and 10-20% slopes (see Figure 2-4 This soil association is also found in the arable or forested areas of Puna, Ka'ū, South Kona, North Kona.

- Kukaiau-Ainakea-Paauhau Soil Association. These soils are generally deep and moderately deep, gently sloping to steep, well-drained soils that have a moderately fine textured subsoil formed in volcanic ash or basic igneous rock. They are located on uplands at elevations ranging from sea level to 2,500 feet and receive from 50 to 140 inches of rainfall annually. Within the Planning Area, the soils within this association include Kūkai'au silty clay loam, 6-12% slope, 12-20% slope and 20-35% slope as well as Paauhau silty clay loam, 6-12% slope, 12-20% slope and 20-35% slope. They are found in the lower elevation lands from Pa'auilo to Kukuihaele. This soil association is also found in the better agricultural areas of Ka'ū, South Kona, North Kona, and North Kohala.

- Hanipoe-Maile-Puu Oo Soil Association. These soils are generally deep, gently sloping to steep, well-drained soils that have a medium-textured to moderately fine textured subsoil formed in volcanic ash. They are located on uplands at elevations ranging from 2,500 to 8,000 feet and receive from 30 to 120 inches of rainfall annually. Within the Planning Area, the soils within this association include Hanipoe silt loam 12-20% slopes, Hanipoe very stony loam, 12-20% slopes, Maile silt loam, 0-3% slopes, Maile silt loam 6-20% slopes and Puu Oo silt loam, 6-12% slopes. This soil association is also found in the mauka areas of Ka'ū, South Kona, North Kona, and North Kohala.

Figure 2-4. Soil Types



- Amalu-Kahua Soil Association. The soils in Waipi'o Valley are in a soil association found only on the Kohala Mountains. The soils in this association are generally shallow to deep, gently sloping to steep, poorly drained to somewhat poorly drained soils that have a moderately fine textured subsoil formed in volcanic ash. They are located at elevations ranging from sea level to 5,500 feet and receive from 80 to more than 200 inches of rainfall annually. Within the Planning Area, the soils within this association include Amalu soils which are associated with the narrow ridgetops of the Kohala Mountains and Amalu rough broken land which are found on sides of gulches, largely devoid of soil. Kahua soils within the Planning Area include Kahua silty clay loam, 6-20% slopes. They are associated with the more undulating soils in the Kohala Mountains.

Soil Suitability Studies. The University of Hawai'i Land Study Bureau *Detailed Land Classification* (Baker 1965) and the State of Hawai'i, Department of Agriculture's *Agricultural Lands of Importance to the State of Hawai'i* (State of Hawai'i 1977) focus on the relative productivity of different land types for agricultural production purposes. The Detailed Land Classification classifies non-urban areas based on a five-class rating system for agricultural productivity using the letters A, B, C, D and E, with A representing the highest class of productivity and E the lowest. Within the Planning Area, the highest ranked lands are located along the North Hilo and Hāmākua coasts, as well as upland areas such as Pa'auilo Mauka (see Figure 2-5).

The ALISH system classifies three types of land suitable for agriculture: Prime Lands, Unique Lands, and Other Lands (unsuitable lands are designated Unclassified) (State of Hawai'i 1977):

- **Prime Agricultural Land** is land best suited for the production of food, feed, forage, and fiber crops. When treated and managed, including water management, and according to modern farming methods, the land has the soil quality, growing season, and moisture supply needed to economically produce sustained high yields of crops.

- **Unique Agricultural Land** is land other than Prime Agricultural Land and is used for the production of specific high-value food crops. The land has the special combination of soil quality, growing season, temperature, humidity, sunlight, air drainage, elevation, aspect, moisture supply, or other conditions, such as nearness to market, that favor the production of a specific crop of high quality and/or high yield when the land is treated and managed according to modern farming methods. In Hawai'i, some examples of such crops are coffee, taro, rice, watercress and non-irrigated pineapple. Land that qualifies as Prime Agricultural Land and is used for a specific high-value crop is classified as Prime rather than as Unique.

- **Other Agriculture Land** is land other than Prime or Unique Agricultural Land that is also of statewide or local importance for the production of food, feed, fiber, and forage crops. The lands in this classification are important to agriculture in Hawai'i yet exhibit properties, such as seasonal wetness, erosion, limited rooting zone, slope, flooding, or drought, which exclude the lands from the Prime or Unique Agricultural Land classifications. By applying greater inputs of fertilizer and other soil amendments, providing drainage improvements, implementing erosion control practices, and providing flood protection, these lands can be farmed satisfactorily and produce fair to good crop yields.

A band of Prime agricultural lands extends across the lower elevations of the Planning Area (see Figure 2-6). Interspersed through the lower elevations and in Waipi'o Valley are lands that are classified by this system as Unique. The "Other" designation is applied to much of the mauka lands in the Planning Area.

2.3. Climate

Rainfall. Rainfall in the Planning Area ranges from 60 inches annually at the lowest coastal elevations to over 240 inches at the Makahanaloa rain gauge located on the southeast flank of Mauna Kea (see Figure 2-7). Located on the windward side of the island, the orographic effect (where tradewinds interact with the mountainous terrain creating precipitation) causes the bulk of the rainfall in the Planning Area. Tradewinds are forced to rise when they encounter the mountainous terrain, cooling, creating fog and ultimately rainfall. Orographic rainfall increases with elevation, reaching a maximum intensity from 2,000 to 3,000 feet elevation and then diminishing so that upper slopes are semi-arid.

Figure 2-5. Land Study Bureau (LSB) Agricultural Suitability Classification

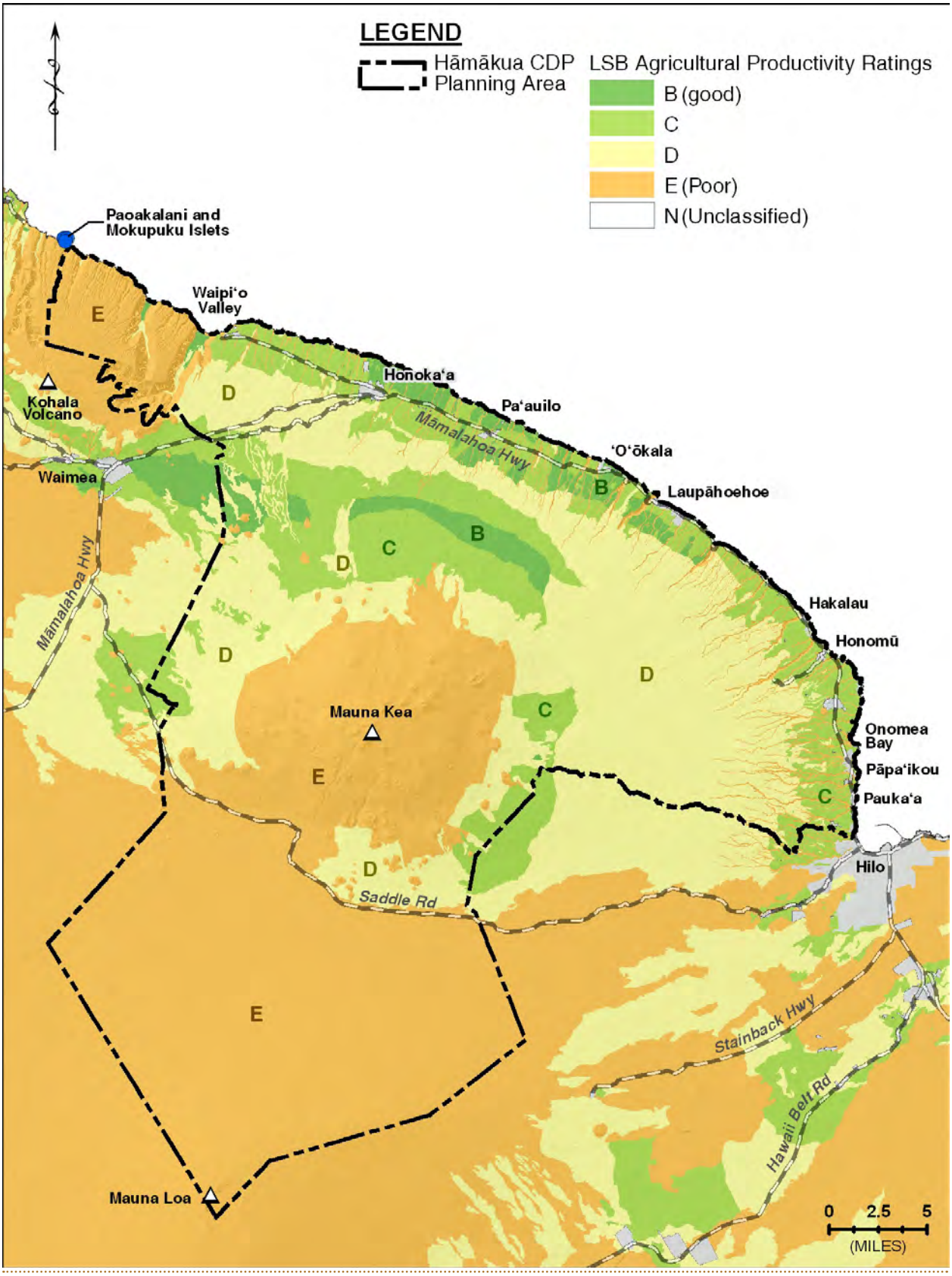


Figure 2-6. Agricultural Lands of Importance to the State of Hawai'i (ALISH) Classification

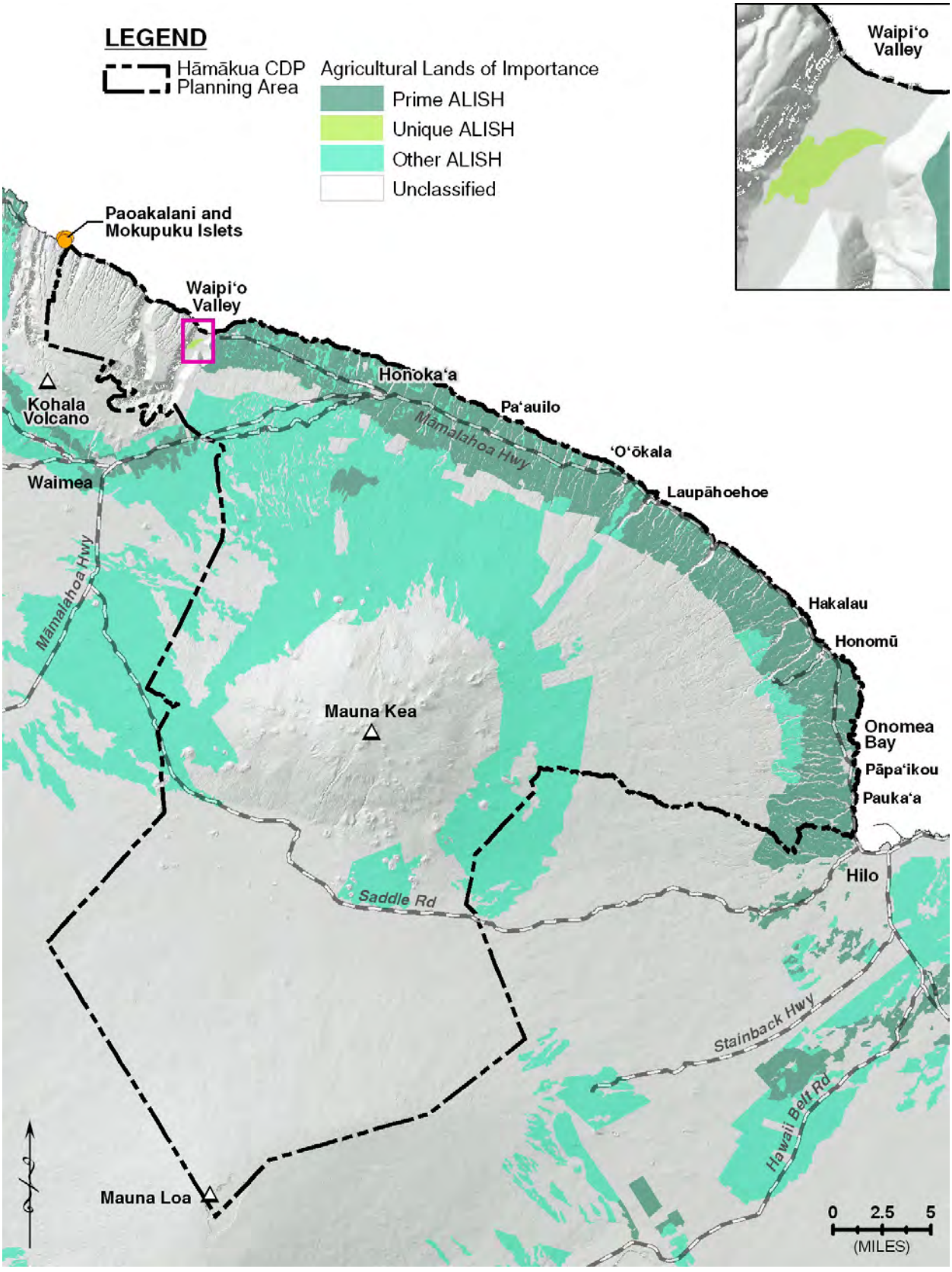
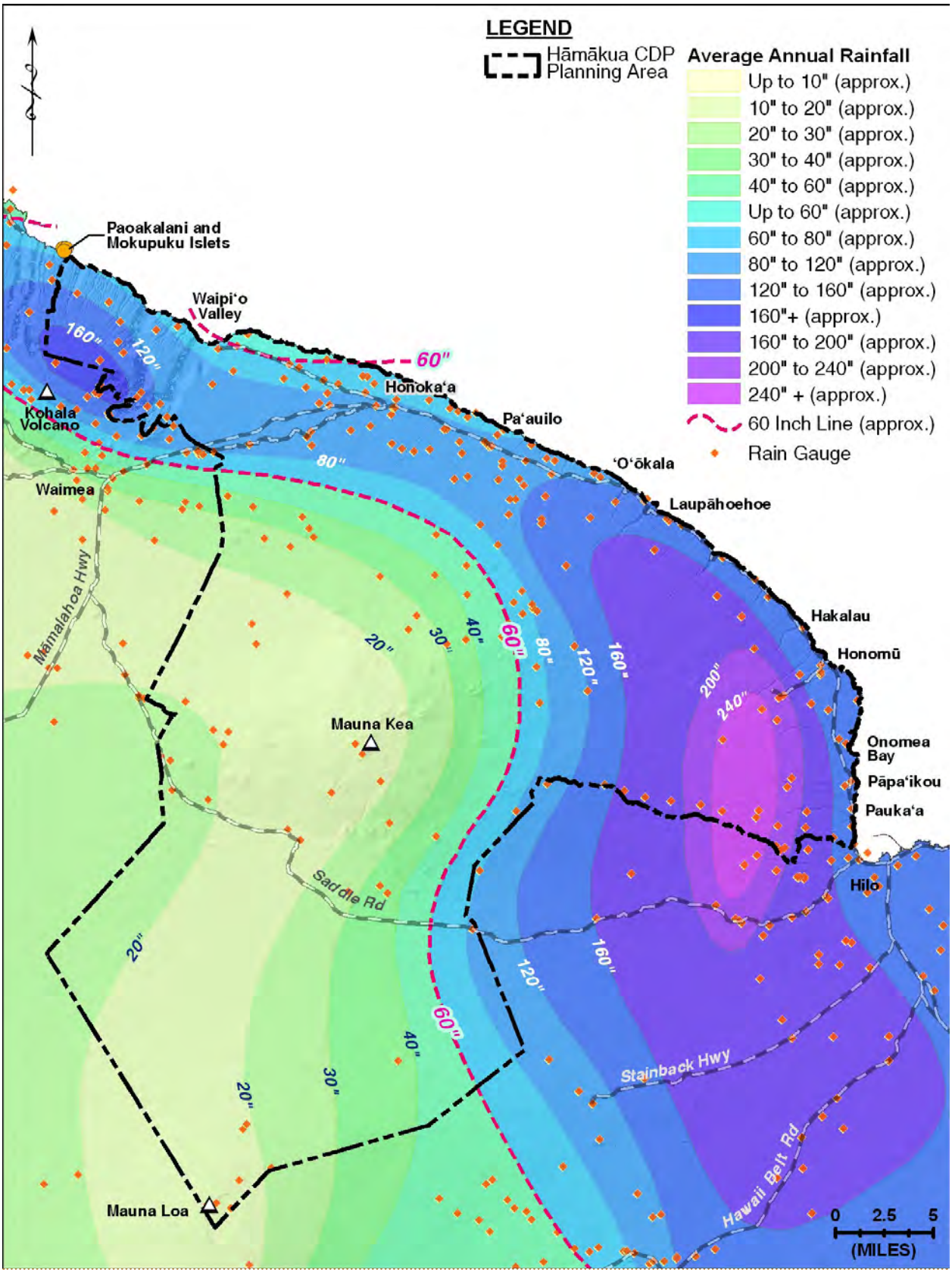


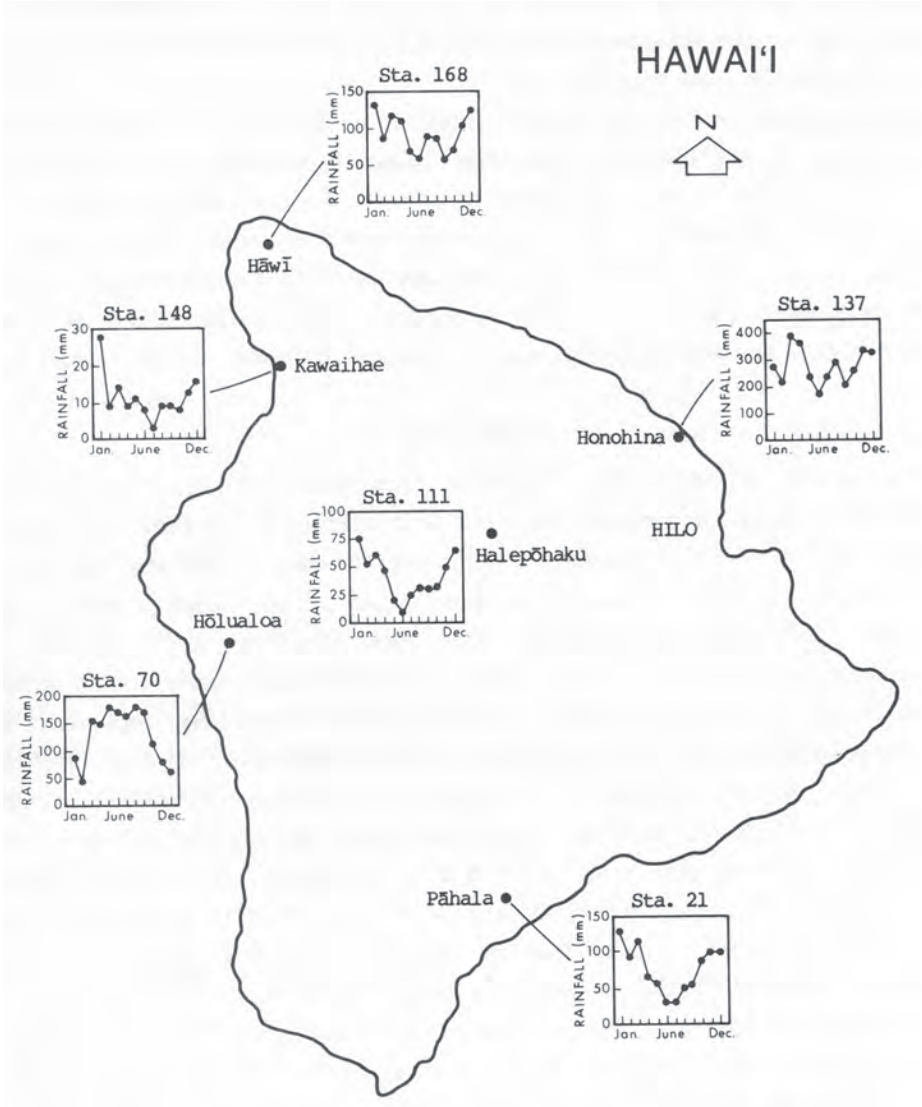
Figure 2-7. Rainfall (Average Annual)



The orographic effect is capped by a temperature inversion layer that varies in altitude between 5,000′ to 10,000′ elevation (Juvik and Juvik 1998) with an average tendency at about 8,000′ (Giambelluca et al 1986). Since Mauna Kea's summit is higher than the inversion layer, Mauna Kea forces the tradewinds to blow around the mountain. Consequently, Mauna Kea's peak and other areas above the inversion layer receive less precipitation than areas of lower elevation. Also due to the elevation of Mauna Kea, a distinct diurnal variation in rainfall occurs in the Planning Area. That is, during the daytime, tradewinds move onshore and upslope, while at night, winds blow down from the mountain slopes.

The monthly rainfall pattern in wet areas such as the Planning Area is usually characterized by a triple maxima, with peaks in March/April, August, and November/December, and lows in February, June, and September/October (Giambelluca et al 1986) (see Figure 2-8). Orographic rainfall increases during the summer months (May-September) because of more persistent tradewinds. During the winter months (October-April), the greater frequency of storm systems produce widespread rainfall over the entire State.

Figure 2-8. Median Monthly Rainfall



Water Catchment Potential. In Hawai'i County, the 60-inch annual rainfall isohyet (contour line documenting precipitation) has land use regulatory implications. A subdivision variance to create less than 6 lots using water catchments is permissible only for areas receiving greater than 60" of rainfall (Planning Department Rule 22). The 60-inch isohyet wraps around the flanks of Mauna Kea corresponding with the 300- foot ground elevation to the north (south of Waimea) and rising to higher ground elevations south of the mountain and across the saddle between Mauna Kea and Mauna Loa.

Wind Energy. The wind patterns that affect rainfall are a product of the diurnal wind fluctuation on Hawai'i Island. Lands on the slopes of both Mauna Kea and Mauna Loa are particularly affected by this pattern. For the Planning Area, this generally means an on-shore wind pattern during the day, and a change in direction in the evenings where winds blow down the mountain side (see Figure 2-9). This fluctuation, although consistent, make the Planning Area less desirable for large-scale wind energy development than areas where wind directions are consistently from one direction (i.e. North Kohala and Ka'ū).

Solar Insolation (Radiation). Generally, the intensity of solar insolation is inverse to rainfall. Clouds and other atmospheric particles can reflect some of the incoming solar radiation. Radiation that has been scattered or reflected and approaches the earth from other than the direction of the sun is called diffuse radiation. Radiation that reaches the surface from the direction of the sun is called direct-beam radiation. The sum of direct-beam and diffuse radiation is called solar insolation. Diffuse radiation may account for 100% of insolation on a densely overcast day and 15% on clear days. Diffuse radiation is generally unsuitable for solar energy applications as it is difficult to focus. On the other hand, a high ratio of diffuse to direct-beam is beneficial to plant growth because diffuse radiation has a high visible-light content and greater canopy penetration (Sanderson 1993).

Slope, aspect, and elevation influence insolation as does the atmosphere and presence of clouds in the sky. Thus, north facing, windward slopes typically exhibit less solar radiation than their south facing counterparts on the leeward side of the island. Similarly, areas with greater cloud cover also generally experience less solar radiation. The diverse landscape of the Planning Area includes areas with some of the lowest solar radiation levels in Hawai'i (North Hilo, 150 watts per square meter) and some of the most intense (peak of Mauna Kea, 300 watts per square meter) (see Figure 2-10).

Figure 2-9. Wind Patterns

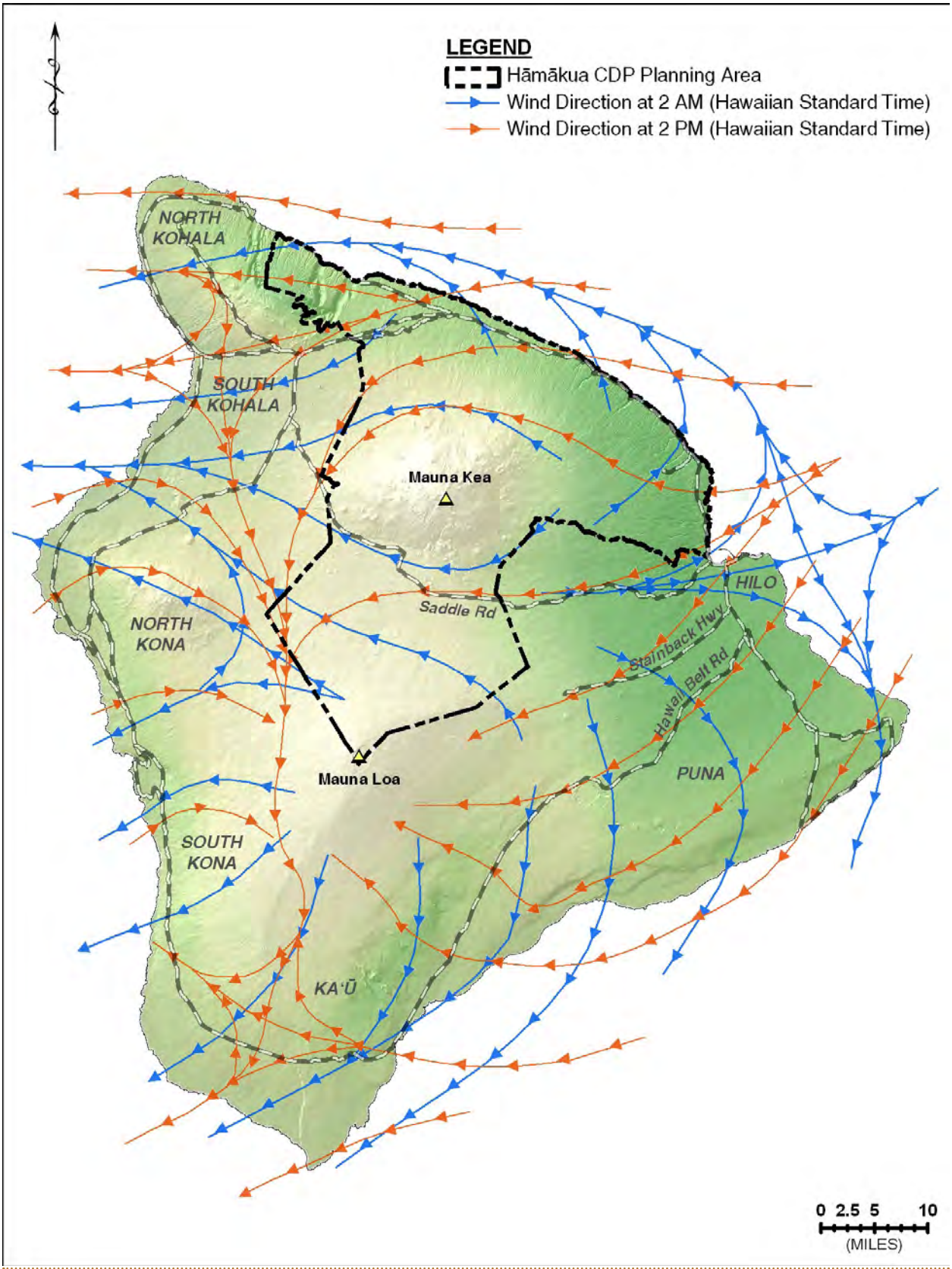
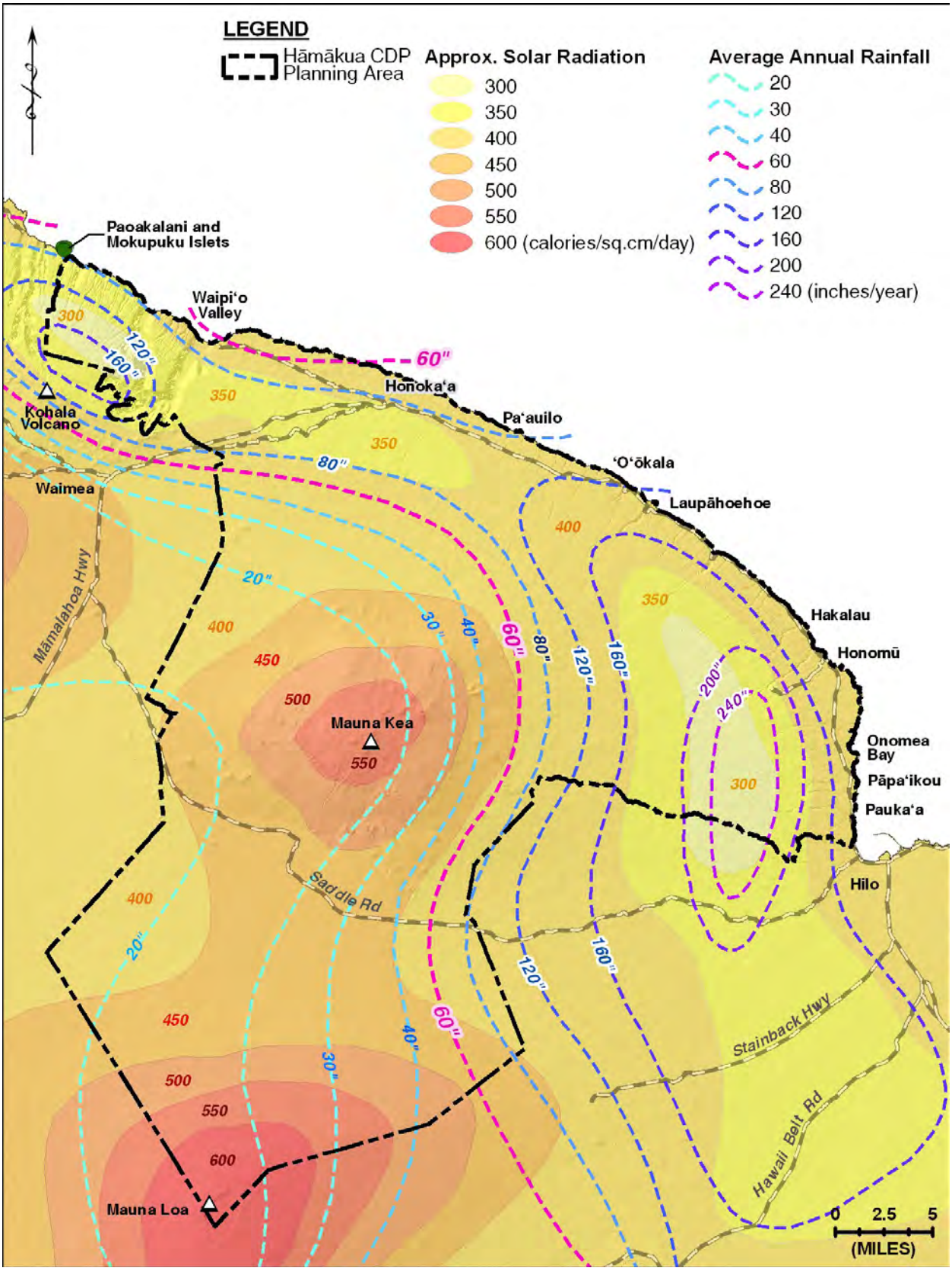


Figure 2-10. Solar Insolation



2.4. Hydrology

Rainfall either infiltrates into the ground or runs off the surface eventually collecting in streams. Some of the water that soaks into the ground returns to the atmosphere by evaporation or transpiration through plant leaves. Much of the water that infiltrates becomes part of the groundwater body which slowly moves downgradient ultimately exiting into streams, springs, or the ocean. This movement of water is called the hydrologic cycle.

Streams and Watersheds. Watersheds are the area of land that defines the drainage basins for streams. They collect water that falls as precipitation and convey it to streams and groundwater and eventually to the ocean. The natural vegetation in a watershed regulates the flow of water as well as help remove sediment and other pollutants from the water, thus serving important ecosystem service functions for flood control and stream and ocean water quality. Watershed boundaries correspond with stream systems including the main channel and its tributaries. Streams are important to the coastal nearshore productivity-- streams bring nutrients, biota that serve as food sources, and conditions such as temperature and salinity. Since native stream species spend a portion of their life cycle in the ocean (diadromous species), it is important to maintain connectivity from headwaters to stream mouth. Even intermittent streams are habitats as species wait for the first flush or floodflows. Even terminal (or "hanging") streams are habitats since certain species can climb cliffs.

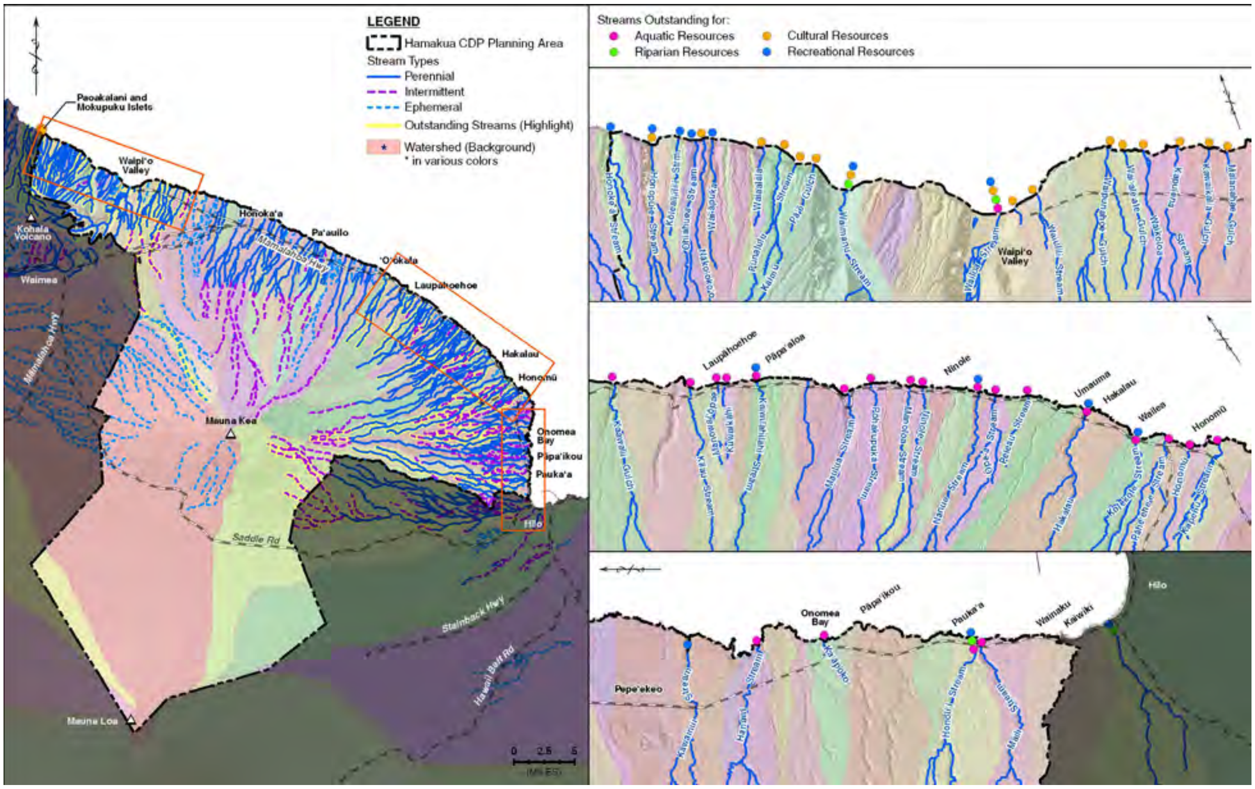
The Planning Area (along with the Napali Coast on Kauai) is unique in the State for its density of relatively pristine streams, especially the Maulua Gulch to Wailuku River area (Nishimoto, R. 2010). The State's inventory of streams identifies 149 streams in the Planning Area (not counting the tributaries) (see Figure 2-11). The streams are classified according to whether they flow continuously throughout the year:

- Perennial= stream flows continuously throughout the year from source to mouth;
- Intermittent= stream flows continuously in portions for all or most of the year, but may be interrupted from source to mouth;
- Ephemeral (or non-perennial)= stream flows in direct response to rainfall.

The State has conducted two assessments of streams. The earlier study entitled Hawai'i Stream Assessment, published in 1990, ranked streams according to the following categories (State of Hawai'i 1990):

- Aquatic Resources. This category includes fish, mollusks, and crustaceans that rely on freshwater streams for habitat. The presence of certain native species served as indicators of the aquatic resource value and overall health of the stream system.
- Riparian Resources. This category includes those streamside or terrestrial natural resources that may affect or be affected by the quality of stream ecosystems. Riparian resources include native plant species, native forests, wetlands and waterbird habitat within the stream corridor, as indicators of the quality of the stream watershed.

Figure 2-11. Streams and Watersheds



- Cultural Resources. This category includes stream-related cultural sites from prehistory to historic times, and sites where taro still grows today. Resources include heiau, habitation complexes, irrigations systems and loʻi, bridges and mills.

- Recreational Resources. This category includes stream pools, waterfalls, and banks that provide places for people to swim, fish, boat, hike and enjoy scenic vistas.

For each of these four categories, the Assessment ranked the streams as Outstanding, Substantial, Moderate, Limited, or Unknown. Those streams that ranked high for each of the aquatic, cultural, recreational and riparian categories or exhibited unusually outstanding characteristics in any one category, the Assessment identified as "candidate streams for protection".

The most recently study, entitled Atlas of Hawaiian Watersheds & Their Aquatic Resources (Parham, J.E., et al 2008), provides an accounting of the existing information available about watersheds, streams and the animals that inhabit the streams. The Atlas, prepared by the State Department of Land and Natural Resources, Division of Aquatic Resources (DAR) and the Bishop Museum reviews stream surveys dating from the 1960's to the present. The Atlas provides stream data available to resource managers and the general public; it provides comparative information about what is known of each stream and provides a platform to link other data sources to better inform ahupuaʻa management. The Atlas includes a watershed summary for each watershed that includes a map, information about land management status and land use as well as stream features and aquatic life. Each watershed summary includes a total watershed rating which evaluates physical characteristics (e.g., land cover, wetness), total biological rating which evaluates habitat quality (e,g., native species, introduced aquatic animals), and an "Overall Rating" that integrates the watershed and biological ratings. The overall rating ranks watersheds from 0-10 range. Watersheds without survey efforts are unranked and listed as "NR". See Figure 12.

Based on the Atlas' Overall Ranking, the watersheds with the highest scores (8-9) were Waimanu, Honoliʻi, Kaiwilahilahi, Hakalau, Kolekole, Kawainui, Hanawi and Pāhoehoe. Many watersheds in North Hilo and Hāmākua were not rated due to an insufficient numbers of studies to support a ranking. The 1990 Stream Assessment identified ten candidate streams for protection on the Island of Hawaiʻi, Of which seven are located in whole or in part within the Planning Area: Wailuku (tributary streams to Wailuku River are located within the Planning Area), Honoliʻi, Kolekole, Lālākea, Wailoa/Waipiʻo, Waimanu and Honokāne Nui (upper reaches are located within the Planning Area).

Stream	HSA Candidate Streams for Protection	Atlas Overall Rating
Wailuku*	x	6
Honoliʻi	x	9
Kolekole	x	8
Lālākea	x	7 (Wailoa watershed)
Wailoa/Waipiʻo	x	7
Waimanu	x	9

Stream	HSA Candidate Streams for Protection	Atlas Overall Rating
Honokāne Nui**	x	7
Kaiwilahilahi		8
Hakalau		8
Kawainui		8
Hanawī		8
Pahoehoe		8

The outstanding streams in the Planning Area for each category are as follows (where Hawai'i Stream Assessment's score is 4=Outstanding and 1=Limited, followed by Atlas' score of 1-10 with 10 as outstanding) :

- The perennial streams with outstanding **aquatic** conditions indicating a quality habitat for native stream species

Stream	Aquatic	Riparian	Cultural	Recreational	Atlas Total Biological Rating
Wailoa	4	4	4	4	6
Lālākea	4	3		3	6
Honoli'i	4	4	1	4	8
Hakalau	4	3		4	8
Kaiwilahilahi	4	3		4	8
Kolekole	4	3		4	7
Ka'awali'i Gl	4	3		2	5
Nanue	4			4	8
Hanawī	4			3	8
Kapehu	4			3	4
Kīlau	4			3	6
Kuwaikahi	4			3	5
Mā'ili	4			3	6
Manoloa	4			3	7
Manowai'ōpae	4			3	5
Maulua	4			3	5
Nīnole	4			3	5
Opea	4			3	5
Peleau	4			3	NR
Pōhakupuka	4			3	5
Honomū	4			2	5
Ka'āpoko	4			2	4

Stream	Aquatic	Riparian	Cultural	Recreational	Atlas Total Biological Rating
Pāheʻeheʻe	4			2	6

- The perennial streams with outstanding **riparian** qualities indicating a quality watershed:

Stream	Aquatic	Riparian	Cultural	Recreational	Atlas Total Watershed Rating
Wailoa	4	4	4	4	7
Honoliʻi	4	4	1	4	8
Waimanu	2	4	4	4	8
Wailuku R	2	4		4	7

- The perennial streams with outstanding cultural qualities indicating the presence of stream-related cultural features (only HSA ranking; Atlas did not rate cultural features):

Stream	Aquatic	Riparian	Cultural	Recreational
Wailoa	4	4	4	4
Waimanu	2	4	4	4
Honokāne Nui	2	3	4	4
Waikoloa	1		4	2
Kaimū		3	4	3
Pae Gl		3	4	3
Honokāne Iki			4	4
Honopue			4	4
Kaluahine Falls			4	3
Nākoʻokoʻo			4	3
Waiaalala			4	3
Malanahae Gl			4	2
Kapulena Gl			4	2
Kawaikalia Gl			4	2
Waiʻaleʻale Gl			4	2
Waipunahoe Gl			4	2
Punalulu			4	
Waiulili			4	

- The perennial streams with outstanding recreational qualities indicating quality features for swimming, fishing, or boating (only HSA ranking; Atlas did not rate recreational features):

Stream	Aquatic	Riparian	Cultural	Recreational
Wailoa	4	4	4	4
Honoli'i	4	4	1	4
Hakalau	4	3		4
Kaiwilahilahi	4	3		4
Kolekole	4	3		4
Nanue	4			4
Waimanu	2	4	4	4
Wailuku R	2	4		4
Honokāne Nui	2	3	4	4
Kawainui	2	3		4
Ohiahuea		3		4
Honokāne Iki			4	4
Honopue			4	4
Honoke'ā				4
Koleali'ili'i				4
Waiapuka				4

Instream Flow Standards. The State Water Code (Chapter 174C, HRS) establishes the State's responsibility to set Instream Flow Standards on a stream-by-stream basis whenever necessary to protect the public interest in the waters of the State. The agency charged with setting Instream Flow Standards is the Commission on Water Resource Management. The Commission recognized the complexity of the issue and from the outset, established an Instream Flow Standard for all perennial streams at, "status quo". Known as "Interim Instream Flow Standards", the standard is defined as the amount of water flowing in each stream at the time the administrative rules were adopted in 1988 and 1989. Status quo Interim Instream Flow Standards were determined to be insufficient through the courts in 2000 (Waiahole Ditch Contested Case and Order). Since the Waiahole decision, the Commission's process to amend interim Instream Flow Standards is by petition. Permanent Instream Flow Standards can also be initiated by the Commission. However, the majority of the Commission's actions since Waiahole have been in response to petitions to amend interim instream flow standards on the island of Maui. However, in an effort for the Commission to collect the best available data to establish permanent Instream Flow Standards, the Commission has initiated a Statewide Stream Channel Inventory as well as a Statewide Stream Diversion Study. Figure 13 shows the recorded diversions for the streams in the Planning Area.. At this time in the Planning Area, standards have not changed beyond "status quo".

Wetlands. According to the Hawai'i Wetland Joint Venture, a partnership of federal, state and local agencies, wetlands provide many functions that contribute to watershed health including flood storage; help groundwater aquifers; filter sediment and pollutants; and are places of biodiversity providing important habitat to migrating birds. Additionally, wetlands can be landscapes that are valued for scenic, cultural or recreational uses. The National Wetlands Inventory (NWI) is a map provided by the US Fish and Wildlife Service that generally indicates where wetlands may be present. Within the Planning Area, the NWI designates large areas of the North Hilo and north portions of the Hāmākua Districts as freshwater forested shrub wetland. Smaller wetlands are designated throughout the district, particularly along the

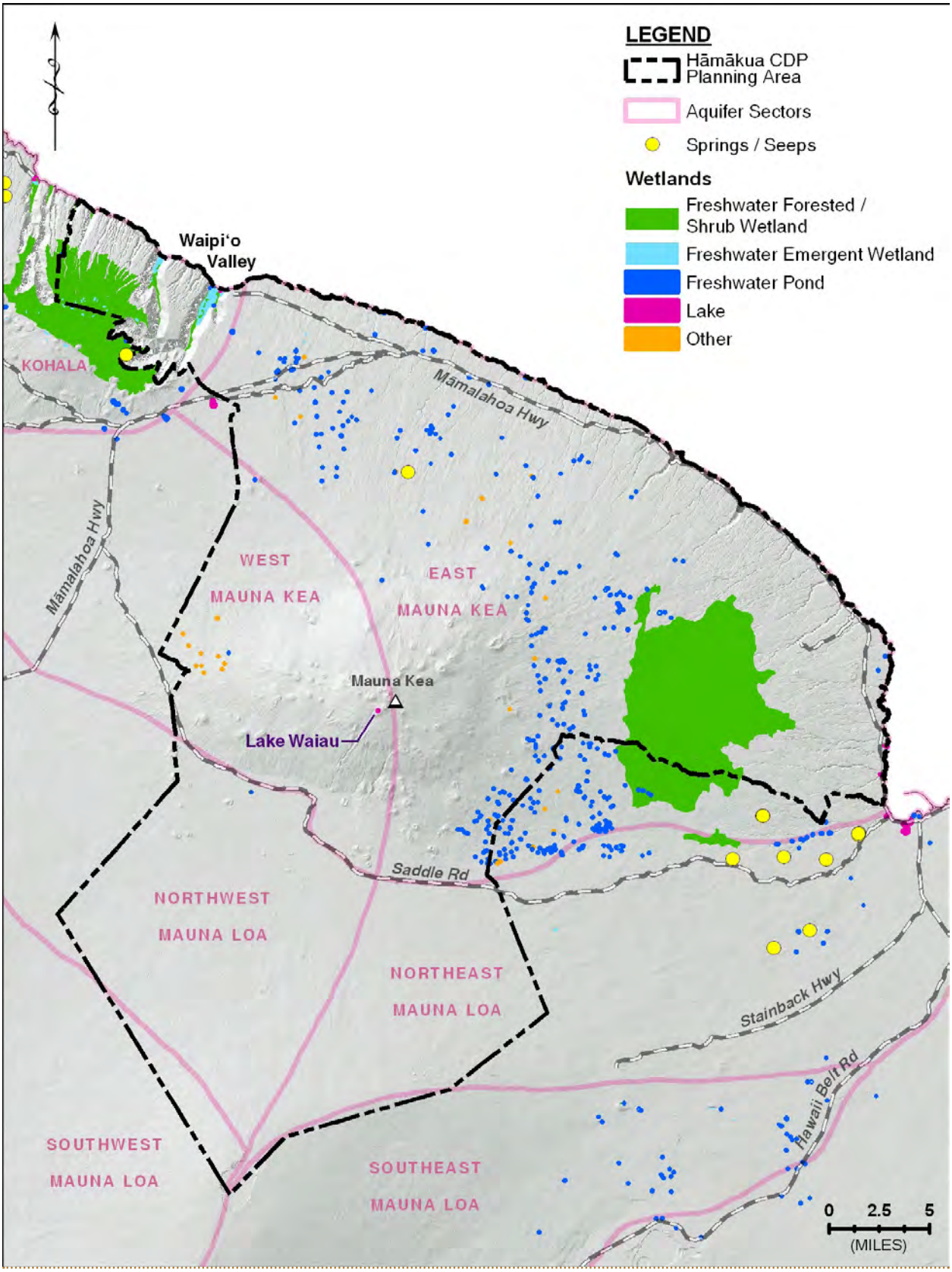
east and north flanks of Mauna Kea. Many of the wetlands identified on the NWI are not natural wetlands but are reservoirs built for irrigation, however, over time, they function as natural wetlands, providing flood control, water quality enhancement and habitat for birds.

Groundwater Occurrence. While topographic features control the drainage of surface water, the continuous flow of groundwater does not correspond with land surface features. An aquifer may underlie numerous surface drainage basins (Juvik and Juvik 1998). Since accurate information about the extent and behavior of groundwater in aquifers is fragmentary throughout most of the State, the State Water Commission relies on an Aquifer Classification Code as a guide to aquifer location and sustainable yield. The basic unit is the Aquifer Sector, a large region with similar hydrological features where groundwater may occur in different (this sub-Sector classification is called Aquifer Systems) but hydraulically continuous aquifers. Sustainable yield (SY) is defined as the quantity of water that can be extracted from an aquifer indefinitely without diminishing the quantity or quality of the water withdrawn (Juvik and Juvik 1998).

The Planning Area is within the East Mauna Kea Aquifer Sector, which includes four Aquifer Systems—Honoka'a (SY 31 mgd), Pa'auilo (SY 60 mgd), Hakalau (SY 150 mgd), and Onomea (SY 147 mgd) (see Figure 2-12). At a total sustainable yield of 388 mgd for the Sector, the Mauna Kea Sector has the third highest sustainable yield among all Sectors on the island. Full buildout according to the existing General Plan would require just 6% of this Sector's sustainable yield (Fukunaga & Associates, Inc. 2006).

Groundwater generally occurs as a freshwater or basal lens (freshwater floating on underlying salt water) or as "high level" or "perched", confined by geologic structures such as dikes or fault systems. High-level dike water exists in the rift zone section of Mauna Kea, and perched water is common in the Laupāhoehoe volcanic series (see "Figure 2-2. Geology"); however, these locations are difficult to access and at great distances from end users (Fukunaga & Associates, Inc. 2006). Basal water is found up to five miles inland. Existing potable water wells tap the basal groundwater source in the vicinity of the Hawai'i Belt Road. Spring water perched above ash beds and dense lava flows is a plentiful source in the Sector, and the existing source for most of the potable water systems. However, due to the costs to meet federal Safe Drinking Water Act treatment requirements, the DWS has plans to replace the spring sources with basal wells. These spring sources would then be available as backup potable sources or for nonpotable uses (Fukunaga & Associates Inc. 1986).

Figure 2-12. Aquifers and Wetlands



2.5. Flora/Fauna

Vegetation Zones. Sugar cane growers cleared much of the lower elevations in the Planning Area. However, a significant native forest habitat remains in the elevation between approximately 1500 to 1600 feet primarily in the Rural South Hilo and North Hilo districts (see "Figure 2-13. Vegetation"). In the Hāmākua district, the Hāmākua Forest Reserve consists of pockets of forests amongst pasture lands. The mid-level native forests in Rural South Hilo and North Hilo are dominated by ʻohia Lehua (*Metrosideros polymorpha*) and koa (*Acacia koa*) with higher elevation forests dominated by mamane (*Sophora chrysophylla*). Understory consists of native fern communities in wet areas that have had little human disturbance. Areas that have been disturbed by human activity are dominated by introduced tree and understory species (e.g., strawberry guava). Lands formerly used for sugarcane production have quickly evolved to landscapes of little diversity, often dominated by ironwood (*Casuarina equisetifolia*) trees and various introduced grasses. The upper slopes of Mauna Kea are unvegetated.

Existing Reserves. Existing areas set aside in protected reserves in the Planning Area are shown in Figure 2-14 and listed in Table 2-1 and include the following types of reserves:

- Forest Reserves;
- State Recreational Areas;
- Natural Area Reserves;
- Game Management Areas;
- Mitigation areas;
- National Wildlife Refuges;
- Military Reservations; and,
- Bird Sanctuaries.

Figure 2-13. Vegetation

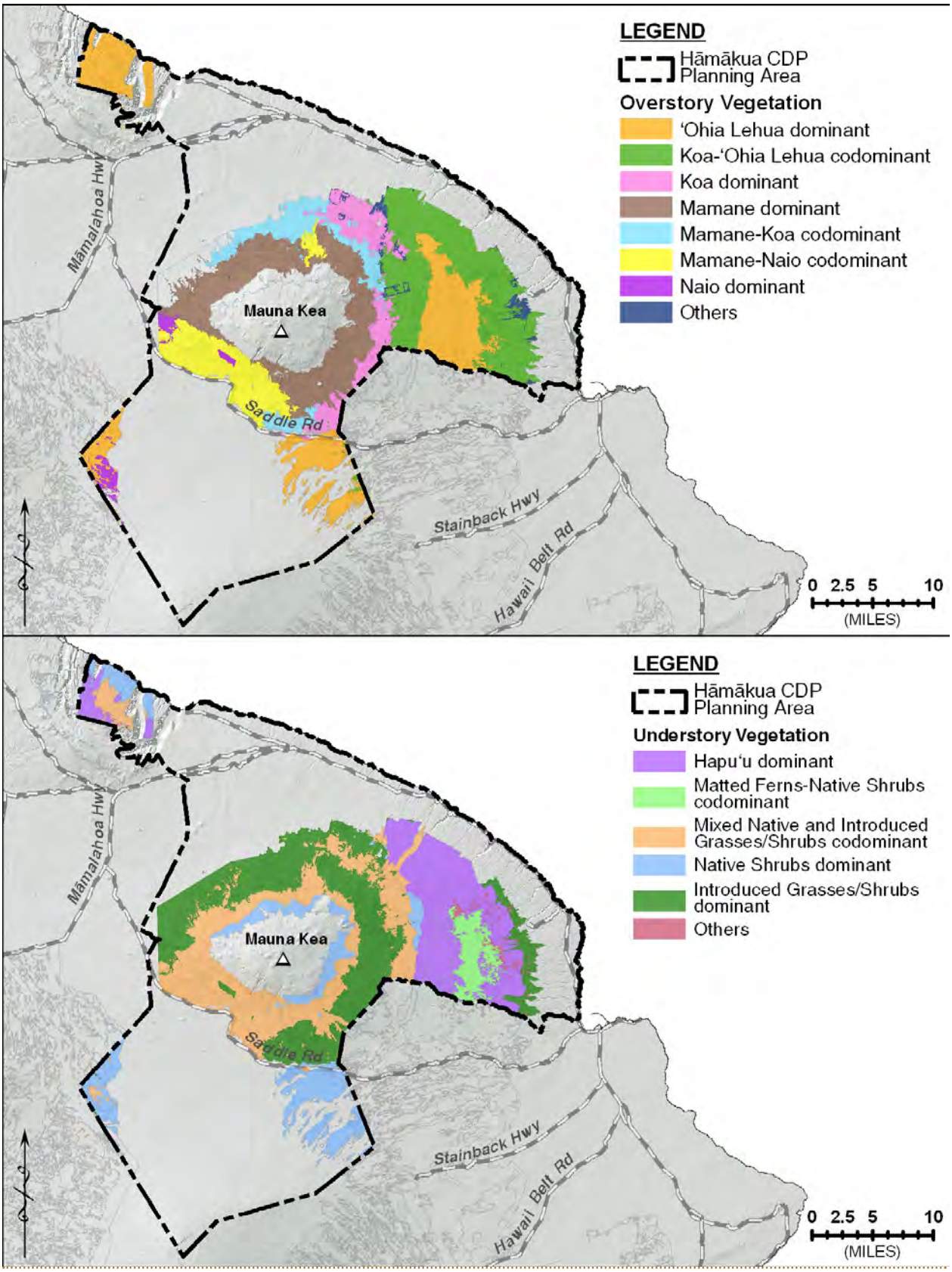


Figure 2-14. Reserves

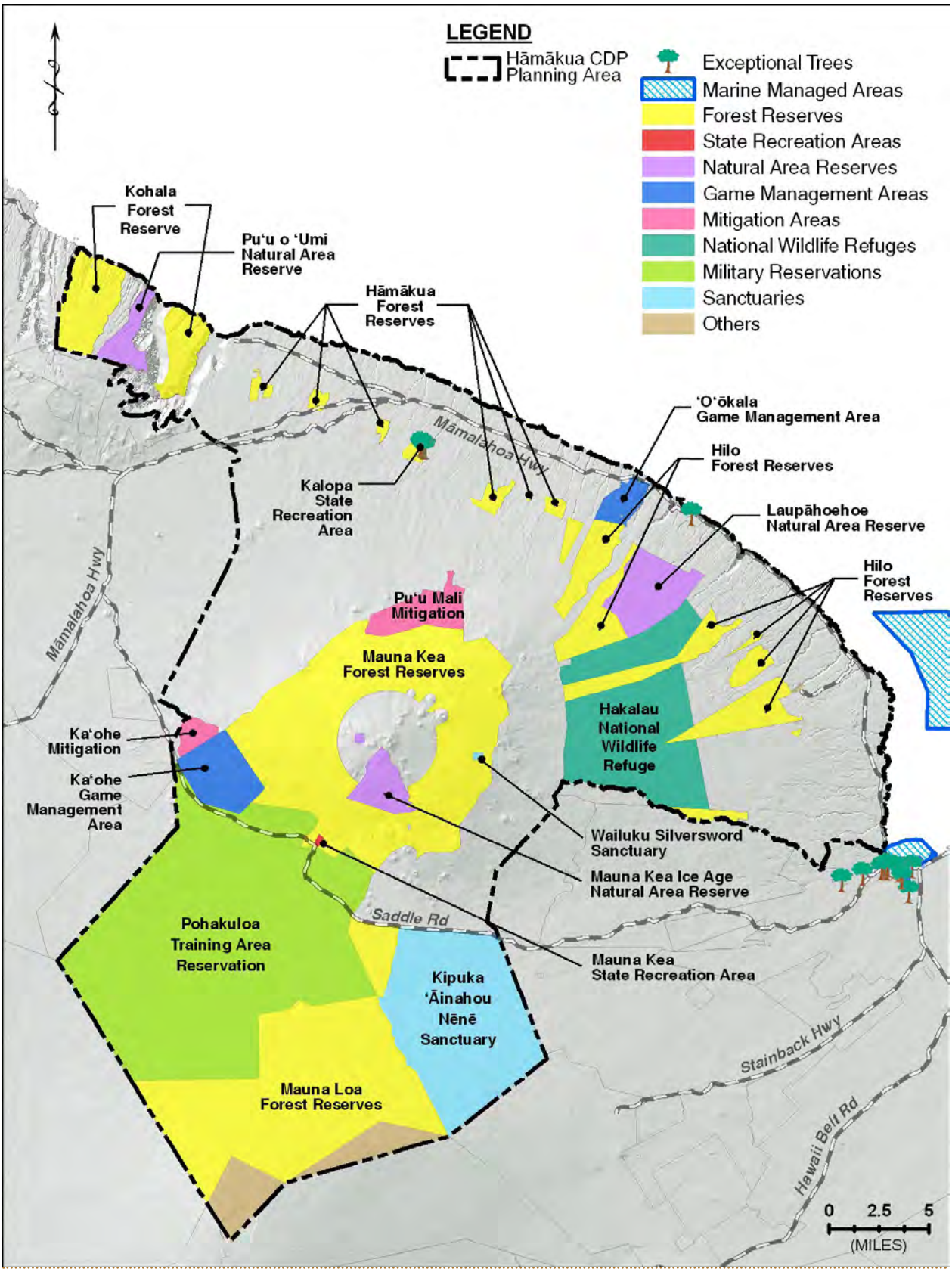


Table 2-1. List of Reserves

Reserve Type	NAME	MANAGED BY	Total
Bird Sanctuary	KIPUKA AINAHOU NENE SANCTUARY	DOFAW	1
Bird Sanctuary Total			1
Forest Reserve	HĀMĀKUA FOREST RESERVE (ĀHUALOA SEC.)	DOFAW	1
	HĀMĀKUA FOREST RESERVE (HANAPAI SEC.)	DOFAW	1
	HĀMĀKUA FOREST RESERVE (HOEA KAAO SEC.)	DOFAW	1
	HĀMĀKUA FOREST RESERVE (HONOKAIA SEC.)	DOFAW	1
	HĀMĀKUA FOREST RESERVE (KAINEHE SEC.)	DOFAW	1
	HĀMĀKUA FOREST RESERVE (KALOPA SEC.)	DOFAW	1
	HĀMĀKUA FOREST RESERVE (KEAA SEC.)	DOFAW	1
	HĀMĀKUA FOREST RESERVE (PAAUILO SEC.)	DOFAW	1
	HAUOLA FOREST RESERVE	DOFAW	1
	HILO FOREST RESERVE (HUMUULA SEC.)	DOFAW	1
	HILO FOREST RESERVE (KAIWIKI SEC.)	DOFAW	1
	HILO FOREST RESERVE (KAMAEE SEC.)	DOFAW	1
	HILO FOREST RESERVE (KAUKU SEC.)	DOFAW	1
	HILO FOREST RESERVE (LAUPAHOEHOE SEC.)	DOFAW	1
	HILO FOREST RESERVE (OPEA SEC.)	DOFAW	1

Reserve Type	NAME	MANAGED BY	Total
	HILO FOREST RESERVE (PIHA SEC.)	DOFAW	1
	HILO FOREST RESERVE (WATERSHED RESERVE SEC.)	DOFAW	1
	KOHALA FOREST RESERVE	DOFAW	1
	KOHALA FOREST RESERVE (WAIMANU SEC.)	DOFAW	1
	KOHALA WATERSHED FOREST RESERVE	DOFAW	1
	MANOWAIALEE FOREST RESERVE	DOFAW	2
	MAUNA KEA FOREST RESERVE	DOFAW	1
	MAUNA LOA FOREST RESERVE	DOFAW	1
	UPPER WAIAKEA FOREST RESERVE	DOFAW	1
Forest Reserve Total			25
Forest Reserve/Game Mgt	HĀMĀKUA FOREST RESERVE (KALOPA SEC.)/ KALOPA GMA	DOFAW	1
Forest Reserve/Game Mgt Total			1
Forest Reserve/Military	POHAKULOA TRAINING AREA RESERVATION/MAUNA KEA FR	DOFAW/US Army	1
Forest Reserve/Military Total			1
Forest Reserve/Preserve/ Sanctuary	WAILUKU SILVERSWORD SANCTUARY/ MAUNA KEA FR	DOFAW	1
Forest Reserve/Preserve/ Sanctuary Total			1
Forest Reserve/State Recreation Area	HĀMĀKUA F.R. (KALOPA SEC.)/KALOPA STATE REC. AREA	DOFAW/DOSP	1

Reserve Type	NAME	MANAGED BY	Total
	MAUNA KEA STATE RECREATION AREA/ MAUNA KEA FR	DOSP/DOFAW	1
Forest Reserve/State Recreation Area Total			2
Game Mgt Area	KAOHE GAME MANAGEMENT AREA	DOFAW	1
	OOKALA COOPERATIVE GAME MANAGEMENT AREA	DOFAW/Private	1
Game Mgt Area Total			2
Military	POHAKULOA TRAINING AREA RESERVATION	US Army	1
	POHAKULOA TRAINING AREA RESERVATION (KEAMUKU SEC)	US Army	1
Military Total			2
National Park	HAWAII VOLCANOES NATIONAL PARK	USNPS	1
National Park Total			1
National Wildlife Refuge	HAKALAU FOREST NATIONAL WILDLIFE REFUGE	USFWS	2
National Wildlife Refuge Total			2
Natural Area Reserve	LAUPAHOEHOE NATURAL AREA RESERVE	DOFAW	1
	MAUNA KEA ICE AGE NATURAL AREA RESERVE	DOFAW	2
	PUU O UMI NATURAL AREA RESERVE	DOFAW	1
Natural Area Reserve Total			4
State Park	AKAKA FALLS STATE PARK	DOSP	1
State Park Total			1
Other	KAOHE MITIGATION	DOFAW	1

Reserve Type	NAME	MANAGED BY	Total
	PUU MALI MITIGATION	DOFAW	1
Other Total			2
Grand Total			45

Reserves are managed for different purposes and a variety of activities occur within the different types of reserves. Most reserves allow a certain level of public access, particularly for cultural practices. Hunting is permitted in most Forest Reserves.

A study analyzing conservation "gaps", "A Gap Analysis of Hawai'i" (USGS 2006), distinguished four levels of protection based on the criteria below:

Table 2-2. Conservation Management & Level of Protection

Management Intent Status	Legal mandate to protect conversion of natural land cover to unnatural (human-induced, exotic-dominated, arrested succession)	Relative amount of tract managed for natural cover	Mandated Management Plan
Status 1	Designated protection from conversion	Entire tract	Mandated management plan to maintain or restore to a natural state
Status 2	Designated protection from conversion	Entire tract	Mandated management plan to maintain a primarily natural state, but which may receive use or management practices that degrade the quality of existing natural communities
Status 3	Designated protection from conversion	Majority of the area	Subject to extractive uses of either a broad, low-intensity type or localized intense type
Status 4	Lacks a mandate to prevent conversion		Allows intensive use throughout the tract

The text of the Hawai'i Gap report did not clearly identify the classification of the conservation programs listed above. It is, however, a useful classification that could suggest the following management classification:

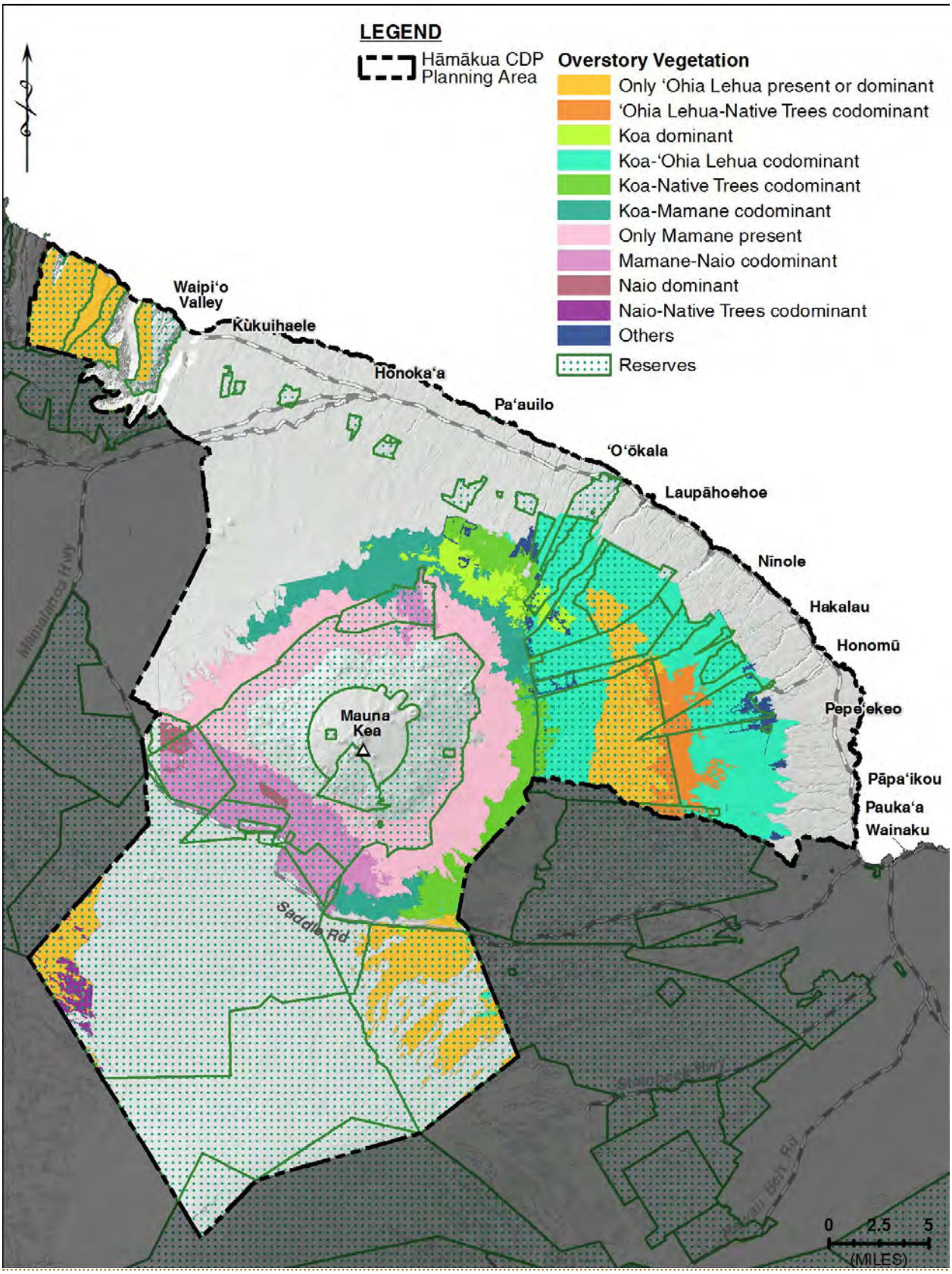
- Status 1

  - National Wildlife Refuge
  - Bird Sanctuaries
  - Natural Area Reserves
  - Watershed Partnerships
  - The Nature Conservancy lands
  - Forest Legacy lands
- Status 2
  - Forest Reserves
  - Mitigation Areas
- Status 3
  - Conservation Districts
  - Game Management Areas
  - State Recreational Areas
- Status 4
  - Military Reservations
  - Government lands (federal, State, County)

Most of the native forests and critical habitats in the Planning Area are within Status 1 or Status 2 management, with the balance of the native forest areas protected by Status 3 (particularly the Conservation District) or Status 4 (Pōhakuloa military initiatives) (see Figure 2-15).

Critical Habitats & Threats to Native Vegetation. Several areas of critical plan habitat have been designated by the State of Hawai'i, Department of Land and Natural Resources, Division of Forestry and Wildlife. North of Waipi'o Valley, there are critical habitats for smallflower 'Aiea (*Nothocestrum breviflorum*) and 'ōhā wai (*Clermontia drepanomorpha*). On the north flank of Mauna Kea, south of Waimea, critical habitat is designated for aupaka (*Isodendrion hosakae*). In the mid-elevations of the Hāmākua District on Mauna Kea's east flank, critical habitats for *Phyllostegia warshaueri*, ha'iwale (*Cyrtandra giffardii and Cyrtandra tintinnabula*), smallflower 'aiea, 'ōhā wai, and hāhā (*Cyanea platyphylla*). At higher elevations in the Hāmākua District, there are critical habitat areas for kīponapona (*Phyllostegia racemosa*), 'ōhā wai (*Clermontia pyrularia* and *Clermontia lindseyana*). Critical habitat for 'ōhā wai (*Clermontia lindseyana*) is also designated in higher elevations of the North Hilo District along with haha (*Cyanea shipmanii* and 'ōhā wai (*Clermontia peleana*). Critical habitat also exists within the Planning Area on the northeast flanks of Mauna Loa for hāhā (*Cyanea shipmanii*) and the Mauna Loa Silversword (*Argyoxiphium kauense*). The US Fish and Wildlife Service administers The Hawai'i Plant Cluster Recovery Plan, to address the recovery needs and ensure survival of these endangered plants. According to the Three Mountain Alliance Management Plan, threats to Hawai'i's native vegetation include uncontrolled wildfire; feral animals; other introduced species, such as slugs which both consume plant life and spread fungus; and, competition from invasive, non-native weeds (TMA, 2007).

Figure 2-15. Extent of Native Forest Protected by Reserves



Native, Threatened & Endangered Animal Species. A variety of faunal resources inhabit the diverse landscapes within the Planning Area. The following table identifies native species to the Planning Area and whether the species is listed by the US Fish and Wildlife Service as Threatened, Endangered or if they are a candidate species for designation.

Table 2-3. Threatened and Endangered Mammals, Reptiles & Insects

Hawaiian Name	"Common Name"	Scientific Name	USFWS Designation
Mammals			
ʻōpeʻapeʻa	Hawaiian Hoary Bat	*Lasiurus cinereus semotus*	E
ʻIlio holo I ka uaua	Hawaiian Monk Seal	*Monachus schauinslandi*	E
Koholā	Humpback Whale	*Megaptera novaeangliae*	E
Reptiles			
Honu	Green Sea Turtle	*Chelonia mydas*	T
ʻEa	Hawksbill Turtle	*Eretmochelys imbricata*	E
Insects			
	Blackburn's sphinx moth	*Manduca blackburni*	E
	Picture-wing fly, Hawaiʻi	*Drosophila heteroneura*	E
	Picture-wing fly, Hawaiʻi	*Drosophila mulli*	E
	Picture-wing fly, Hawaiʻi	*Drosophila ochrobasis*	E
	Flying earwig Hawaiian damselfly	*Megalagrion nesiotes*	E
	Pacific Hawaiian damselfly	*Megalagrion pacificum*	E

In addition, many birds are listed as Threatened or Endangered. The following table is a list of Threatened and Endangered birds for the island of Hawaiʻi.

Table 2-4. Threatened and Endangered Birds

Hawaiian Name	"Common Name"	Scientific Name	USFWS Designation
ʻIo	Hawaiian Hawk	*Buteo solitarius*	E

Koloa Maoli	Hawaiian Duck	*Anas wyvilliana*	E
Nēnē	Hawaiian Goose	*Branta sandvicensis*	E
ʻAlalā	Hawaiian Crow	*Corvus hawaiiensis*	E
ʻAlae keʻokeʻo or ʻĀlae kea	Hawaiian Coot	*Fulica alai*	E
ʻAlae ʻula	Hawaiian Moorhen or Hawaiian Gallinule	*Gallinula chloropus sandvicensis*	E
Akia pōlāʻau		*Hemignathus munroi*	E
ʻAeo	Hawaiian Stilt	*Himantopus mexicanus knudseni*	E
Palila		*Loxioides bailleui*	E
ʻĀkepa		*Loxops coccineus coccineus*	E

Critical Habitats. Critical Habitat is a term defined by the Endangered Species Act. It is a specific geographic area that contains features essential for conservation of a threatened or endangered species and may require special management and protection (USFWS). High elevation forests ringing Mauna Kea are designated as critical habitat by the US Fish and Wildlife Service for the Palila (*Loxioides bailleui*), a Hawaiian honeycreeper.

Other Native Fauna. In addition to those native animals that are listed as threatened and endangered, native fauna of note in the Planning Area include; pueo, or Hawaiian Owl (*Asio flammeus sandwicensis*); Kamehameha Butterfly (*Vanessa tameamea*); and seabirds such as ʻuaʻu, or dark-rumped petrel (*Pterodroma phaeopygia sandwichensis*); and ʻakēʻakē , band-rumped storm petrel (*Oceanodroma castro*). The Hawaiʻi Stream Assessment also found all four native goby ʻoʻopu nakea (*Awaous stanmineus*), ʻoʻopu alamoʻo (*Lentipes concolor*), ʻoʻopu nopili (*Sicyopterus stimpsoni*) and ʻoʻopu naniha (*Stenogobius genivittatus*) – as well as hihiwai, an endemic snail, present in streams within the Planning Area.

Threats to Native Fauna. Threats to Hawaiian the Monk seal and turtles include entanglement in marine debris, human interactions, food limitations, loss of haul out beaches and disease outbreaks. Threats to native fishes include man-made alterations to stream and riparian ecosystems and competition, predation and spread of disease by introduced aquatic species. According to the Three Mountain Alliance Management Plan, threats to Hawaiʻi's flora and fauna include other fauna; feral ungulates; other feral animals such as cats; non-native invertebrates and aquatic species such as slugs and aquarium species of fishes (TMA, 2007).

3 Natural Hazards & Climate Risks

The County of Hawai'i Multi-Hazard Mitigation Plan defines hazards as, "a natural- or human-caused event that has the potential to cause significant injury, loss of life or property damage" (Martin & Chock 2010). The plan, updated in 2010 and approved by FEMA, was prepared to protect Hawai'i County residents, visitors and structures from harm while minimizing cost and disruption of disaster response and recovery. The plan does this by identifying hazards of concern; assessing the vulnerability of critical facilities; and developing strategies for mitigation. Mitigation projects identified in the plan qualify for FEMA funding.

Based on the information from the Multi-Hazard Mitigation Plan, the hazards relevant to the Planning Area are discussed below in the relative priority of the risk to the Planning Area, followed by an assessment of vulnerability. The first two hazards can affect the entire region—hurricanes and earthquakes. The second set of hazards have more localized effects within the Planning Area although some may occur more frequently—landslides and rockfalls, flooding, tsunami, wildfire. The final set of hazards have lower probability to cause damage or injury within the Planning Area (lava hazards, droughts, high waves, beach erosion).

3.1. High Winds, Tropical Cyclones & Hurricanes

Hazard Description

Wind hazards can originate from intense trade-winds, Kona storms and hurricanes or tropical storms. Wind may inflict damage to rooftops and structures, tree limbs and utility equipment. Airborne debris in high wind conditions can damage structures or place humans and animals at risk.

Trade winds blow from northeast to east-northeast direction thus windward coasts such as the Planning Area are particularly vulnerable to events related to intense trade-winds.

Tropical cyclones develop over warm tropical oceans. Cyclones are classified as hurricanes when there are sustained winds measuring over 74 miles per hour. Hazards from cyclones and hurricanes are from both the high winds and ocean storm-surge that causes water to rise above sea level at the time of storm onset. Certain topography can amplify the velocity of hurricane winds.

The Planning Area is particularly vulnerable to high winds and hurricanes due to the numerous single-wall and double-wall construction homes built prior to the 1991 Uniform Building Code adopted in Hawai'i County in December 1993 (see Figure 3-1). These pre-1993 homes were not required to have roof straps (see Table 3-1 and Table 3-2).

Figure 3-1. Residences Vulnerable to Hurricane and Earthquake

Forthcoming data from HazMit Plan consultant

Table 3-1. Double Wall Construction with and without Roof Straps- Hawai'i County

Effective Date	Year of UBC	Hurricane Tie Requirement	Number of Residences	
February 8, 1962	1961	None	648	41% Without Roof Strap
April 17, 1968	1967	None	194	
August 8, 1972	1970	None	1416	
February 25, 1975	1973	None	1065	
December 11, 1978	1976	None	2600	
January 19, 1985	1982	None	5010	
December, 1993	1991	UBC Appendix Load Path	12126	59% With Roof Strap
July, 1999	1994	UBC Appendix Load Path	3759	
		Total =	26818	

Source: Martin & Chock 2010

Table 3-2. Single Wall Construction with and without Roof Straps- Hawai'i County

Effective Date	Year of UBC	Hurricane Tie Requirement	Number of Residences	
February 8, 1962	1961	None	8723	91% Without Roof Strap
April 17, 1968	1967	None	2109	
August 8, 1972	1970	None	2471	
February 25, 1975	1973	None	931	
December 11, 1978	1976	None	1088	
January 19, 1985	1982	None	1378	
December, 1993	1991	UBC Appendix Load Path	1271	9% With Roof Strap
July, 1999	1994	UBC Appendix Load Path	293	
		Total =	18264	

Source: Martin & Chock 2010

Hazard Events and Losses

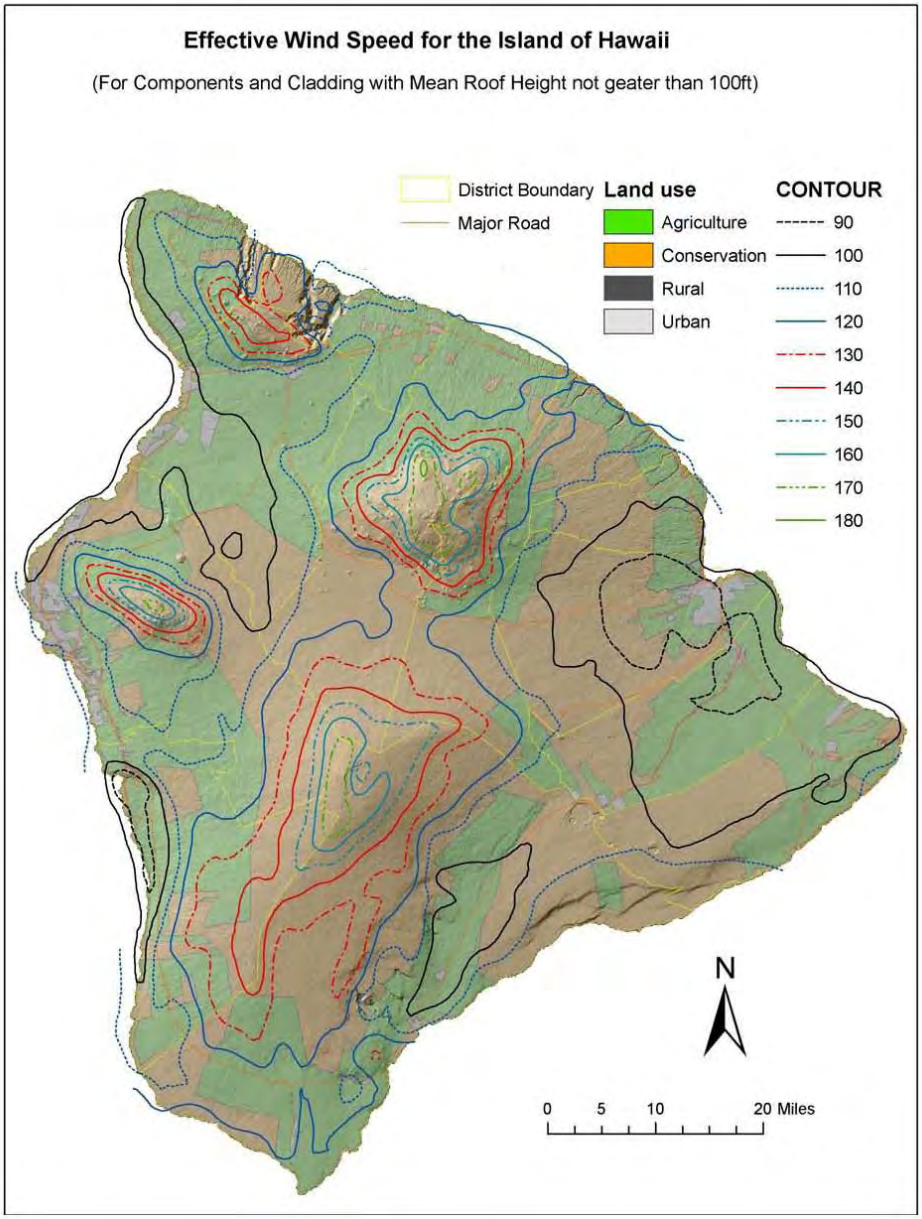
In 1980, a significant wind storm caused damage of $11.7 million to the Island of Hawai'i. During the 1993-1994 and 1994-1995 winter storm seasons, trade winds of 40 to 50 miles per hour lasted several days and damaged structures, tree limbs and utility equipment. Significant hurricanes since 1950 affect-

ing the Planning Area included Dot (1957), Fico (1978) and Iniki (1992).

Hazard Risk Areas (Zones)

Since hurricane Iniki in 1992, NASA Office of Earth Science and the Hawai'i Hurricane Relief Fund (HHRF) have developed new models for estimating probability of hurricanes in the Pacific. The models find that Hawai'i Island has a long-term hurricane hazard higher than the other Hawaiian Islands. Additionally, models have resulted in Hawai'i Island being designated as a special wind area, accounting for topographic amplification. Mountainous regions or stream gorges in these regions can develop wind speeds significantly higher than areas of flat topography. Based on the wind model, the 'O'ōkala-Paauilo area seems more susceptible to accelerated wind speeds (see Figure 3-2).

Figure 3-2. Effective Wind Speed



3.2. Earthquakes

Hazard Description

The Pacific Disaster Center describes earthquakes as the sudden release of strain in the earth's crust. The result is waves of shaking that radiate from the source (PDC website). In Hawai'i, the majority of earthquakes are associated with volcanic activity where magma is moving below the earth's surface. On Hawai'i Island, there are thousands of earthquakes every year however, the strongest occur at shallow depths beneath the flanks of Kilauea and Mauna Loa.

Strong earthquakes may endanger people and property by shaking structures, causing ground cracks, ground settling and landslides. Potential for hazards during an earthquake event may increase in areas susceptible to landslide. Earthquakes can also generate tsunami. When localized tsunami occur as a result of earthquake, there is little or no time for advance warning.

The Planning Area is particularly vulnerable to earthquakes due to the numerous single-wall and double-wall construction homes built prior to the 1994 Uniform Building Code adopted in Hawai'i County in July 1999 (see Figure 3-1). These pre-1999 homes were not structurally required to meet updated seismic standards (see Table 3-3 and Table 3-4).

Table 3-3. Double Wall Construction Seismic Compliance- Hawai'i County

Effective Date	Year of UBC	Seismic Zonation	Number of Buildings	
February 8, 1962	1961	Pre Code	648	3% No Seismic Design
April 17, 1968	1967	Pre Code	194	
August 8, 1972	1970	Zone 3	1416	83% Code Deficient
February 25, 1975	1973	Zone 3	1065	
December 11, 1978	1976	Zone 3	2600	
January 19, 1985	1982	Zone 3	5010	
December, 1993	1991	Zone 3	12126	
July, 1999	1994	Zone 4	3759	14% Seismic-Compliant Design
		Total =	26818	

Source: Martin & Chock 2010

Table 3-4. Single Wall Construction Seismic Compliance- Hawai'i County

Effective Date	Year of UBC	Seismic Zonation	Number of Buildings	
February 8, 1962	1961	Pre Code	8723	59% No Seismic Design
April 17, 1968	1967	Pre Code	2109	
August 8, 1972	1970	Zone 3	2471	39% Code Deficient
February 25, 1975	1973	Zone 3	931	
December 11, 1978	1976	Zone 3	1088	
January 19, 1985	1982	Zone 3	1378	
December, 1993	1991	Zone 3	1271	
July, 1999	1994	Zone 4	293	2% Seismic Compliant Design
		Total =	18264	

Source: Martin & Chock 2010

Hazard Events and Losses

Historically, earthquakes are known to have occurred within the Planning area. In 1885 a magnitude 6.1 earthquake occurred off shore from North Hilo. In 1973, a magnitude 6.2 earthquake was recorded in Honomū. Earthquakes with their epicenter outside the Planning Area can also inflict damage. The Kiholo Bay earthquake which occurred on the Kona coast on October 15, 2006 was felt throughout the Planning Area, and damage was documented to be sustained in the Honoka'a area (see Figure 3-3).

Hazard Risk Areas (Zones)

Seismic hazard maps were developed by Fred W. Klein, Arthur D. Frankel, Charles S. Mueller, Robert L. Wesson and Paul G. Okubo in Seismic Hazard in Hawai'i: High Rate of Large Earthquakes and Probabilistic Ground-Motion Maps. These maps show the 2-percent and 10-percent probability of exceedance in 50 years for horizontal spectral response acceleration, and places the entire island of Hawai'i in significantly higher seismic risk zones than the rest of the State (see Figure 3-4).

Figure 3-3. Peak Ground Acceleration from Kiholo Earthquake

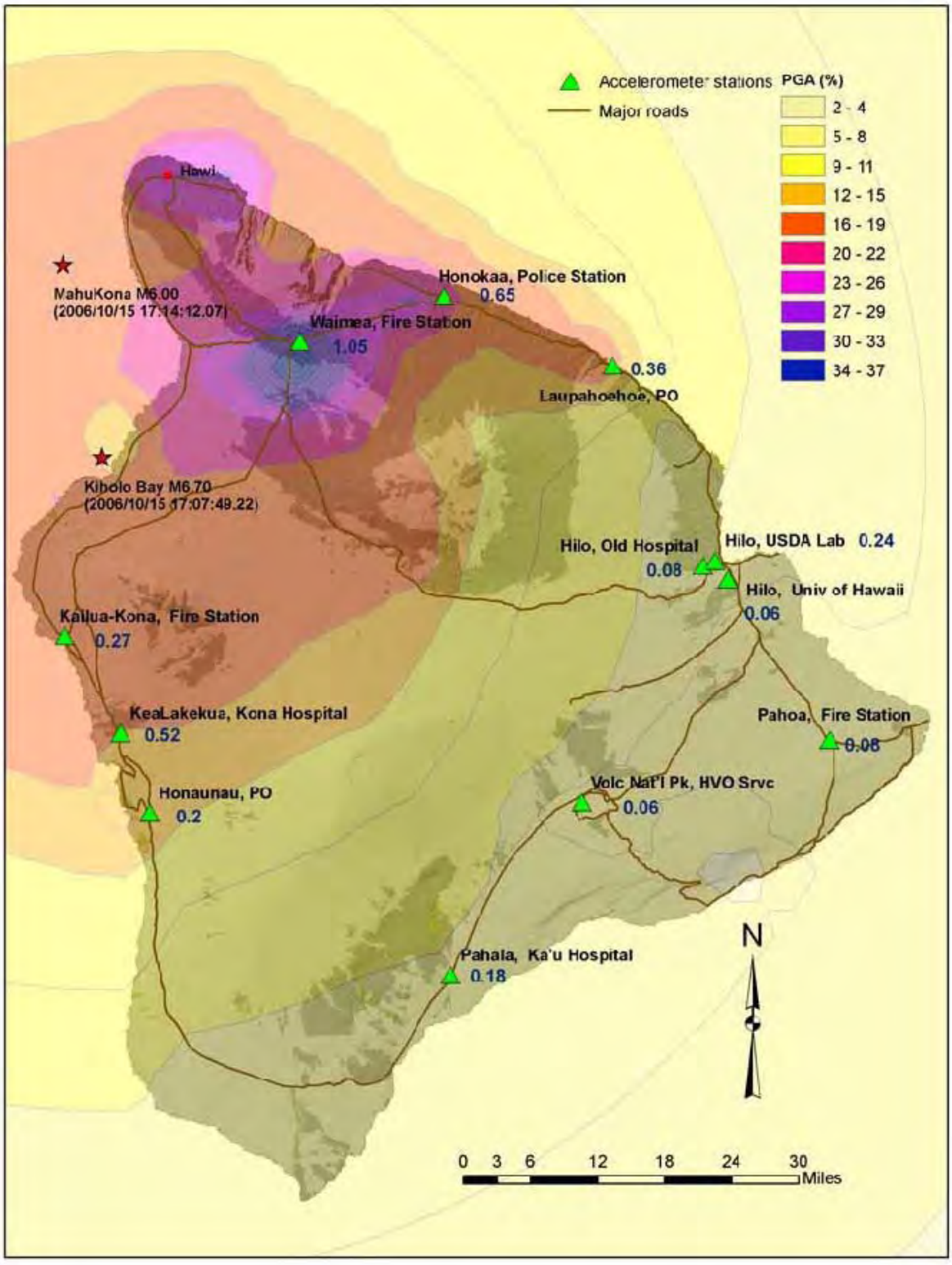
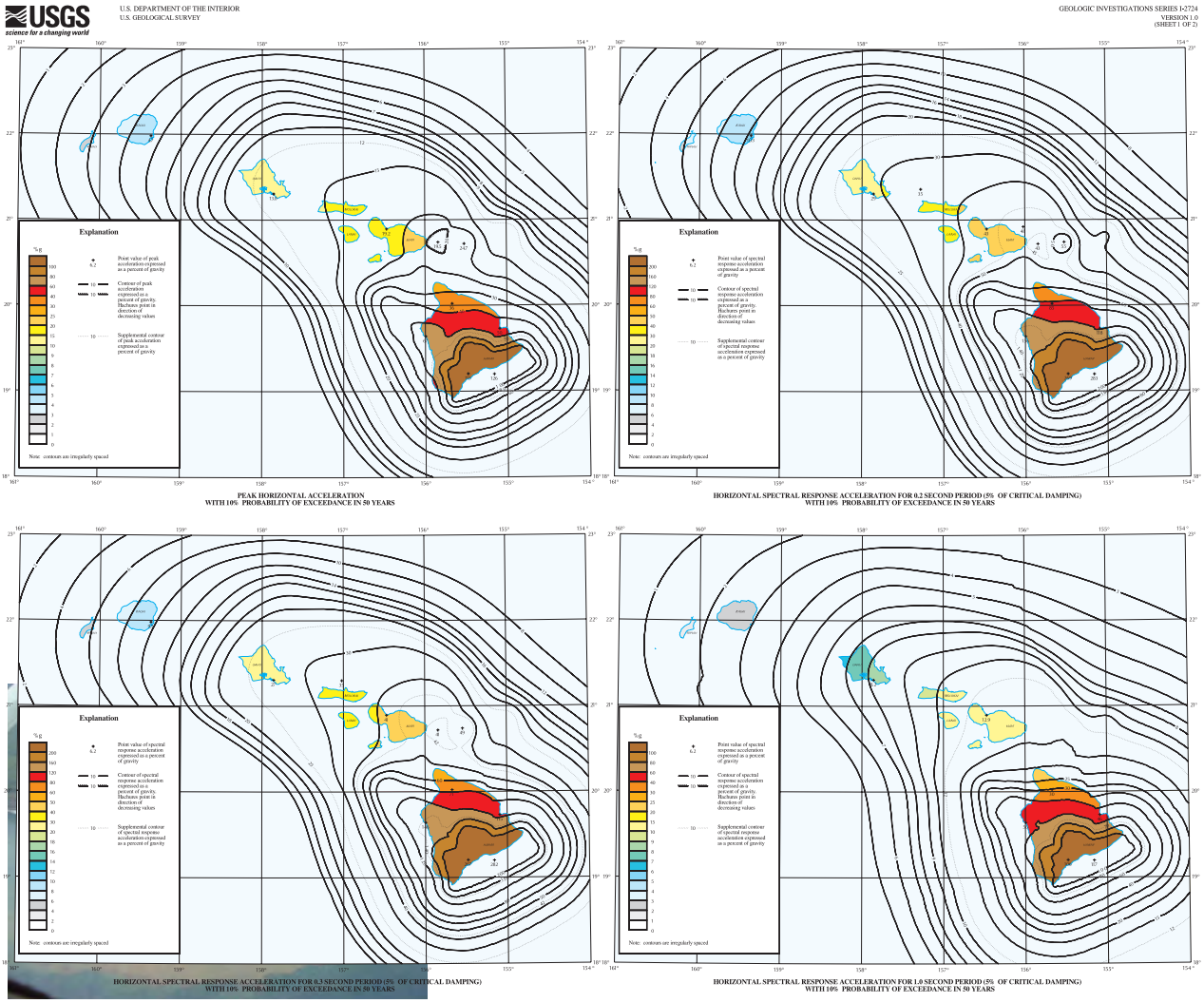


Figure 3-4. Probabilistic Ground-Motion Maps



http://pubs.usgs.gov/imap/2000/i-2724/

3.3. Landslides & Rockfalls

Hazard Description

Landslides are principally the result of gravity, where earth material moves down the sides of slopes. Factors that play in to landslides and rockfalls include: erosion by water including waves and precipitation; slopes that are weakened when saturated; stress created by earthquakes; high winds; and human causes

such as grading or cutting of hillsides. Landslides can occur slowly over time or when the conditions are right, with a dramatic collapse.

Hazard Events and Losses

On Hawai'i Island, the landslide known to cause loss of life was associated with earthquake in the Kā'ū District in 1868. Within the Planning Area, historic areas of landslides and rockfalls have occurred along the highway and sea cliffs, but the events have not been systematically mapped or recorded.

Hazard Risk Areas (Zones)

Within the Planning Area, coastal sea cliffs are susceptible to abrupt collapse, especially during times of heavy rainfall. These areas are exposed to a continuous process of wave action which undermines the base of the cliff precipitating the collapse of the higher section of the cliff.

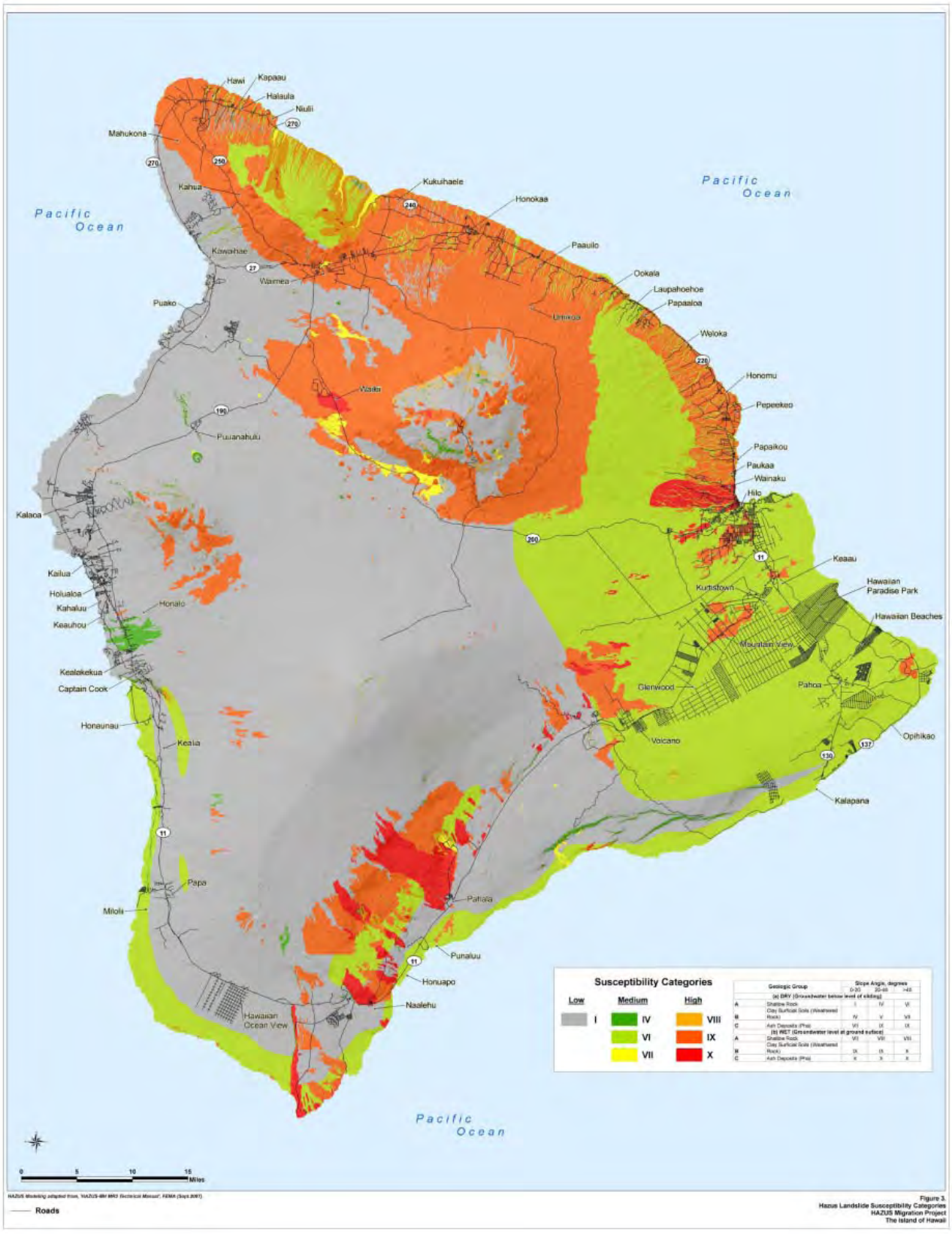
Sea cliff landslides, Hāmākua Coast

(Photograph courtesy of Hawaii Civil Defense Agency)

Roadcuts and other altered or excavated areas of slopes are particularly susceptible to debris flows and abrupt collapse. Within the Planning Area, this is a chronic problem particularly during periods of heavy rainfall. Maulua, Laupāhoehoe and Kaāawali'i Gulches are notorious for rockfall hazards that affect Mamālahoa Highway. Rockfall occurs when heavy rains and tradewinds cause trees to loosen the soil and rocks beneath.

In a study conducted by URS for the FEMA Hazard Mitigation Technical Assistance Program, three factors were considered to determine probability of rockfall and landslide occurrence: topography, geologic groups (rock and soil type) and soil moisture. Based on an integration of those three factors, the entire Planning Area is susceptible to landslides and rockfall with the exception of the most mauka slopes of Mauna Kea (see Figure 3-5). The figure also shows the many historic roadway slope hazards along the Hawai'i Belt Highway.

Figure 3-5. Landslide susceptibility map of Hawai'i Island



3.4. Tsunami

Hazard Description

The Pacific Disaster Center describes a tsunami as a series of waves of extremely long wave length and long period, generated in a body of water by an impulsive disturbance that displaces the water such as an earthquake, landslide or sub-marine volcanic eruption. Most tsunamis are generated by earthquakes from around the Pacific Rim, however, local tsunamis can also be generated by earthquakes or underwater landslides.

Tsunamis may begin at a height of 12-24 inches, but when they reach a shore, they can create a large breaking wave. The vertical height above sea level of a wave that reaches on shore is called a run-up height. In extreme cases, the water level can rise to 50 feet and the flooding of an area can extend inland to 1,000 feet or more. According to the Atlas of Natural Hazards in the Hawaiian Coastal Zone, Hilo has received more damaging tsumanis than any other Hawaiian city. One of the most devastating tsunami's to strike the Island of Hawai'i was in 1946 when a wave with a run-up of 26-feet reached Hilo Bay. The wave runup for the same event was recorded to be 55-feet at Upolu Point.

The danger from tsunami can last for several hours from the arrival of the first wave and often the first wave is not the largest or most violent. Often, during a tsunami, the ocean waters recede, exposing the ocean floor.

Hazard Events and Losses

Significant tsunamis have occurred on all of Hawai'i Island's coastlines with significant runups particularly in Waipi'o Valley (see Table 3-5).

Table 3-5. Historic Tsunami Run-up in the Planning Area

Year	Wave Run-up Height	Area of Origin
1896	9 feet in Hāmākua	Japan
1946	35 feet N. Hilo - 40 feet at Waipi'o	Eastern Aleutian Islands
1957	10 feet in N. Hilo – 23 feet at Waipi'o	Central Aleutian Islands
1960	9 feet in N. Hilo – 11 feet in Waipi'o	Chile
1964	3 feet in Hāmākua - 4 feet in Waipi'o	Gulf of Alaska

Source: USGS Atlas of Natural Hazards in the Hawaiian Coastal Zone (http://pubs.usgs.gov/imap/i2761/)

Hazard Risk Areas (Zones)

Distant tsunami events occur with roughly 7% probability per year while local tsunami events occur with roughly a 2% probability per year. While local tsunamis may be limited in extent and duration, the waves can be up to 40-feet high. Less warning time is available with a local tsunami, which can result in loss of life and property damage. Such was the case of the 1975 Halape tsunami that originated in South Puna with waves traveling around the island to North Kona.

Tsunami evacuation maps have been updated for all of the main Hawaiian Islands; however, the maps for Hawai'i Island plan to be officially released in the latter part of 2010 or early 2011. The updated maps identify the evacuation zones only for the major populated areas. Within the Planning Area, the mapped evacuation zone areas include just Laupāhoehoe and Waipi'o Valley (see Figure 3-6).

Figure 3-6. Tsunami-Prone Communities. Tsunami-Prone Communities

3.5. Floods & Dam Failures

Hazard Description

Flooding can occur due to different situations and physical conditions on the ground. In Hawai'i, different types of flooding can occur. **Riverine flooding** occurs when rivers and streams overtop their banks. Water levels can rise to levels where the drainage channel (floodway) cannot contain the flood waters. **Flash Floods** refer to a type of riverine flooding where the time of concentration to cause a flood occurs quickly in a matter of hours due to heavy rainfall, the steepness of valley walls, and the small size of drainage basins—typical conditions in the Planning Area. Flash flooding can also occur when a dam breaks. **Sheet flooding** occurs when mauka waters collect, usually on already saturated ground, forms a pool of several inches and flows downhill. Sheet flooding may occur within the Planning Area on the former sugar cane fields where such flows were once controlled with plantation-maintained levees. **Coastal flooding** occurs when sea water rises above normal tidal actions during storm waves, storm surges, or tsunamis (PDC).

Hazard Events and Losses

Flooding occurs with regular frequency in the Planning Area due to high annual precipitation, storm events and soils that readily absorb precipitation (facilitating landslides). According to the Hawai'i County Multi-Hazard Mitigation Plan, the portions of the Planning Area within the South Hilo district most often experience flooding caused by runoff from former sugarcane fields mauka of the South Hilo communities. In the North Hilo District, the County's hazard mitigation plan has recognized that flood hazard areas are difficult to delineate because high intensity storms can create conditions for localized flooding almost anywhere. The plan provides the following descriptive information about a few N. Hilo communities:

- O'okala – minor problems due to surface waters from former cane fields mauka of the community.
- Nīnole – flood control system installed by the plantation is considered adequate.
- Laupāhoehoe – contains the only definite flood hazard area in North Hilo at Laupāhoehoe School.
- Papa'aloa – no serious flooding problems are identified, however, projected population expansion will necessitate more flood protection for the community.
- In the Hāmākua District, the majority of flood damage is born by public facilities such as roads, ditches and bridges. The Hawai'i County Multi-Hazard Mitigation Plan provides the following descriptive information about a few Hāmākua Communities:
- Honoka'a – has experienced flooding from the streams above and flowing through the community. Existing culverts are undersized.
- Pa'auhau and Kukaiau – have not been subject to high flood flows.

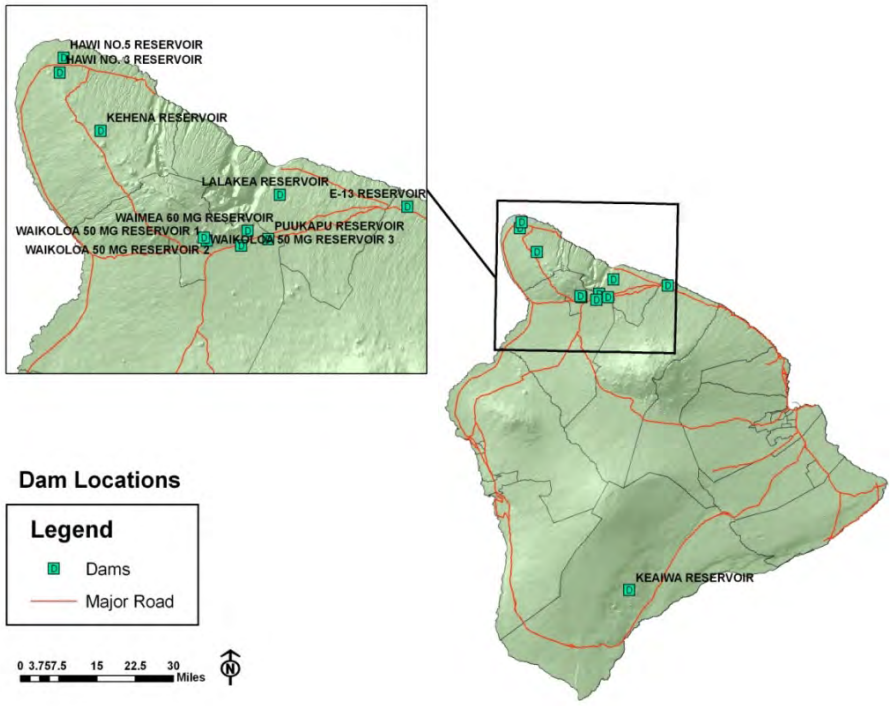
- Pa'auilo – localize drainage problems exist when surface waters collect within the town and flow down narrow roadways.

Hazard Risk Areas (Zones)

Hawai'i County's Flood Management Code (Hawai'i County Code chapter 27) meets the requirements of the National Flood Insurance Program (NFIP). Under the NFIP, each county has mapped flood hazard areas and established a permit system to regulate development within these flood hazard areas. The Flood Insurance Rate Maps (FIRMs) include areas prone to riverine flooding (A zones) and coastal flooding (V zones). Although the NFIP has significantly mitigated flood damages, major flood problems exist in older areas developed prior to flood control regulations and building standards, in areas that are subject to flooding but not identified on the FIRMs, and areas with flood control improvements that are inadequate to contain or control larger floods by present standards. Direct economic losses from flooding result from soaking, dislocation and destruction of property as well as erosion and scouring from the velocity of the flow, and deposition of sediment and debris transported by the water. Within the Planning Area, there does not seem to be many areas mapped for riverine flooding except for Honoka'a, Waimanu Valley, and Waipi'o Valley. The mapped areas are primarily coastal hazard areas along the shoreline from Kapulena to Pa'auilo. One of the NFIP mitigation policies is to relocate or acquire repetitive loss properties. Fortunately, there are no repetitive loss properties within the Planning Area (Martin & Chock 2010).

Dams can cause flooding should they fail; hence, a dam safety program is also an integral part of flood control. Hawai'i County has 13 earth dams, primarily built for irrigation reservoirs for sugar plantations. The State Department of Land and Natural Resources (DLNR) has designated two of those dams to be of high hazard based on potential downstream losses to residential/commercial structures or agricultural crops. One of the high hazard dams is located within the Planning Area near Honoka'a (see Figure 3-7).

Figure 3-7. Dam Locations



3.6. Droughts

Hazard Description

According to the Pacific Disaster Center, drought is described as originating from a deficiency of precipitation over an extended period of time. Drought is different from aridity and should be considered relative to the long-term balance between precipitation and evapo-transpiration in a particular area. Hence, a typically wet area such as the Planning Area can experience drought. The Pacific Disaster Center also describes drought as an interplay between the natural event and the demand that people place on the water supply. In Hawai'i, drought is measured by the Standardized Precipitation Index (SPI). The index uses monthly rainfall as the indicator of drought and is utilized by the National Weather Service to monitor drought conditions.

Hazard Events and Losses

Most severe droughts on record in Hawai'i have occurred during the years associated with El Niño – 1982/1983, 1997/1998 2009/2010. According to the Pacific El Niño-Southern Oscillation Application Center, the dry conditions, in general, have been associated with persistent zones of high-pressure systems throughout the islands. This feature related to El Niño is typical in the tropical Pacific.

Hazard Risk Areas (Zones)

For the Island of Hawai'i, the greatest areas of risk from drought to water supply and agriculture are in the low-rainfall areas on the west and southwest ends of the island (Martin & Chock 2010) (see). Nevertheless, past disaster declarations have included the Planning Area in 2007, 2005, 2003, 2000, 1999, 1998, 1996, 1995, 1994, 1992, 1986, 1983, and 1981 (Martin & Chock 2010). Upon a disaster declaration by the Mayor or Governor, special funds to assist agriculture may become available.

Figure 3-8. Drought Vulnerability to the Water Supply Sector

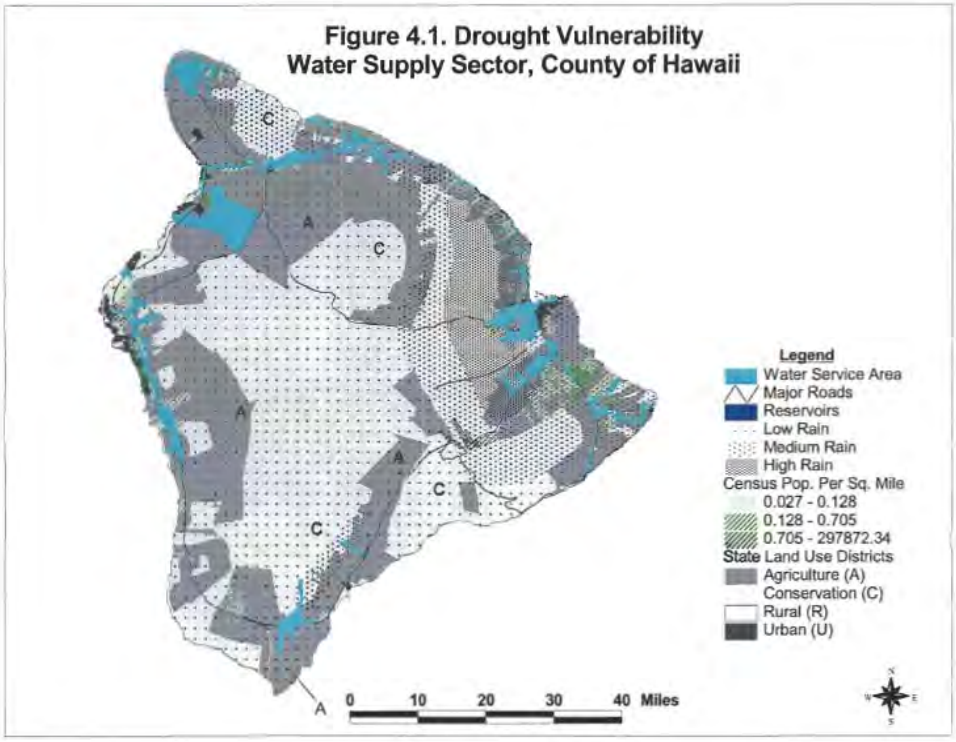
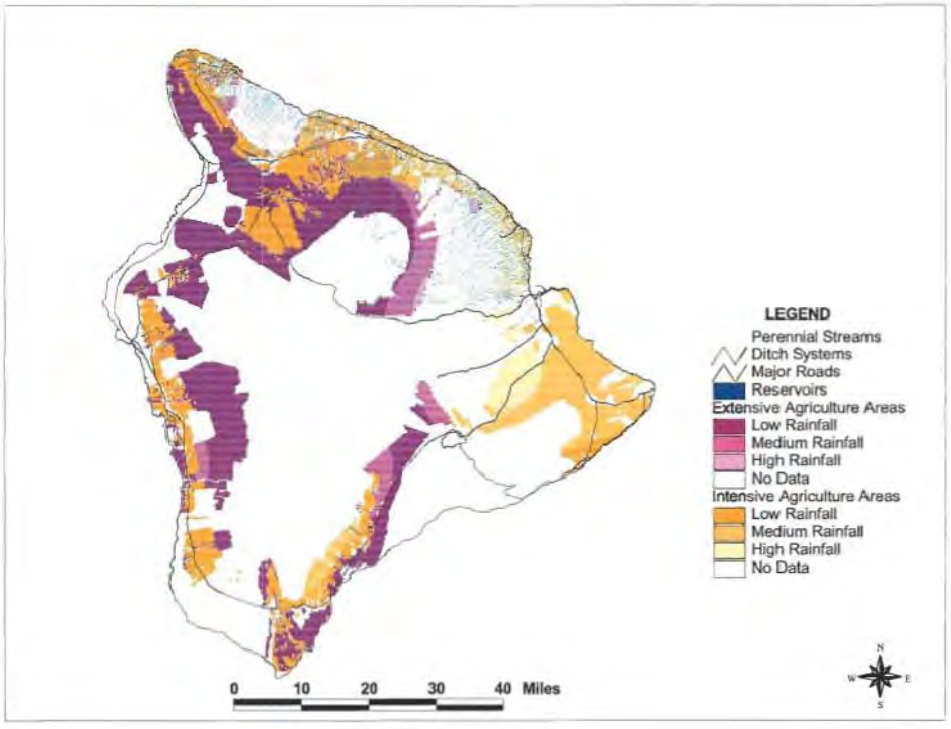


Figure 3-9. Drought Vulnerability to the Agricultural Sector



3.7. Wildfires

Hazard Description

Wildfires or wildland fires are uncontrolled non-structural fires in a wild area. Typically referred to as brushfires, they range from grass fires on ranch lands to forest fires in more densely vegetated areas. Wildfires in Hawai'i can destroy native plants and lead to soil erosion which in turn impacts a watershed and nearshore ecosystems.

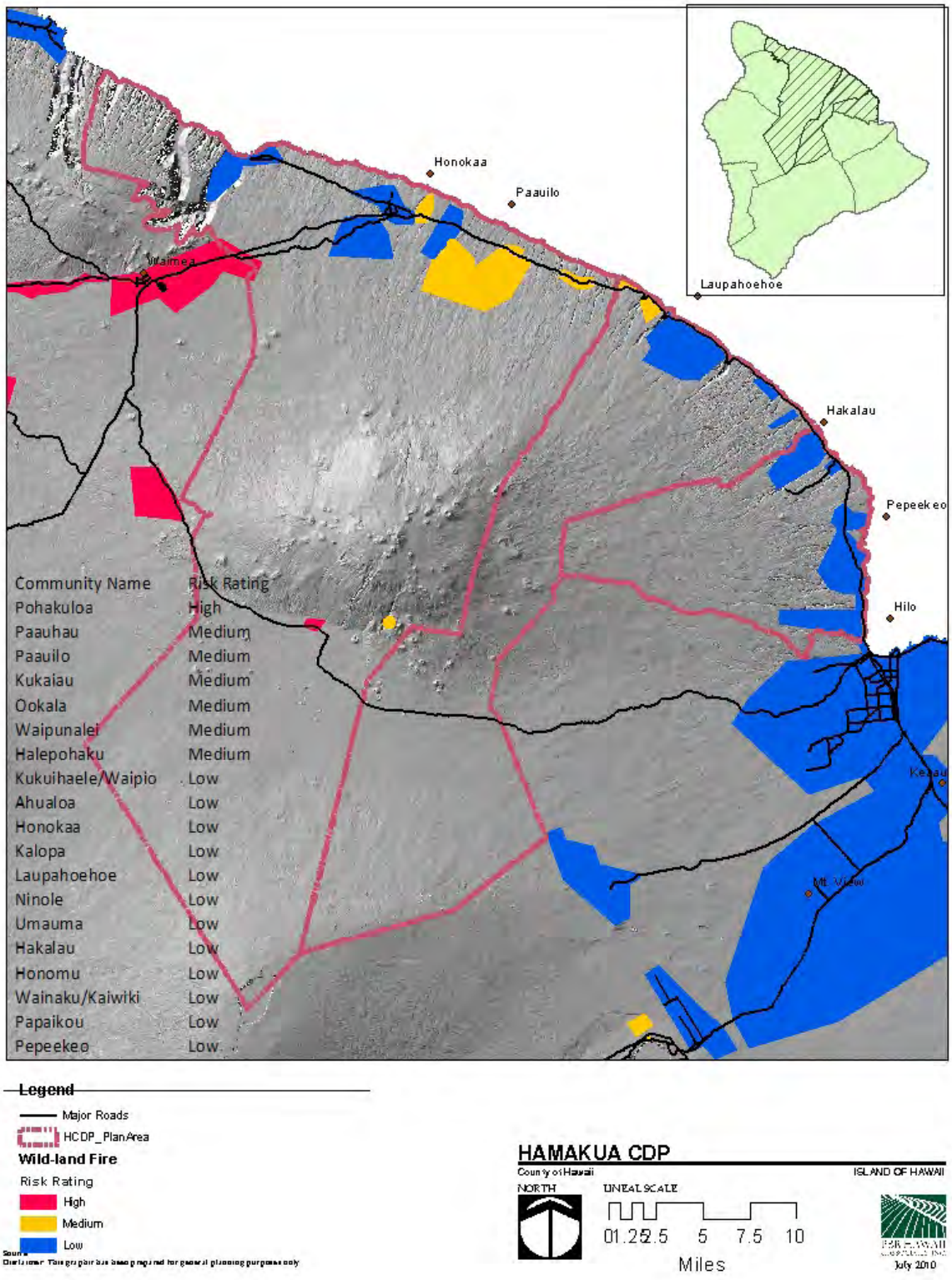
Hazard Events and Losses

The State of Hawai'i data book documents approximately 70-80 wildfires on the Island of Hawai'i annually. Fortunately, none of the major wildfires have occurred within the Planning Area.

Hazard Risk Areas (Zones)

Within the Planning Area, wildfires are less likely to occur than in more arid regions of the island. However, a concern raised by local residents is the extensive eucalyptus plantings in proximity to settlement areas. The DLNR Division of Forestry identified at-risk wildland-urban interface communities and rated each community's risk from wildland fires. Within the Planning Area, the only high risk area was Pohakuloa. The at-risk communities with medium risk included Paauhau, Pa'auilo, Kūkai'au, 'O'ōkala, and Waipunalei (see Figure 3-10).

Figure 3-10. Wildfire At-Risk Communities



3.8. High Surf

Hazard Description

The Pacific Disaster Center describes High Surf as when higher than normal sea-surface wave activity occurs between a shoreline and the outermost line of breakers. Tropical storms, and hurricanes, high waves from north swells and distant storms can all generate high wave conditions to Hawai'i's shorelines. The size of a wind wave is the function of the strength of the wind (force), the length of time it blows (duration) and the amount of open water over which it blows (the fetch). Large wind-generated waves can create storm surges also known as overwash. Damage from high surf can include flooding and erosion.

Hazard Events and Losses

Coastal lands within the Planning Area are exposed to the Northeast trade winds that can generate significant storm waves. However, due to the nature of the Planning Area's coast, which is comprised of many sea cliffs, hazards from storm surge are isolated to low-lying communities or facilities. The following table details high wave events that have caused damage within the Planning Area.

Table 3-6. Damaging High Waves in the Planning Area

Year	Description
1951	High seas at Hilo
1954	High seas
1967	High surf
1976	Large swell
1983	High surf
1984	High surf
1989	High eastern swell
1990	Rough surf
1993, Feb 3-4	25-30 foot north swell
1993, Aug 15-16	Hurricane Fernanda
1996, Feb 16-17	8-12 North Northeast swell
1996, Nov 8	20 foot north swell
1998	20-30 foot north swell

Hazard Risk Areas (Zones)

The Hawai'i County Multi-Hazard Mitigation Plan, utilizes the FIRM coastal zone flood classifications to give probabilities of coastal flooding. Due to the topography of the Planning Area's coastline, high surf damage to property are uncommon.

3.9. Lava Flows, Volcanic Gas (VOG) and Ashfall

Hazard Description

The presence of five volcanoes on the Island of Hawai'i, make the island relatively susceptible to damages to life and property from lava flows, volcanic gasses (VOG) and ashfall. On Hawai'i island, threats are primarily from lava flows and vog due to the non-explosive nature of eruptions. Lava flows, especially when they occur on steep slopes can travel many miles from the source threatening structures, utility infrastructure as well as human populations.

VOG, which is primarily oxides of sulfur, react with atmospheric conditions such as sunlight, oxygen and moisture to create a mixture of gasses and aerosols. Vog can trigger respiratory problems in humans. Short term exposure may irritate the eyes, nose, throat and respiratory tract. Longer term exposure may increase hazard to human health causing headaches, breathing difficulties, increased susceptibility to respiratory ailments, watery eyes and sore throat. Vog can also damage crops, and significant agricultural losses have been recorded in Kā'ū, the district most affected by the volcanic gasses. Vog damages plants by entering the leaf tissue and upon interacting with water is converted to surfuric acid which burns the plant tissue.

Volcanic Ash consists of tiny pieces of rock and glass and can be spread by the wind during explosive volcanic eruptions. Ashfall becomes hazardous when it darkens the sky and causes power outages disrupting communications and disorienting people.

Hazard Events and Losses

Significant historic events on Hawai'i Island are associated with Mauna Loa and Kilauea volcanoes. Of the 33 recorded eruptions at Mauna Loa, approximately 25% have occurred on the east-northeast rift zone, which is within the most southerly extent of the Planning Area.

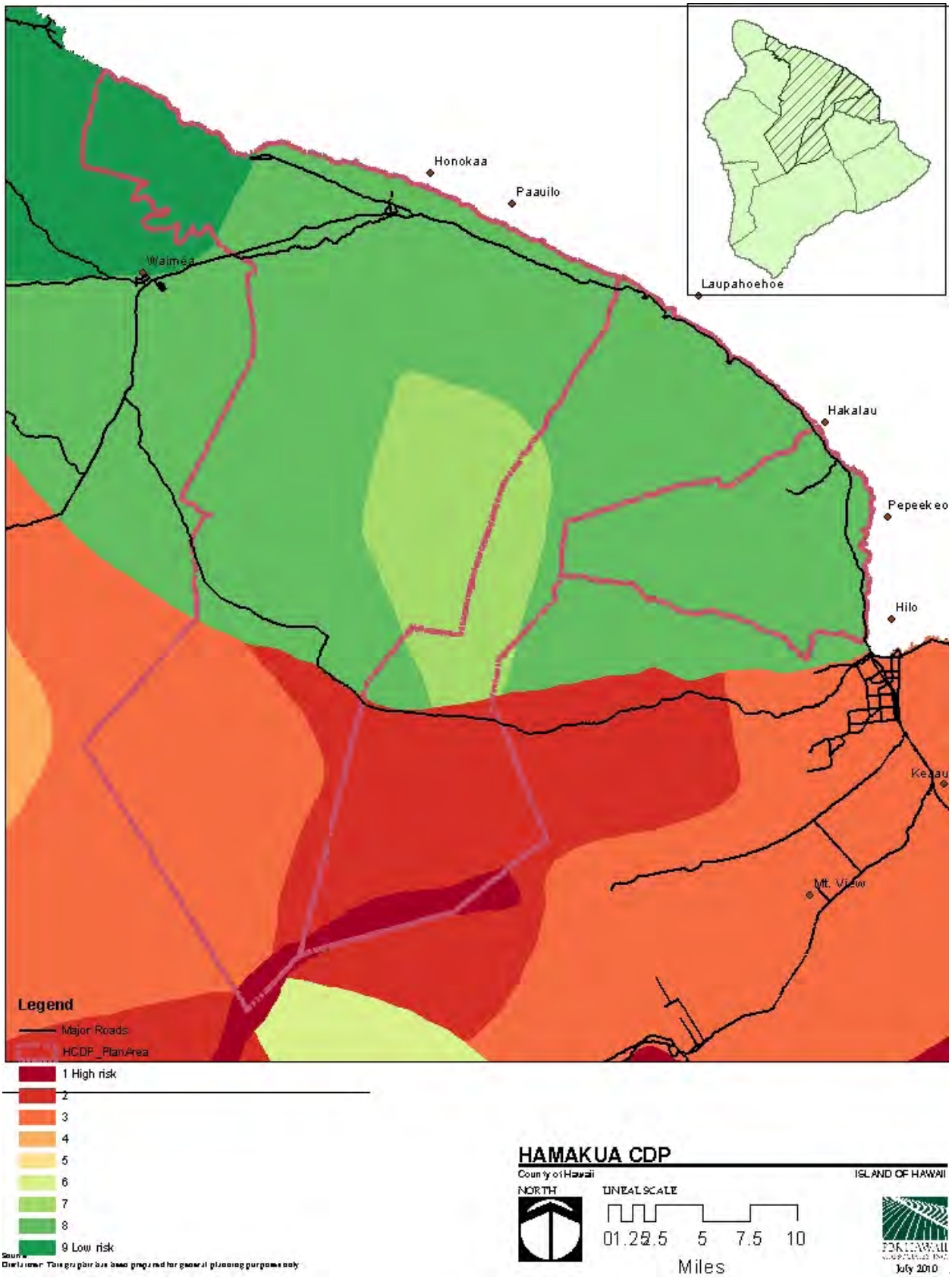
Hazard Risk Areas (Zones)

The areas of the island exposed to the highest risk are those down slope from the rift zones associated with Mauna Loa and Kilauea, Hawai'i's most active volcanoes.

The Lava Flow Hazard Zone Maps divide the island into areas based on a scale of one to nine with Zone 1 being the areas of greatest hazard and Zone 9 being areas of least hazard. The Planning Area has a relatively low risk of lava flows, with the majority of the area being in Zone 8 (only a few percent of this area covered by lava in the last 10,000 years) (see Figure 3-11). The upper slopes of Mauna Kea are within Zone 7 (20% of this area was covered by lava 3,500-5,000 years ago. The area within the Planning Area with the highest risk of lava flow are areas along the north and northeast flank of Mauna Loa. These areas are designated Zone 2 (areas adjacent to and downslope of active rift zones.

With respect to VOG, while a haze created by volcanic gasses can be present in portions of the Planning Area, the majority of the Planning Area is not anticipated to experience hazards from the volcanic gasses due to the prevailing trade winds.

Figure 3-11. Lava Flow Hazard Zones



3.10. Coastal Erosion

Hazard Description

Coastal erosion occurs when the beach migrates toward the land in order to compensate for beach erosion as the system tries to maintain a constant supply of sand.

Hazard Risk Areas (Zones)

Sandy beaches are not a feature within the Planning Area. Thus, coastal erosion does not present a hazard of concern.

3.11. Vulnerability Assessment

Critical Facilities and Lifeline Infrastructure

Critical facilities include emergency response facilities such as fire and rescue, police stations, public works baseyards, and medical facilities. The County's Multi-Hazard Mitigation Plan assessed the critical facilities within the Planning Area as follows:

- None of the Planning Area's main police stations are located in the tsunami evacuation zone.
- The Laupāhoehoe Fire Station does not have EMS capability. None of the fire stations in the County are located within the flood or tsunami evacuation zones.
- Baseyards, considered essential for repair and debris clearance, are located in Honoka'a and near Pa'auilo. Neither is situated in areas highly susceptible to natural hazards.
- A 1993 study evaluating the seismic risk to hospitals found non-structural hazards at all the County's hospitals.
- The Honoka'a Fire Station is at risk of economic losses or loss of functionality. The report recommended a retrofit primarily consisting of insalling a completed load path for hurricane wind uplift.
- The Laupāhoehoe Police Station is at risk of economic losses or loss of functionality in a hazard event.

The "lifeline" infrastructure systems refer to the systems upon which the community depends to support its daily activities and respond to emergencies. These systems include the transportation systems (harbors, airports, roads, bridges, buses, automobile rentals), energy systems (electrical, fuel, gas), communication systems (telephone networks, cell phone sites, radio transmitters), water systems, and wastewater systems. Within the Planning Area, the major vulnerability is the ability to keep the Hawai'i Belt Road open post-disaster since it is the only means of access to the Planning Area and therefore critical to response and recovery. Major factors in keeping the highway open are the condition of bridges and the availability of alternative bypass routes.

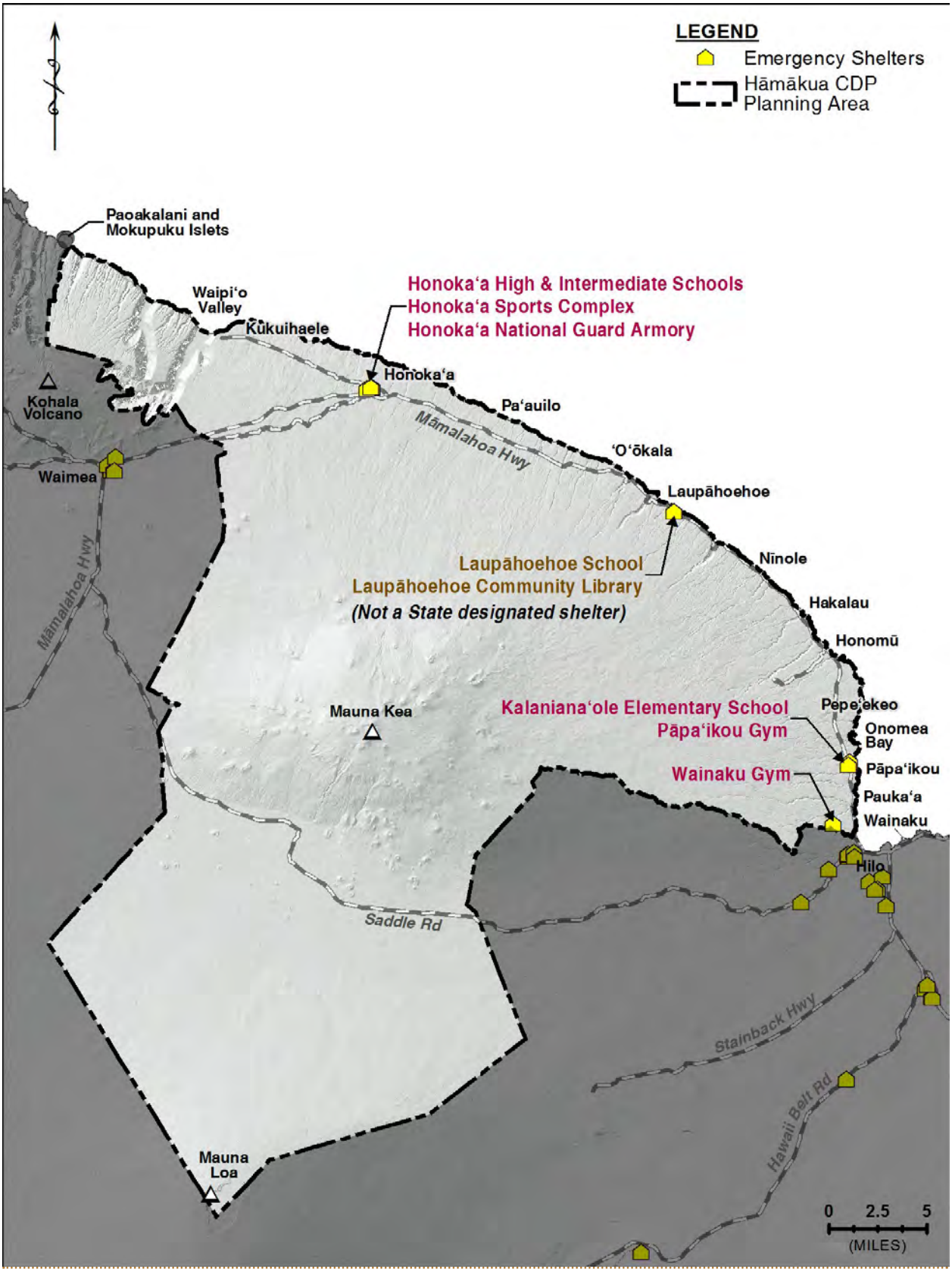
Shelters

Emergency shelters within the Planning Area are located at Honoka'a High & Intermediate School, Laupāhoehoe School, and Kalanianaole Elementary (see Figure 3-12). Laupāhoehoe is not a State designated shelter; therefore, Red Cross will not staff it. However, the County will utilize Laupāhoehoe as needed and use Parks and Recreation staff (personal communication, Quince Mento, Hawai'i County Civil Defense Administrator, September 2010).

The State Civil Defense has designated the Honoka'a and Kalanianaole shelters as special needs and pet-friendly shelters. Special Needs Shelters provide limited support to persons with special health needs, but such evacuees must either be capable of taking care of their own personal needs or be accompanied by a caregiver. Household pets entering a Pet-Friendly Shelter must be caged for safety and owners should provide water and food for their pets (State Civil Defense 2010).

Although the shelters are the best available, some need upgrading for improved hurricane resistance. DAGS has so far evaluated only four of the shelters on this island for safety, none of which are within the Planning Area. The Multi-Hazard Mitigation Plan includes shelter evaluations as a high priority mitigation project. According to the County's Multi-Hazard Mitigation Plan, the shelters within the Planning Area have adequate and possibly excess emergency shelter capacity.

Figure 3-12. Shelters



Warning Sirens and Evacuation System

The Hawai'i County Multi-Hazard Mitigation Plan describes the County's emergency preparedness including detection, warning, communications, public education (awareness, preparedness, flood insurance), evacuation and sheltering. According to the Plan the County relies on the following sources of forecasting the various hazards:

- Tsunami-- The Federal Pacific Tsunami Warning Center (PTWC), based on Oahu, provides capable warning for distant tsunamis. The system has never missed warning of a damaging tsunami since its beginning in 1947, but has caused a number of unneeded evacuations.

- Flooding (rainfall, high waves) and Hurricanes-- National Weather Service Forecast Office (NWS)

- Lava flow-- Hawaiian Volcano Observatory, U.S. Geological Survey

Warnings to the public include:

- The warnings from the PTWC and NWS are issued as a "watch" and/or a "warning" to the County Civil Defense Agency.

- The Civil Defense activates the sirens to alert people to seek further information from the radio or TV. The Civil Defense transmits warnings to the public through the Emergency Alert System, which consists of simultaneous broadcasts over all radio and television stations.

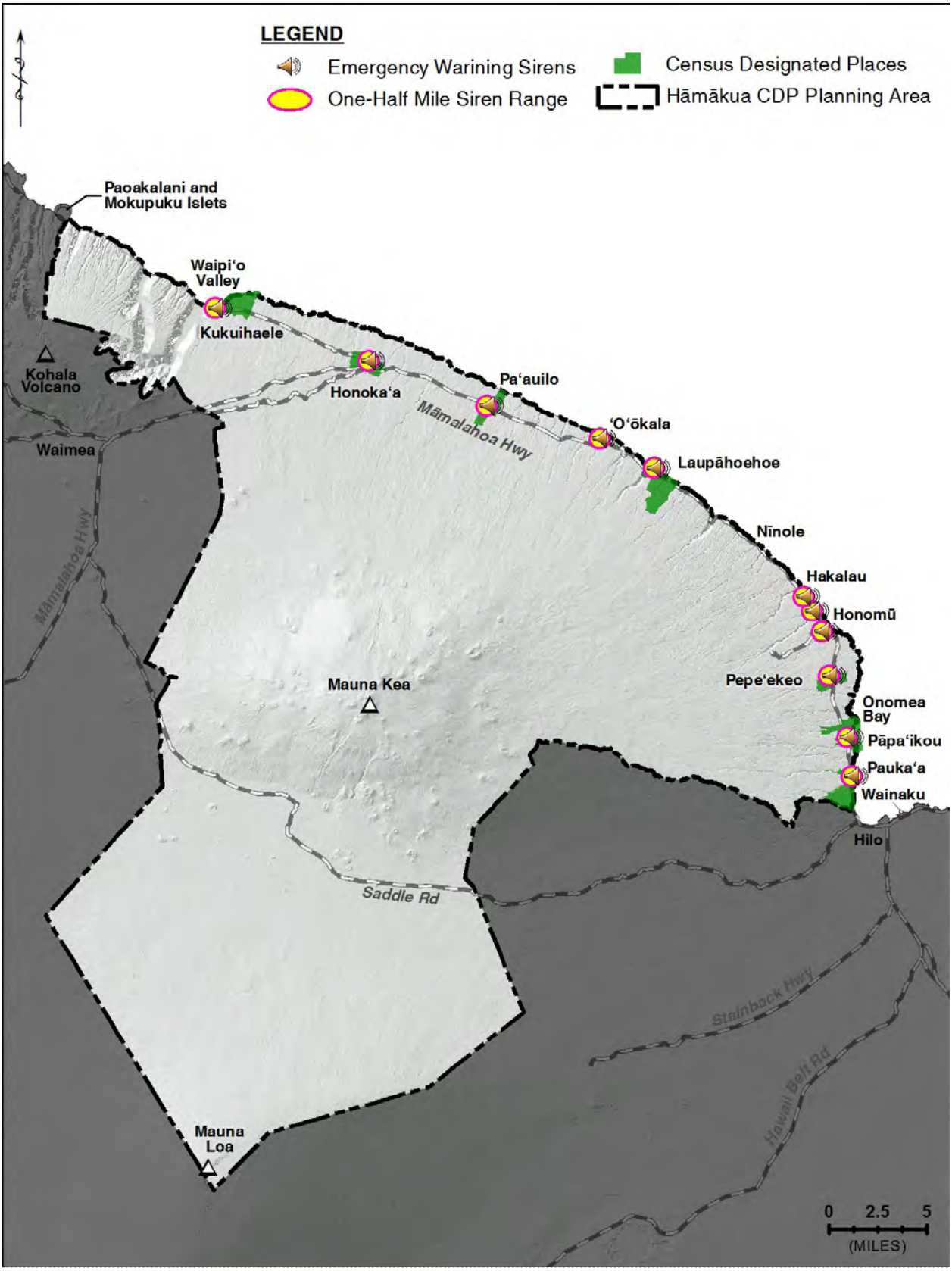
- An effective public education program ensures a calm, organized, and efficient response to the warnings.

- The County currently has 68 sirens and 12 simulators in operation around the island. Simulators provide a signal to manned stations where personnel are utilized to disperse the warning (see Figure 3-13).

- Sirens have an effective average range of one-half mile. Sirens are critical for populated coastal areas for tsunami warnings.

- Police, fire and other emergency vehicles equipped with siren and PA equipment will sound and broadcast warnings in areas to be evacuated, particularly in affected areas not covered by the CD sirens or in radio reception "dead spots". The Civil Air Patrol, County, military and private helicopters provide warnings to isolated areas.

Figure 3-13. Emergency Warning Sirens



Populations That May Require Special Assistance

Those who may need special evacuation assistance are the elderly or disabled, and those who may need special hazard education are those whom English may not be their first language. The County's Multi-Hazard Mitigation Plan identifies that there is a relatively high percentage of elderly (60+ years old) in many of the Planning Area communities including Honomū, Papa'ikou, Pauka'a, Wainaku, Laupāhoehoe and Honoka'a. The Plan also identifies that the community of Pepe'ekeo has high numbers of non-English speaking residents.

Hazardous Waste Sites

Areas where hazardous materials might be stored could cause secondary hazards should a spill occur.

Community-Based Emergency Response

The Hawai'i County Civil Defense has trained volunteers to serve as a volunteer pool to assist first responders when needed. With proper training, Community Emergency Response Teams (CERT) have a potential role in the Planning Area where communities are vulnerable to isolation after a disaster event due to flooding or the closing of the Belt Highway. The CERT program is a national initiative described as follows:

> *Following a major disaster, first responders who provide fire and medical services will not be able to meet the demand for these services. Factors as number of victims, communication failures, and road blockages will prevent people from accessing emergency services they have come to expect at a moment's notice through 911. People will have to rely on each other for help in order to meet their immediate life saving and life sustaining needs.*
>
> *One also expects that under these kinds of conditions, family members, fellow employees, and neighbors will spontaneously try to help each other. This was the case following the Mexico City earthquake where untrained, spontaneous volunteers saved 800 people. However, 100 people lost their lives while attempting to save others. This is a high price to pay and is preventable through training.*
>
> *If we can predict that emergency services will not meet immediate needs following a major disaster, especially if there is no warning as in an earthquake, and people will spontaneously volunteer, what can government do to prepare citizens for this eventuality?*
>
> *First, present citizens the facts about what to expect following a major disaster in terms of immediate services. Second, give the message about their responsibility for mitigation and preparedness. Third, train them in needed life saving skills with emphasis on decision making skills, rescuer safety, and doing the greatest good for the greatest number. Fourth, organize teams so that they are an extension of first responder services offering immediate help to victims until professional services arrive. (http://www.citizencorps.gov/cert/about.shtm)*

3.12. Implications of Climate Change

Present Understanding of Climate Change

The US Global Change Research Program has found that the US affiliated islands have experienced rising temperatures and sea levels in recent decades. The program also predicts that there will be an increase in both air and ocean surface temperatures in the Pacific, increasing the number of heavy rain events and hurricane wind speeds. As a result of sea-level rise and an increase in storm-surge, low-lying coastal areas will be at an increased risk of coastal flooding. Climate change can also affect freshwater sources which provide drinking water and support ecosystems. Freshwater can be affected during droughts when

aquifers cannot adequately recharge or when polluted runoff during flooding contaminates the system. Sea level rise is predicted to cause more flooding to islands, increasing coastal erosion and loss of coastal land. Impacts from climate change are expected to be felt by marine and coastal ecosystems. Changes to ecosystems may in turn have an impact on industries important to Hawai'i, including fishing, agriculture and tourism. Coral reefs, in particular, serve a number of functions. They sustain fisheries and tourism, have an educational value and form a natural protection against wave erosion.

Sea Level Rise Predictions

The National Oceanic and Atmospheric Administration (NOAA) acknowledges the effects of climate change on sea level rise. According to NOAA, changes in sea level are directly linked to a number of atmospheric and oceanic processes. Changes in global temperatures, hydrologic cycles, coverage of glaciers and ice sheets and storm frequency/intensity are examples of known effects of a changing climate, all of which are directly related to and captured in long-term sea level records. By understanding local rates of sea level change and projections of global sea level rise, communities can begin to analyze and plan for the impacts of sea level rise. Long-term variation in sea level may be repeatable cycles, gradual trends or anomalies. Sea level trends are estimated using a minimum of 30 years data in order to account for long-term sea level variations. Accounting for short term variations such as tides, seasons and interannual variations allows for a more accurate computation of sea level trend. Based on monthly mean sea level data from the years 1927 to 2006, NOAA has established that the mean sea level trend for Hilo is 3.27 millimeters/year. This is equivalent to a change of 1.07 feet in 100 years.

Possible Impacts of Climate Change in the Planning Area

High Winds, Tropical Cyclones & Hurricanes – If the frequency and intensity of high wind events, cyclones and hurricanes increase, the Planning Area will be at greater risk of sustaining damage to property, human injury or loss of life. The windward orientation of the Planning Area exposes residents, businesses, agricultural lands and infrastructure to winter storms.

- Flooding – The possibility of increased sheet flooding and flashflooding may increase with increased frequency and intensity of high wind events and hurricanes.

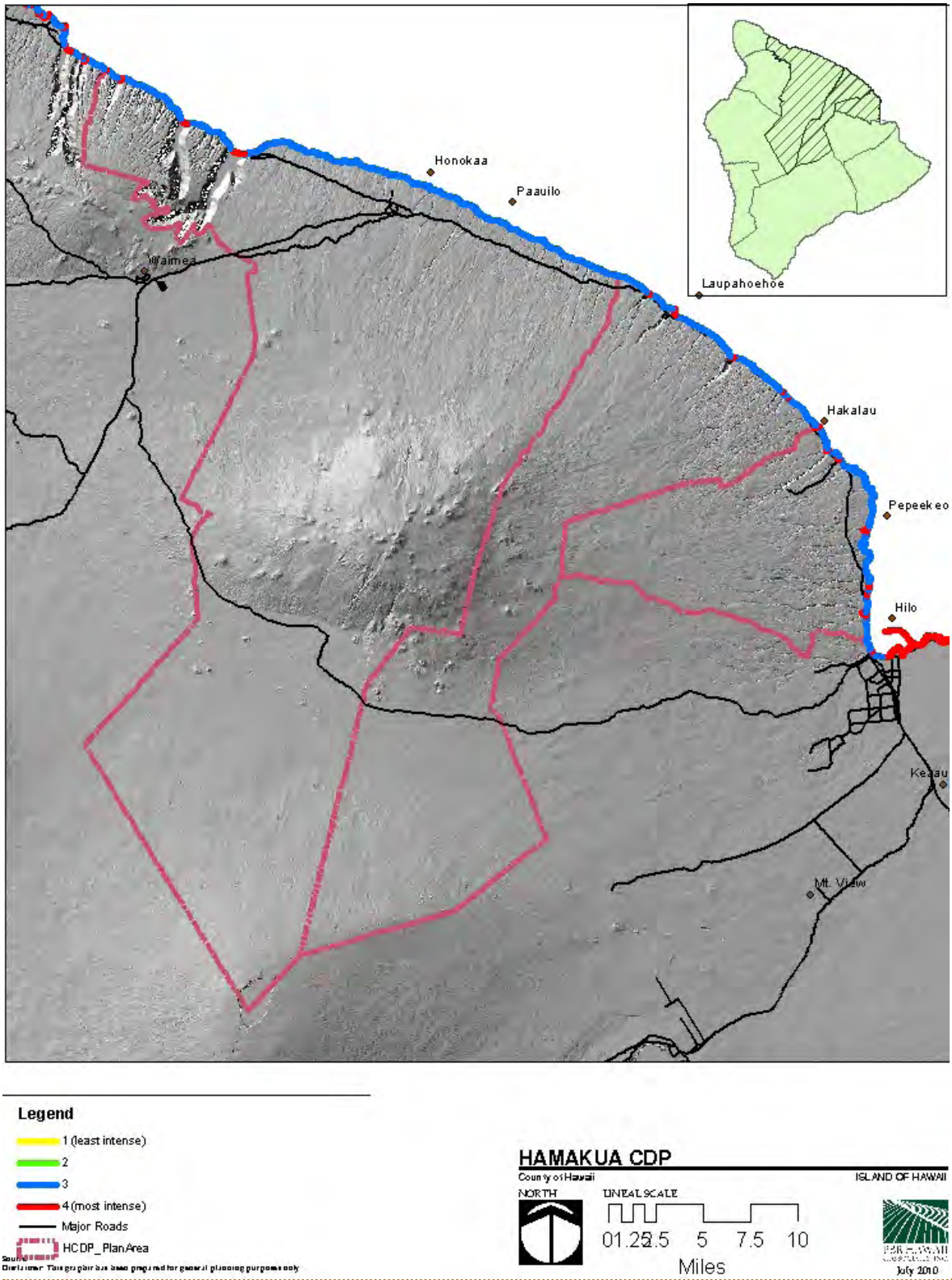
- Drought – Predicting the causes of droughts is challenging and global warming and climate change may complicate matters due to increasing atmospheric concentrations of carbon dioxide and other radiation-absorbing gases may change the frequency, intensity, duration, and pattern of droughts.

- Beach Erosion – On a local level, beaches erode and accrete (expand) on a seasonal basis. However, on a global level, sea level rise causes beach erosion as well. Increased beach erosion from sea level rise poses a minimal threat to the Planning Area as a whole, because there are few sandy beaches.

Overall, on a scale of 1 (least intense) to 4 (most intense), USGS rated most of the Planning Area as 3. The pockets of most intense sea level rise hazards included (from north to south) Waimanu Valley, Waipi'o Valley, Ka'awali'i Gulch, Laupāhoehoe Point, Maulua Bay, Hakalau Bay, Wailea Bay (Kolekole Park), vi-

cinity of Lehuawehi Point near Honomū, Kawainui Bay, and Honoli'i (see Figure 3-14).

Figure 3-14. Sea Level Rise Hazards



4 Coastal Resources

4.1. Shoreline Type

The Hāmākua Planning Area's shoreline is approximately 70 miles in length. A great majority of the shoreline is high, rocky cliffs. Punctuating the sea cliffs are stream outlets, either along valley floors where cobble beaches have formed, or along hanging valleys where streams spill to the ocean (see Figure 4-1.

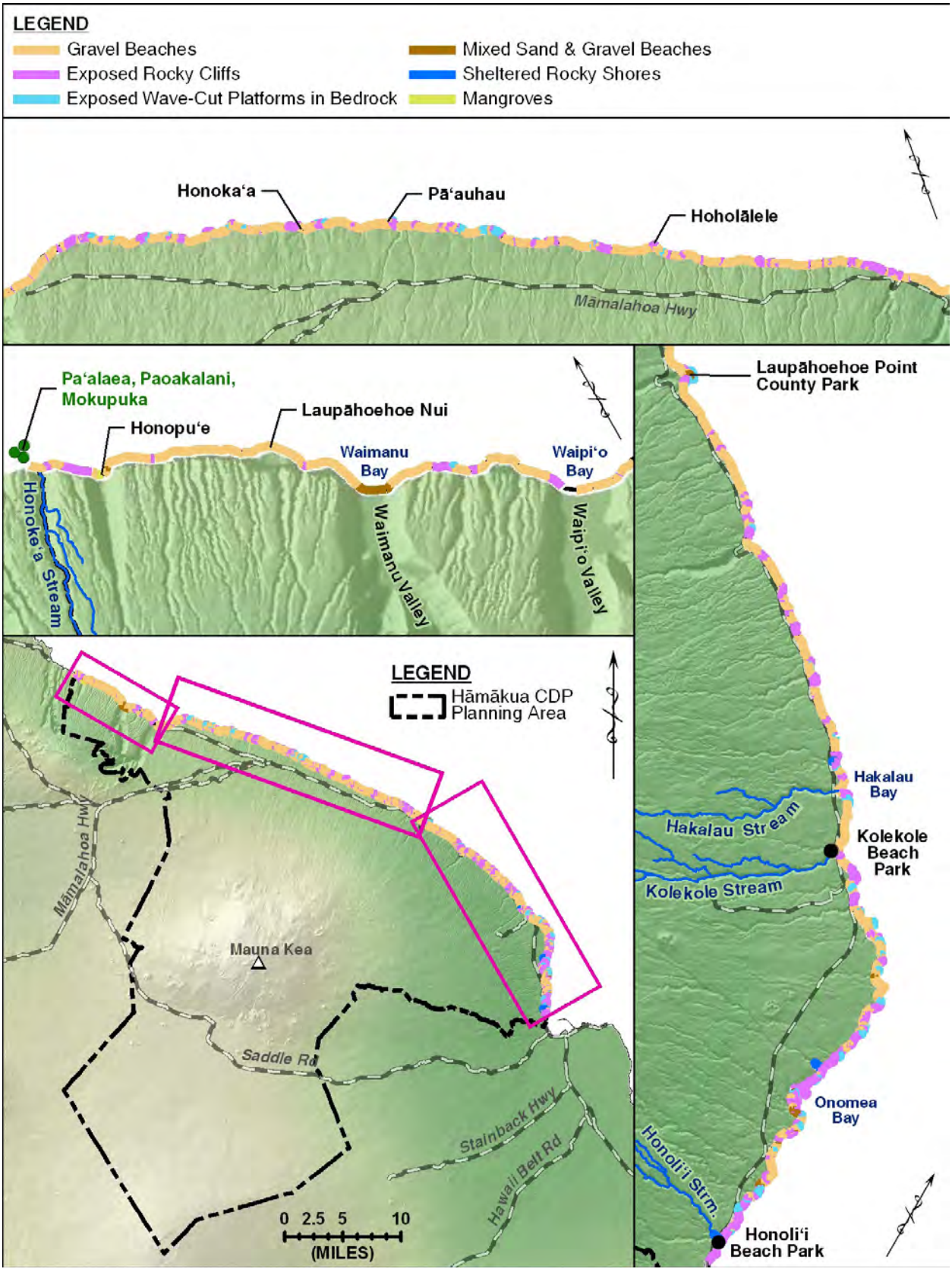
The shoreline is described below in sections going from north to south summarizing descriptions from Beaches of the Big Island (Clark 1985):

Honokeʻā to Waipiʻo. The northernmost coastal valley in the Planning Area is Honokeʻā. The waters of Honokeʻā stream are largely diverted to the Kohala ditch, thus there is little fresh stream water that reaches the ocean. The beach consists of large boulders that face rough seas and winds. The sea stacks Paʻalaea, Paoakalani and Mokupuka are off shore and are part of the Hawaiʻi State Seabird Sanctuary. Honopuʻe is also a boulder beach, although somewhat protected from the wind and waves by a small bay. Laupāhoehoe Nui is a rare coastal flat, where several springs surface. The flat was once inhabited and taro was thought to have been grown. Waimanu Valley was once the location of a major taro producing community. However, since the tsunami of April 1, 1946 the valley has been virtually uninhabited, except for backcountry hikers. The valley floor is comprised of extensive wetlands and the beach is comprised of black sand. Waipiʻo Valley continues to be inhabited and the extensive wetlands measuring three miles deep and one wide are still in taro production. Lālākea fishpond is located behind Waipiʻo's black sand beach.

Honokeʻā

Laupāhoehoe Nui

Figure 4-1. Shoreline Types



Waipio Valley

Kukuihaele to Nāhiwa Point. The shoreline between Waipi'o and Laupāhoehoe is principally composed of high sea cliffs. Landings at Honoka'a, Pā'auhau, Koholālele, and 'O'ōkala historically provided ports for export of sugar. The remnant landings are often used by the local community for fishing.

Figure 2. Example of an incline railway at Kukuihaele Landing ca 1910, running from the head-house atop the bluff to the wharf and derrick at inside. A freight pallet is suspended from the boom. Hawai'i (Territory) 1911.

Kukuihaele Landing

Honoka'a (Haina) Landing

Figure 4. *Landing facility at Pāauhau ca 1920. Note the substantial masonry ramp supporting a steep incline cable railway, and the wharf and derrick at seaside. Pāauhau Mill and village were situated between two major gulches of Mauna Kea. That is cane field 001 adjacent to the cliff-side warehouses. Paauhau Sugar Company.*

Pā'auhau Landing

Koholālele Landing

'O'ōkala

Laupāhoehoe to Honoli'i. Laupāhoehoe Point County Park is a low-laying peninsula and the site of a tidal wave memorial to those Laupāhoehoe school children and teachers lost in the devastating tsunami of 1946. The park also offers dramatic views of exposed pāhoehoe and 'a'ā lava rocks protruding from the sea. Breakwaters protect the landing and boat ramp on the east side of the peninsula. Hakalau Bay is a small embayment at the mouth of Hakalau Stream with a black pebble beach. The narrow access road zig-zags down the valley wall to the stream gulch. Māmalahoa Highway crosses over embayment high above by bridge. Kolekole County Beach Park is similarly situated at a stream mouth, far below the highway. The pebbles and stones that comprise the substrate of Kolekole stream give way to a black sand beach. Surf conditions and rip currents make Hakalau and Kolekole bays dangerous for swimmers, although surfers are known to take advantage of stream mouth breaks. Onomea Bay is a broader bay that historically served as a steamship port. Within the bay are smaller embayments where red lava rock is present on the shoreline and visible on the cliff faces above. Honoli'i valley is home to Honoli'i Beach Park, a popular Big Island surf site. The beach is comprised of black sand and pebbles. Historically, the sands of Honoli'i are known to be washed away when Honoli'i Stream experiences heavy flooding, but are always returned by the ocean currents.

Laupāhoehoe Point (today and 1880)

Ka'awali'i and Maulua Gulches

22 Hakalau Plantation
Hakalau Plantation's mill, shown here (far right) in 1935, was built right at the treacherous shoreline of Hakalau Bay, with support facilities located above it in the village proper. The bay was a busy shipping port in the days of Hawai'i's inter-island sailing ships. Cattle, passengers and plantation freight went in and out for about five cents per item, big or small. The Hawaii Consolidated Railway line was later built just *mauka* of the mill area. In 1906, a section of track extended back from Hakalau Station to the mill, where two concrete warehouses still stand. Hawai'i State Archives

Hakalau Bay

Pepe'ekeo

Onomea Bay

Pāpa'ikou

4.2. Coastal Habitats.

The National Oceanic and Atmospheric Administration (NOAA) has documented Hawai'i's shallow-water benthic habitats, by mapping both biological cover (i.e. corals, seagrass and algae) as well as geomorphologic structure types (i.e. aggregate reef, rock, sand). The benthic habitat of the nearshore waters from Honoke'a to Laupāhoehoe are relatively unknown. Access to field survey this coastline is difficult due to ocean conditions, strong trade winds and deep nearshore waters. At Laupāhohoe, NOAA documents the rocks and boulders and that the majority of this coastal geology is relatively uncolonized by biological cover. Further south between Wailea Bay and Pepe'ekeo Point, more rock and boulder structure is documented along with corals (10%-50% cover) and patchy turf algae (50%-90% cover). Similar geomorphology and biological cover are documented between Onomea Bay and Mokihana Bay, near Pāpa'ikou. Corals give way to rocks, boulders and a greater occurrence of algae turf from this point through Honoli'i cove and into Hilo Bay at Alealea Point, the south extent of the Planning Area.

4.3. Coastal Access and Recreation.

Known coastal recreational activities occur at the following areas:

Beach Parks. There are three County beach parks in the Planning Area; Honoli'i Beach Park, Kolekole Beach Park, Laupāhoehoe Point Beach Park. Honoli'i is a popular surf break and staffed by lifeguards, however, the strong rip currents make swimming conditions unadvisable. A large pond is within the park and is popular for swimming and known to be fished. Kolekole Beach Park offers a large pavilion and open grassy areas for play at the mouth of Kolekole Stream. A falls within the park contribute to its scenic beauty. Camping, by County permit, is allowed and facilities include restrooms and outdoor showers. Fishing is known to occur. Swimming is not advised, however, local surfers are known to take advantage of the break at the stream mouth. Camping is also permitted at Laupāhoehoe Beach Park and facilities include a covered pavilion, restrooms, outdoor showers and drinking water. Picnic areas are

also available. A boat ramp is maintained by the County. Swimming, wading and bodysurfing are not recommended at Laupāhoehoe.

There are no coastal State or National Parks in the Planning Area.

Beach Public Accesses. The public can also access the shoreline at Hakalau, Waipi'o and Honopu'e. Remnant landings are Pa'aulio, "Fire Landing", "Spring Water Landing", "Kukio" and "Malanahai" continue to provide local access to marine resources (www.lawaia.net). Ocean conditions are such that swimming and snorkeling are not recommended at these locations.

Fishing and 'Opihi Picking. Fishing and 'Opihi (Cellana sp.) picking is popular where people can get access along rocky coastlines. According to the blog, lawaia.net, former landings are often used by the local community for both activities. The State of Hawai'i regulates the size of 'opihi that are legal to harvest and consume (HAR 13-92). Shells must be greater than one and one-fourth inch in diameter and 'opihi meat must be greater than one-half inch in diameter, except by special permit.

4.4. Nearshore Water Quality.

The Department of Health (DOH) has classified all of the nearshore waters of the Planning Areas as Class A. Hawai'i Administrative Rules Section 11-54-3 describes the objective of Class A waters "that their use for recreational purposes and aesthetic enjoyment be protected. Another use shall be permitted as long as it is compatible with the protection and propagation of fish, shellfish, and wildlife, and with recreation in and on these waters. These waters shall not act as receiving waters for any discharge which has not received the best degree of treatment or control compatible with the criteria established for this class."

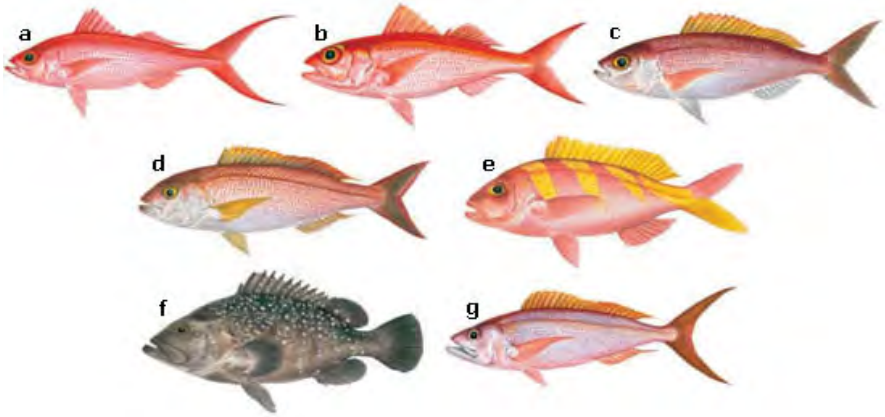
DOH regularly monitors and posts water quality data at Honoli'i Cove. Water quality is also monitored and posted at times at Kolekole Gulch (ocean), Laupāhoehoe boat ramp.

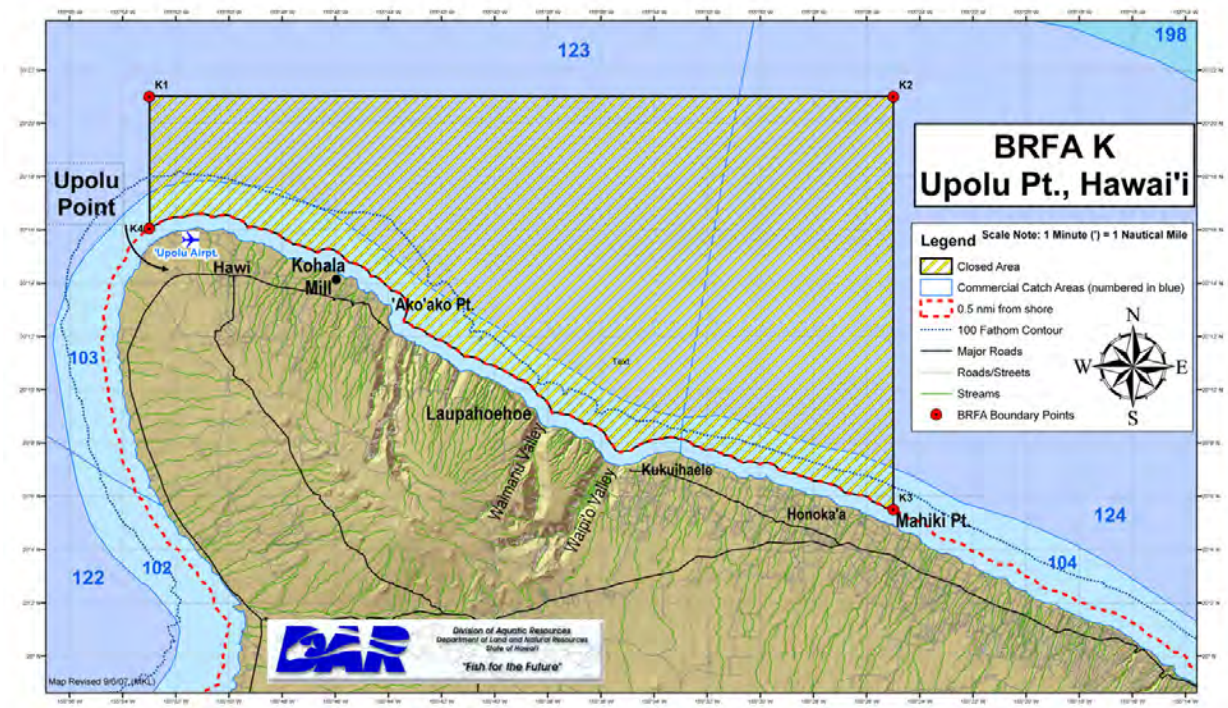
4.5. Coastal Managed Areas and Planning.

There are several types of government-managed marine programs including marine life conservation districts, natural area reserves, fisheries management areas, and wildlife sanctuaries. Within the Planning Area there is one National Estuarine Research Reserve (NERR) (formerly known as the National Estuarine Sanctuary System) at Waimanu. The NERR is a network of 28 areas representing different biogeographic areas around the U.S. that are protected for long-term research. Established by the federal Coastal Zone Management Act, the reserve system is a partnership between the National Oceanic and Atmospheric Administration (NOAA) and the State. The State Department of Land and Natural Resources manages the program through the Natural Area Reserves program. Although designated in 1980, the site is no longer listed as one of the 28 designations on NOAA's NERR list, so the current status is questionable.

There is also one Bottomfish Restricted Fishing Areas (BRFA), set forth by HAR 13-94 §1-10. Upolu Point BRFA extends from North Kohala into the Planning Area to Mahiki Point, near Honoka'a. Bottomfish species covered by the rules include (a)'ula'ula koa'e or onaga (Etelis coruscans); (b) 'ula 'ula or ehu (Etelis carbunculus); (c) kalekale (Pristipomoides sieboldii); (d) 'opakapaka (Pristipomoides filamentosus); (e) 'ukikiki or gindai (Pristipomoides zonatus); (f) hapu'u (Epinephelus quernus); and (g) lehi (Apharues

rutilans). Besides the bottomfish restriction, there are no other existing or planned fishery management areas within the Planning Area according to DLNR Division of Aquatic Resources.





5 Infrastructure and Public Facilities

5.1. Roads

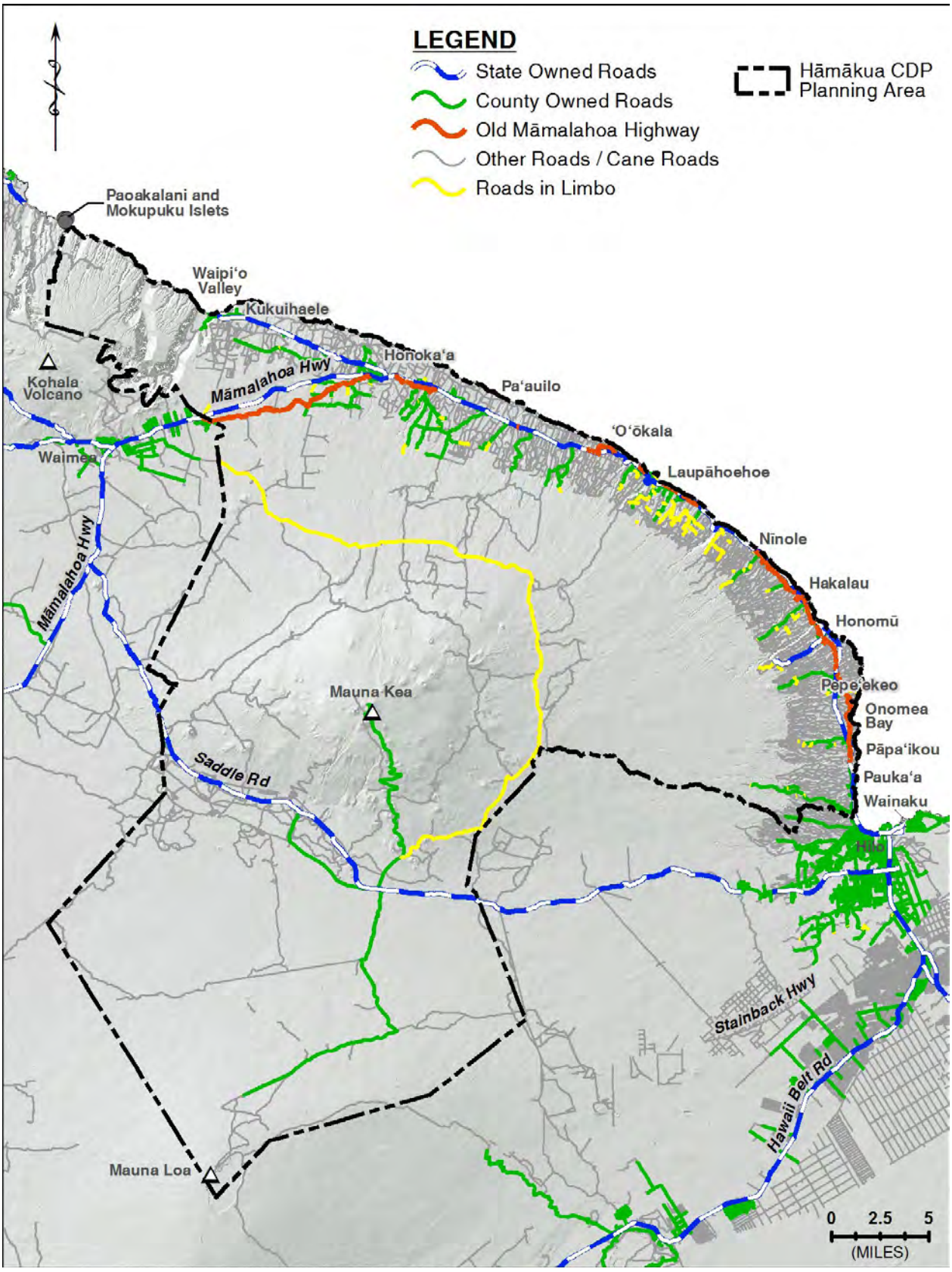
State Highways

There is one regional arterial providing access to and through the Planning Area-- Māmalahoa Highway (also known as the Hawai'i Belt Road) (Highway Route 19) (see Figure 5-1). There is another regional arterial located within the Planning Area called Saddle Road (Highway Route 200), but with ongoing improvements to this once dangerous road, the Saddle Road is becoming a major alternative route between East and West Hawai'i that diverts traffic away from the Planning Area. The Honoka'a-Waipi'o Road (Route 240), is another State Highway and terminates at the Waipi'o lookout. When the State built the Hawaii Belt Road, the State transferred segments of the Old Māmalahoa Highway to the County.

Passing Lanes on State Highways

The latest Long-Range Land Transportation Plan for Hawaii Island (Frederic R. Harris, Inc. 1998) recommended passing and truck climbing lanes for the stretch of Highway 19 through the Planning Area. As a guideline, vehicles should have either a passing zone or a passing lane or a slow-moving vehicle pullout every 10 minutes to prevent drivers from overtaking in a no passing zone (Transportation Association of Canada (TAC) 2007). Passing lanes are auxiliary lanes; passing zones are locations where sight distance permits overtaking by use of the opposing direction lane and are marked with dashed lines. A truck climbing lane is warranted if the grade reduces truck speeds by about 10 mph, average uphill traffic flow exceeds 200 vehicles per hour, and uphill truck traffic exceeds 20 vehicles per hour (TAC 2007). At moderate to higher traffic volumes (SADT > 1000 veh/day), the minimum climbing lane should allow about 30 seconds of passing opportunity, which is equivalent to about 2,300′ at 50 mph. At lower traffic volumes, the minimum length is 1,700′. The passing lane length should allow for at least 30 seconds of passing opportunity in order to disperse platoons of 4 to 6 vehicles, equivalent to about 2,600′ to 6,600′. Typical passing lane spacings (end of one passing lane to the start of the next passing lane) as a function of traffic volumes is about 6 miles for lower traffic volumes (1001-3000 AADT) to 4 miles for moderate traffic volumes (5001-7000 AADT). Factors to locate passing lanes include construction conditions (e.g., avoid large cut and fills), avoid intersections within the passing lane, sight distance, avoid passing zones, segments leading away from rather than into areas of traffic congestion (e.g., outbound from town), avoid physical constraints such as bridges and culverts, place opposing auxiliary lanes tail-to-tail rather than head-to-head (the tail is the diverge), strive to achieve balance in both directions (TAC 2007).

Figure 5-1. Roads



The Planning Area has 3 passing or climbing lanes in the northerly direction (towards Honoka'a): between Pāpa'ikou and Pepe'ekeo, a short climbing lane at Laupāhoehoe Gulch, and after Ka'awali'i Gulch in the vicinity of 'O'ōkala. In the southerly direction (towards Hilo), there are 3 passing or climbing lanes: Ka'awali' Gulch, Laupāhoehoe Gulch, and between Honomu and Pepe'ekeo. The spacing between the passing/climbing lanes is summarized in Table __ below. Although there are numerous passing zones in both directions along Highway 19, the passing zones are relatively short. There are two longer stretches that could be candidates for passing lanes or improved shoulders for pullouts: between Umauma and Nīnole (1500') and between Pa'auilo and Pā'auhau (4400'). The 1979 CDP recommended a climbing lane between Honoka'a and Waimea (p. 236). Candidate passing zones in that segment range in length from 700' to 3400'. Useful data to reassess the need for additional passing and truck climbing lanes in the Planning Area include:

- Traffic study to determine existing and projected traffic volumes in both directions, existing and projected truck traffic, and extent of platooning;

- Engineering study to determine grades that reduce truck speed under the warrant threshold, sight distance, intersection locations, physical constraints (bridges, culverts), and unfavorable construction conditions (poor cut/fill conditions).

ID	Direction	Location	Length (ft)	Spacing	Miles	Travel Time (minutes at 45mph)
N1	North	Between Papa'ikou and Pepe'ekeo	1,000	Between N1 and N2	5	7
N2	North	Laupāhoehoe Gulch	240	Between N2 and N3	1	1
N3	North	'O'ōkala	2,600	Between N3 and Mud Lane	6	8
S1	South	Ka'awali' Gulch	500	Between S1 an S2	1	1
S2	South	Laupāhoehoe Gulch	600	Between S2 an S3	4	5
S3	South	Between Honomu and Pepe'ekeo	1,200	Between S3 and Waianuenue	2	3

County Roads and Roads in Limbo

The County has an inventory of roads that it considers to be County-owned and maintained. The fuel tax is the primary source of funding for maintenance. There are several homestead roads that the State created when homestead lots were created in the late 1800's to early 1900's. Although in the past the State and County disputed over maintenance responsibilities (hence these roads were called "roads in limbo"), the County assumed responsibility in the mid-2000's (DPW Roads in Limbo Fact Sheet).

A "road in limbo" is:

- a government road (under the Highways Acts of 1892, all roads existing at that time were declared to be public highways and title thereto vested in the government. In Re Application of Kelley, 50 Haw. 567 (1968); in addition, "All roads, alleys, streets, ways, lanes, bikeways, bridges, and all other real property highway related interests in the State, opened, laid out, subdivided, consolidated, and acquired and built by the government are declared to be public highways. (HRS §264-1(a));

- that is not part of the State Department of Transportation's state highway system (a public highway is not a state highway unless it is designated for inclusion in the state highway system under §264-41. Santos v. Perreira, 2 H. App. 387 (1982));

- nor on the County's road inventory (the County Department of Public Works maintains an inventory of undisputed roads that the County owns and has the responsibility to maintain, and for which fuel tax proceeds can be used for maintenance or improvement);

- owned, built or laid out by government (either an existing road or "laid out" but unbuilt paper road, see letter to DLNR from the State Attorney General's office dated 7/21/99);

- transferred to county ownership by operation of law ("The ownership of all county highways is transferred to and vested in the respective counties in which the county highways lie." HRS §264-2).

Under the Land Act of 1895, the government at the time (which became the State) created homestead lots. Many of the roads which today are considered roads-in-limbo are "homestead roads" built or "laid out" to serve these homestead lots. For decades, the State and counties argued over ownership and associated maintenance responsibility of roads-in-limbo (see Jaworski 1989). In 2006, Hawaii County agreed to take responsibility for roads-in-limbo, and in return, the State agreed to fund $2M as a one-time payment to repair some of these roads (County of Hawaii DPW 2010).

The County attempted to inventory the roads-in-limbo in 2005. According to this initial inventory, the Planning Area has over half of the roads-in-limbo in the County in terms of number and total miles. Focusing just on the existing roads (i.e., not the paper roads), the County DPW assessed the condition of 202 roads-in-limbo segments covering 122.3 miles of roadway around the island (County of Hawaii DPW 2010). DPW staff used four criteria to prioritize the use of available funding to improve or maintain roads-in-limbo:

- road condition;

- number of homes served;

- alternative access route;

- whether to pave or gravel the road.

The highest priority went to roads with poor conditions, many homes served, no alternative access, and

needed to be paved. Of the 52 roads ranked highest, 30 (58%) were in the Planning Area. Of the 27 roads that DPW staff either could not find or could not access (e.g., gated), 19 (70%) were in the Planning Area.

Of the $2M provided by the State, DPW budgeted $1M for the actual repairs, with the balance budgeted for emergency bridge repairs, safety assessment, signage, and contingency. Recognizing that the $1M will not go far, the County Council passed Resolution No. 320-10 directing DPW to partner with communities where the County would provide maintenance material from County-owned quarries.

Private Roads

The sugar plantations created a network of private cane roads, some of which are still used by the current owners. These cane roads served as alternative routes for off-highway truck traffic, for access to shoreline or mountain areas, and emergency bypasses when the main highway closed.

Bridges and Roadside Rockfall Hazards

Because of the many streams and valleys, there are numerous bridges in the Planning Area which require diligent maintenance and seismic (earthquake) hardening. The wet climate also causes rockfalls along the "horseshoe bends" at Maulua, Laupāhoehoe, and Kaʻawaliʻi Gulches, as well as other road cuts along the Belt Highway.

Proposed Capital Improvements Projects

Proposed and funded capital road improvements in the Planning Area include:

- State (State Transportation Improvements Plan (STIP) (FY2011-2014) and State Capital Improvements Program (CIP))
    - Bridge repair or replacement
        - Umauma (HS5)
        - Pāhoehoe (HS6)
    - Bridge seismic retrofit (HS15)
        - East Paʻauilo
        - Āʻāmanu
        - Kainehe
        - Kalapahapuʻu
        - Wailoa River
    - Safety improvements to guardrail and shoulder
        - Kaumoali Bridge towards Waipunahina Bridge (HS7)
        - Kealakaha Bridge towards Kaula Bridge (HS8)
        - Kupapaulua Bridge towards Kaʻawaliʻi Gulch (HS9)
        - Papalele Road towards Kaumoali Bridge (HS10)
        - Kaʻala Bridge towards Kealakaha Bridge (HS11)
        - Waipunahina Bridge towards East Paʻauilo Bridge (HS12)
    - Rockfall protection

        - Laupāhoehoe Gulch (HS13)
        - Maulua Gulch (HS14)
        - Kaʻawaliʻi Gulch (HS38)
- County CIP
    - Bridge replacements
        - Kaʻahikini (5391.82, 5395.72, HC6)
        - Kalōpā (5392.44/.45)
        - Opea (5393.11/.52)
        - Waikaʻalualu (5393.13)
        - Manienie I, II, III (5399.64/.92)
        - Kaiwiki (5399.64)
    - New Road
        - Kalōpā Sand Gulch Bypass (5393.63/.66/.71)
    - Road Improvements
        - Laupāhoehoe Access Road (5393.72)
    - Highway Maintenance Building and Baseyard Warehouse (5393.73/.74)

5.2. Transit

The Hawaiʻi County Mass Transit Agency provides the Hele-On Bus service. Routes that traverse the Planning Area on the Belt Highway include:

- Hilo/South Kohala Resorts
- Honokaʻa/Hilo
- Kona/Hilo
- Waimea/Hilo

Based on the current schedule for these routes, a bus heading north towards Kona passes through the Planning Area approximately every 15 minutes during the early morning commute hours (3:30-6:30 AM). Similarly, a bus heading south towards Hilo passes through the Planning Area approximately every 15 minutes during the late afternoon hours (3:15 PM-6:30 PM). Mid-day northbound busses run through the Planning area on an hour to hour and a half intervals, while mid-day southbound bus service is limited to a single route.

Although the County has plans to construct park & ride facilities in various locations around the island, no facility is planned for the Planning Area (cite park & ride plan). The County also has plans for a para-transit system to improve service in the rural areas. [Describe paratransit and cite County plan; discuss plans for Planning Area and status per interview w/ Tom Brown].

5.3. Water

County Water System

There are ten County water systems within the Planning Area (see Figure 5-2) (R.W. Beck 2006):

- Pauka'a-Pāpa'ikou Water System. This is the largest system in the Planning Area (853 connections, 0.29 mgd average production (2003)). The water sources are two springs and one well—Ka'ie'ie Mauka (Pāpa'ikou) Spring supplies the mauka areas, and Ka'ie'ie Meideros Spring serves the makai areas. The well will replace Ka'ie'ie Mauka Spring to ensure a more reliable supply. The water system is connected to the Hilo water system by a valve that is normally closed but can be opened as needed to allow water to flow in either direction.

- Pepe'ekeo Water System. This is the third largest system in the Planning Area (491 connections, 0.20 mgd average production (2003)). The water sources are one spring (Maukaloa Spring) and one well. A booster pump station will pump water from the well to ensure more reliability so that the mauka areas do not have to rely exclusively on the spring source. The water system is not connected to any other water system.

- Honomū Water System. This is one of DWS's smaller systems and the eighth largest system in the Planning Area (242 connections, 0.06 mgd average production (2003)). The water source is one spring (Honomū Spring). Water is disinfected and treated to provide corrosion control. The water system is not connected to any other water system.

- Hakalau Water System. This is one of DWS's smaller systems and the sixth largest system in the Planning Area (28 connections, 0.074 mgd average production (2003)). The water source is one spring (Honomū Spring) and one well. Both sources are chlorinated and there is corrosion control treatment at the spring source to prevent copper from leaching out of household pipes. The water system is not connected to any other water system.

- Nīnole Water System. This is the smallest DWS system (49 connections, 0.011 mgd average production (2003)). The water source is one spring (Nīnole (Chaves) Spring). Water is disinfected and treated to provide corrosion control. The water system is not connected to any other water system.

- Laupāhoehoe Water System. This is the fourth largest system in the Planning Area (399 connections, 0.13 mgd average production (2003)) serving Laupāhoehoe, Pāpa'aloa, Kapehu, and Waipunalei. The water sources are the two Laupāhoehoe wells. This is one of four systems (Hakalau, Kalapana, and Kapoho are the others) in which agricultural water use exceeds 20% of the total water system use. The water system is not connected to any other water system.

Figure 5-2. County Water Systems

- ʻOʻōkala Water System. This is one of DWS's smaller systems and the ninth largest system in the Planning Area (83 connections, 0.042 mgd average production (2003)). The water source is the ʻOʻōkala well. The water system is not connected to any other water system.

- Paʻauilo Water System. This is one of DWS's smaller systems and the fifth largest system in the Planning Area (199 connections, 0.081 mgd average production (2003)). The water source is the Paʻauilo well. The water system is connected to the Haina water system.

- Haina Water System. This is the second largest system in the Planning Area (1,557 connections, 0.28 mgd average production (2003)) and DWS's most spread-out system with approximately 260' of pipe per customer. The water sources acres the Haina well and the Waimea Water Treatment Plant. Water is disinfected and treated to provide corrosion control. The water system is connected to the Waimea water system at two connections.

- Kukuihaele Water System. This is one of DWS's smaller systems and the seventh largest system in the Planning Area (157 connections, 0.071 mgd average production (2003)) serving Kukuihaele and Kapulena. The water source is the Kukuihaele (Waiulili) Spring. DWS is developing a well in the Kapulena area to replace the spring. The water system is not connected to any other water system.

Agricultural Water Systems

Most agricultural water needs are met from rainfall or from a variety of non-potable water systems. Non-potable water is often less expensive for agricultural customers because potable water quality standards do not apply. Nevertheless, many farmers use potable water from the County water system. DWS charges a reduced rate for agricultural use, but agricultural use is one of the first uses to be restricted in times of shortage, when the irrigation needs are usually the highest.

The Lower Hāmākua Ditch is the major nonpotable irrigation water system in the Planning Area. The system diverts water from four streams in Waipiʻo Valley at the 1,000' elevation. The system starts at the Kawainui Intake, followed by the Alokahi and Koiawe Intakes. The Waiama Intake, currently inactive, is expected to be reactivated. The system flows by gravity through a series of transmission tunnels excavated behind the Waipiʻo Valley cliff face. The tunnels are unlined and carved in the basalt rock. A tunnel section located close to the cliff collapsed a decade ago from a landslide but has been replaced with a bypass tunnel. The cliff tunnels end and the ditch system begins at the Kukuihaele Weir. The gravity flow system extends 14 miles from Kukuihaele to the Paʻauilo Reservoir. The plantation had installed service laterals along the entire length. DOA is still in the process of locating many of these laterals, which consist entirely of buried pipelines. The system is still not fully metered. The irrigation system includes five reservoirs that store water from the ditch. Additionally, several small ponds serve as fore bays for the service laterals (State of Hawaii Department of Agriculture 2004) (see Figure 5-3).

Upon closure of the sugar plantation, the State took over ownership, operation, and maintenance of the Lower Hāmākua Ditch. The State Department of Agriculture (DOA) employs an irrigation manager and two irrigation system service workers to operate the system. DOA has entered into a partnership with the USDA Natural Resources Conservation Service and the Hāmākua Soil & Water Conservation District

to plan system improvements to meet the needs of the numerous small-scale farming operations within the service area of the system. Estimated annual maintenance cost of the system is $396,000. Proposed improvements, estimated at $9.6M, include (State of Hawai'i Department of Agriculture 2004):

- Flume replacement and repair. The wooden flumes pose the greatest threat of failure. All 24 wooden flumes need repair due to dry rot.

- Ditch lining repair and sediment removal. While cracking of the concrete-lined open ditch sections is extensive, only those sections with broken and missing lining, upheaval, intrusion of roots, significant leakage, or open to sediment sources will be repaired. Deposited sediment, estimated to average one foot throughout the system, needs to be removed at least from the accessible open ditch sections.

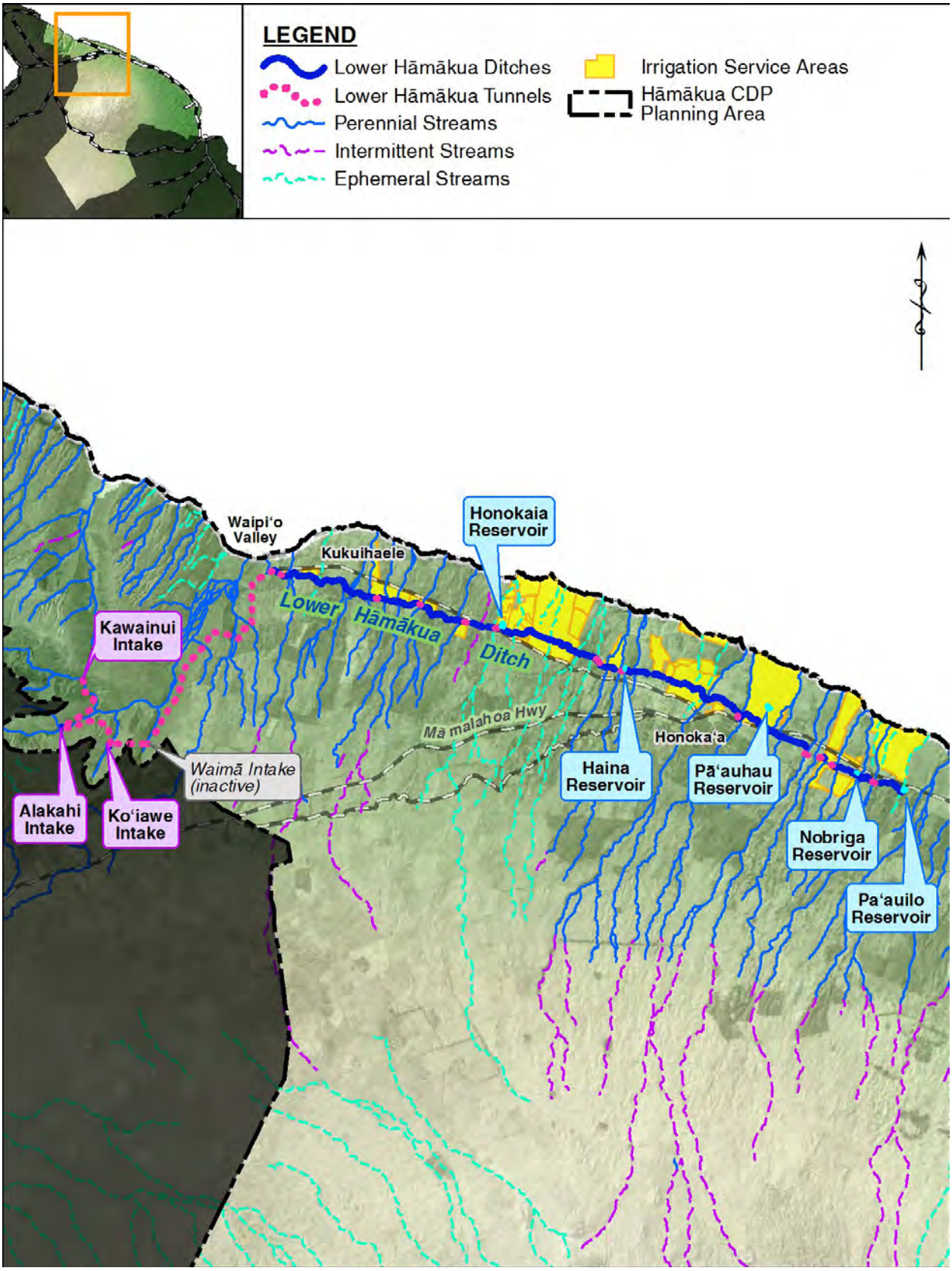
- Reservoirs. The four active reservoirs on the system have a combined storage capacity of 31 MG. The farmlots at the east end of the system at Honokaia do not have adequate storage capacity, thus a new 1MG reservoir is planned at Honokaia. The existing Pa'auilo Reservoir will be lined to eliminate seepage loss.

- Lateral pipeline systems, screening and filtration, water meters. Approximately ten lateral distribution systems will repaired or installed (of the sixteen once used by Hāmākua Sugar Company). Each inlet to a lateral system requires a screen filter box or other filtration to prevent damaging sediment and floating debris from entering the lateral pipeline system. Each water user needs a meter.

- Intakes. The existing intakes will be controlled to limit the amount of water diverted to not exceed the water demand plus system losses. Current peak demand is estimated at 14 mgd. The estimated system loss is 3 mgd after improvements to the system are completed.

- Supervisory Control and Data Acquisition (SCADA) system. A SCADA system will enable remote data collection and operation of key components of the system. The data collection points include: flows at the stream diversions, flows at the Main Weir, flows at the lateral systems, storage levels at the reservoirs, and overflow at dump gates. Control components include: variable diversion gate at the Kawainui Intake (manual controls at the other diversions due to difficulty of installation and signal transmission), dump gate at the Main Weir, inlets to the reservoirs, and main gates on the lateral pipeline systems.

Figure 5-3. Lower Hāmākua Ditch



5.4. Wastewater

There are four County wastewater systems in the Planning Area (see Figure 4):

- Pāpa'ikou. This system serves Pauka'a and Pāpa'ikou. The wastewater treatment plant located at Pāpa'ikou provides secondary treatment and disposes the effluent by an outfall to the ocean. The sludge is disposed at the Hilo landfill. The design capacity is 0.35 mgd and the existing average flow is 0.1 mgd. There is adequate capacity for additional connections.

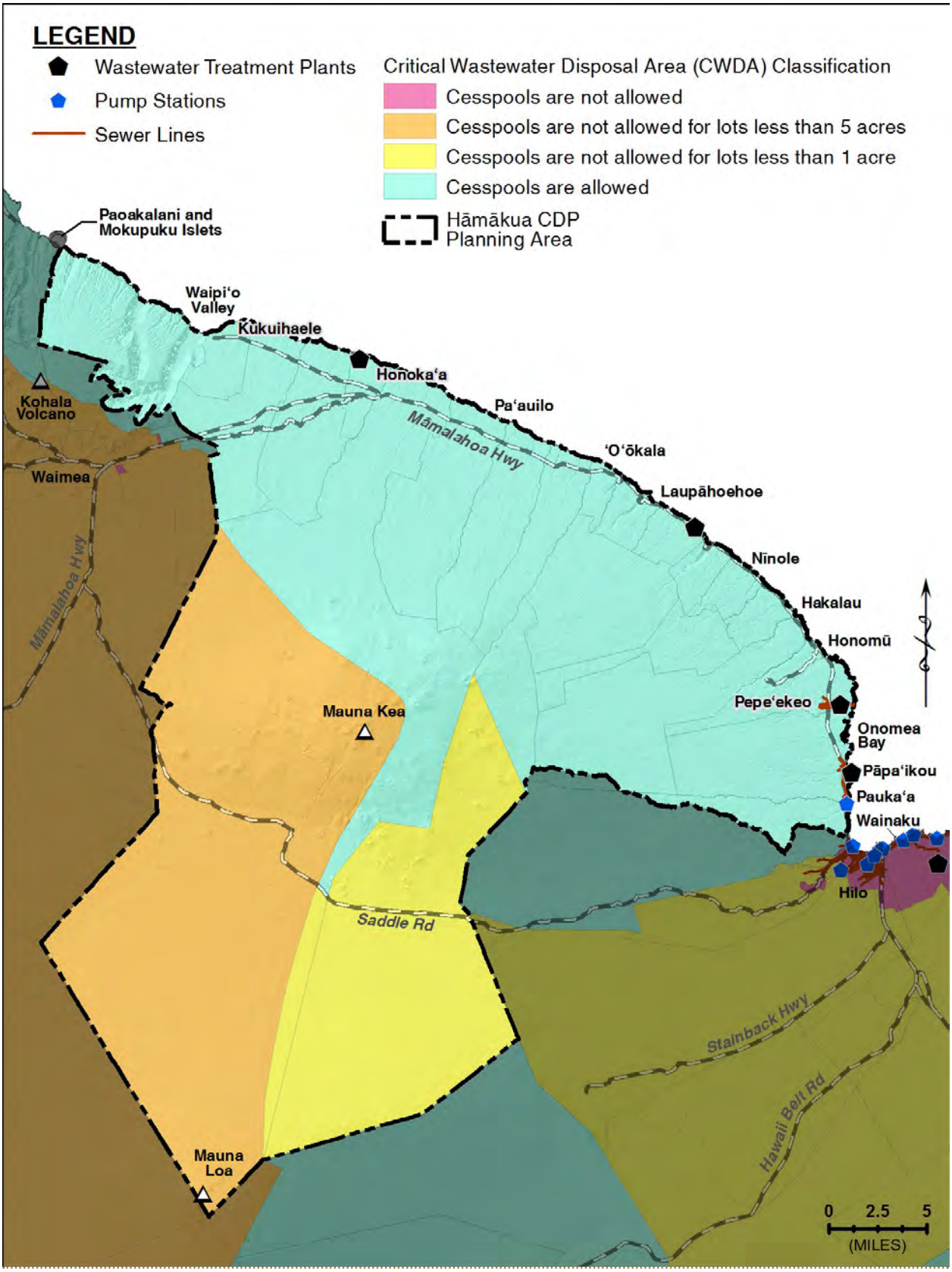
- Kula'imano. This system serves Pepe'ekeo. The wastewater treatment plant provides secondary treatment and disposes the effluent by an outfall to the ocean. The sludge is disposed at the Hilo landfill. The design capacity is 0.5 mgd and the existing average flow is 0.1 mgd. There is adequate capacity for additional connections.

- Kapehu. This system serves Kapehu Camp. The wastewater treatment plant provides secondary treatment and disposes the effluent by soil absorption system. The sludge is disposed at the Hilo wastewater treatment plant. The design capacity is 0.016 mgd and the existing average flow is 0.013 mgd. There is adequate capacity for additional connections.

- Haina. This system serves Honoka'a. The wastewater treatment plant provides secondary treatment and disposes the effluent by an injection well. The sludge is stored in lagoons. The plant is being upgraded from a capacity of 0.056 mgd to a capacity of 0.2 mgd. The capacity improvements are part of an effort to eliminate the use of large capacity cesspools in Honoka'a. At present, the existing average flow is 0.016 mgd. There is adequate capacity for additional connections.

For new subdivisions within 300' of an existing public sewer, the subdivision code requires the subdivider to hookup (Hawaii County Code §23-85). If the new subdivision is within a planned service area of a public sewerage system, then the County may require the subdivider to install "dry sewers" (Hawaii County Code §21-6). When a new public sewer line is installed, landowners fronting the new sewer line must hookup subject to certain exceptions (Hawaii County Code §21-5). For new construction outside areas served by sewer, the Department of Health's critical wastewater disposal areas (CWDA) map restricts cesspools to non-critical areas as identified in the Department of Health's Critical Wastewater Disposal Area map (see Figure 5-4). In such non-critical areas, the contamination risk from cesspool leachate to groundwater or nearshore coastal water quality is low. The DOH must approve the design and construction of any onsite wastewater disposal system (e.g., cesspools, septic systems). Under current rules, the DOH requires a new wastewater treatment plant if a subdivision will create more than 50 dwelling units.

Figure 5-4. County Wastewater Systems and Critical Wastewater Disposl Areas



5.5. Solid Waste

There is no residential curbside pickup of recyclables or garbage provided by the County, so most residents self-haul recycling and rubbish to solid waste disposal facilities. The Solid Waste Division of the County Department of Environmental Management operates all solid waste disposal facilities. Islandwide, this includes two sanitary landfills and 21 transfer stations. The County's two landfills are located outside the Planning Area in North Kona and Hilo. Within the Planning Area, transfer stations are located at Honokaʻa, Laupāhoehoe, Honomū and Pāpaʻikou. Transfer stations accept residential self-haul rubbish at no charge. Business and Institutional garbage must be disposed of at one of the two County sanitary landfills. Scrap metal and green waste recycling (both residential and commercial) are not accepted at the transfer stations within the Planning Area. These services are available at Hilo and Kealakehe/Kailua Transfer stations. Transfer station days and hours of operation vary by site. Honokaʻa is open 6:00 a.m. to 6:00 p.m. daily. Laupāhoehoe and Pāpaʻikou are open 6:00 a.m. to 6:00 p.m. Sunday/Tuesday/Friday. Honomū is open from 6:00 a.m. to 6:00 p.m. Monday/Thursday/Saturday.

Transfer Station	Tons of trash (fy 2007-08)	Percentage of County total
Honokaʻa	3,459	4.2%
Paʻauilo	1,922	2.4%
Laupāhoehoe	1,547	1.9%
Honomū	1,727	2.1%
Pāpaʻikou	2,902	3.6%

Transfer Station	Glass	Mixed Recyclables	Scrap Metal	Green Waste	Reuse Center	HI-5
Honokaʻa	X	X				X
Paʻauilo	-closed-					
Laupāhoehoe	X	X			X	
Honomū	X	X				
Pāpaʻikou	X	X				

According to the County's Island Wide Transfer Stations Repair and Enhancement Plan (2006), all five of the transfer stations (including Paʻauilo which is presently closed) in the Planning area have major engineering deficiencies that require reconstruction.

The County's Integrated Solid Waste Management Plan (CH2M Hill 2009) documents existing source reduction activities within Hawaiʻi County and presents options for achieving further source reduction. Source reduction is the adoption of practices that generates less waste.

In 2007, the County adopted Resolution 356-07, "A Resolution to Embrace and Adopt the Principles of Zero Waste as a Long-term Goal for Hawaiʻi County." The resolution commits to taking steps to incorporate a zero waste philosophy into legislation, policies and actions. The philosophy is a closed loop sys-

tem that (1) reduces the volume and toxicity of waste through product and packaging redesign strategies, (2) reusing materials and products for alternative uses, as well as for their original intended use, and (3) recycling and composting all remaining materials for their best use. The Integrated Solid Waste Management Plan makes the following recommendations:

- Develop County policies or ordinances that mandate certain actions be taken to reduce the source of waste currently entering landfills, including:
    - Develop County ordinances requiring that a waste reduction plan be submitted to obtain commercial or residential building permits. Coordinate implementation with the Planning Department.
    - Develop EPR policy statements or resolutions expressing strong support for initiatives that require manufacturers of certain products or materials to take responsibility for the life cycle costs of their products.
    - As a component of the EPR policy, implement a campaign to develop EPR for difficult to recycle products, and lobby state and federal lawmakers to advance EPR initiatives.
    - Implement a County government source reduction program by implementing policies, procedures, and incentive programs that will reduce waste streams currently being generated within various County departments and agencies.
- Establish Pay-As-You-Throw system for residential discards, creating a financial incentive to reduce waste
- Expand reuse facilities, including at Laupāhoehoe
- Expand source reduction education
    - Develop a business waste audit and education program
    - Develop a visitor industry waste reduction education program
    - Develop a public education and awareness campaign to encourage use of the reuse centers

The waste reduction efforts suggested in the Integrated Solid Waste Plan are beginning to be implemented in the Planning Area. The community re-use program at Laupāhoehoe is an informal arrangement between the County and some members of the community. The County provided the facility and the community members work to keep it clean. In other parts of the island, transfer stations are being retrofitted to include recycling centers. In Waimea, recycling bins are "recessed" so that vehicles can easily access and dispose of recyclables.

It is illegal to abandon a vehicle on public roadways, and the registered owner is subject to a fine of $250 and all reasonable expenses to remove (Hawaii County Code sections 20-38 and 24-199). Where the registered owner cannot be traced, the County can remove the abandoned vehicle on public roadways. A portion of the vehicle registration fees fund the Vehicle Disposal Fund "for the towing, removal, disposal and recycling of abandoned or discarded automobiles and automobile parts' (Hawaii County Code section 24-19(i)). Land owners are responsible for vehicles that are abandoned on their property. However, private metal recyclers will remove abandoned vehicles and other scrap metal from private property.

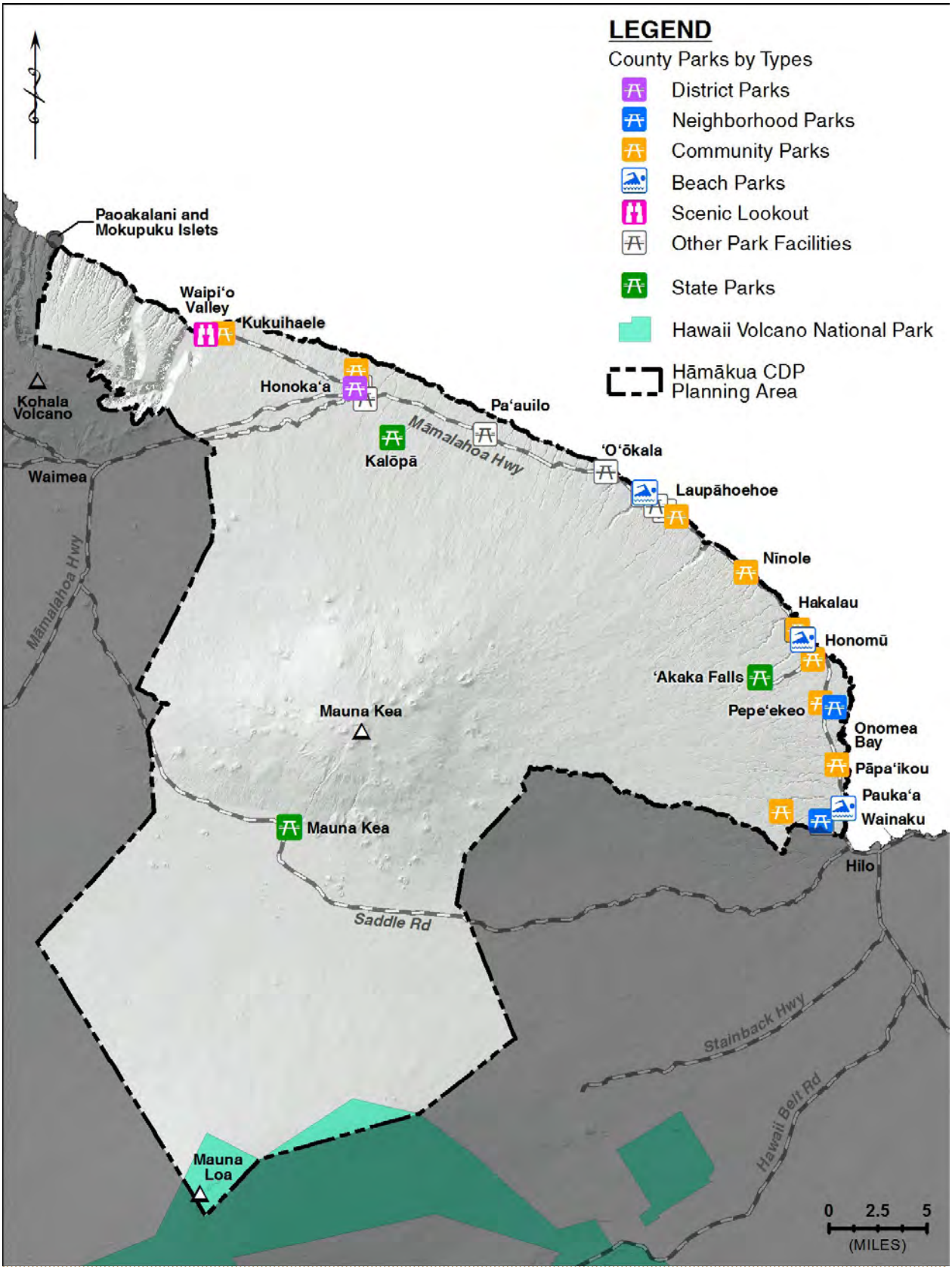
5.6. Parks

County parks are typically beach parks or facilities for active recreation (e.g., playfields, gymnasiums, swimming pools). State and Federal parks are typically oriented toward passive recreation activities centered on a valued natural or cultural resource. Since the plantations built and turned over to the County several gymnasiums and playfields, such facilities are adequate and even underutilized in the Planning Area. On the other extreme, there are only three heavily used beach parks in the Planning Area as a result of the very limited places to access the shoreline—Honoli'i, Kolekole, and Laupāhoehoe Point.

The General Plan sets forth a hierarchy of parks based on the intended population or area to be served: neighborhood park (playfield, playground equipment, courts, up to 4 acres, intended to serve the immediate neighborhood); community park (neighborhood park facilities plus gymnasium, swimming pool, 4-8 acres, intended to serve a broader community approximately 1-mile radius in urban areas or larger area in rural areas); district park (community park facilities plus multi-purpose recreation building, 10-30 acres, intended to serve the entire district); and regional park (district park facilities plus auditorium, spectator sports facilities, approximately 50 acres, intended to serve several districts). There are no regional parks in the Planning Area—the Ho'olulu regional park in Hilo serves the Planning Area. Honoka'a Park is a district park. There are nine community parks, ten standalone facilities (e.g., gymnasium, swimming pool, tennis court, rodeo), two neighborhood parks, and the Waipi'o Lookout which is considered a passive recreational facility (see Figure 5-5).

The Hawai'i State Parks system includes three parks within the Planning Area: Akaka Falls State Park, Mauna Kea State Park and Kalōpā State Recreation Area. Kalōpā has cabins for overnight accommodations. Hawai'i Volcanoes National Park, the largest National Park in the State, reaches across the peak of Mauna Loa into the very southwest corner of the Planning Area.

Figure 5-5. Parks



5.7. Schools and Libraries

Schools

The State of Hawai'i, Board of Education divides the Island of Hawai'i into ten school complexes. Three of these complexes fall wholly or partially within the Planning Area, including, Honoka'a, Laupāhoehoe and Hilo (see Figure 6). In the Honoka'a Complex, Honoka'a High School is fed by the Honoka'a and Pa'auilo Elementary and Intermediate Schools. In the Laupāhoehoe Complex, students attend Laupāhoehoe Elementary, Intermediate and High Schools. Schools in the Hilo Complex that are also in the Planning Area include Ha'aheo Elementary and Kalaniana'ole Elementary and Intermediate School. Ha'aheo and Kalaniana'ole feed Hilo High School, which is located outside the Planning Area.

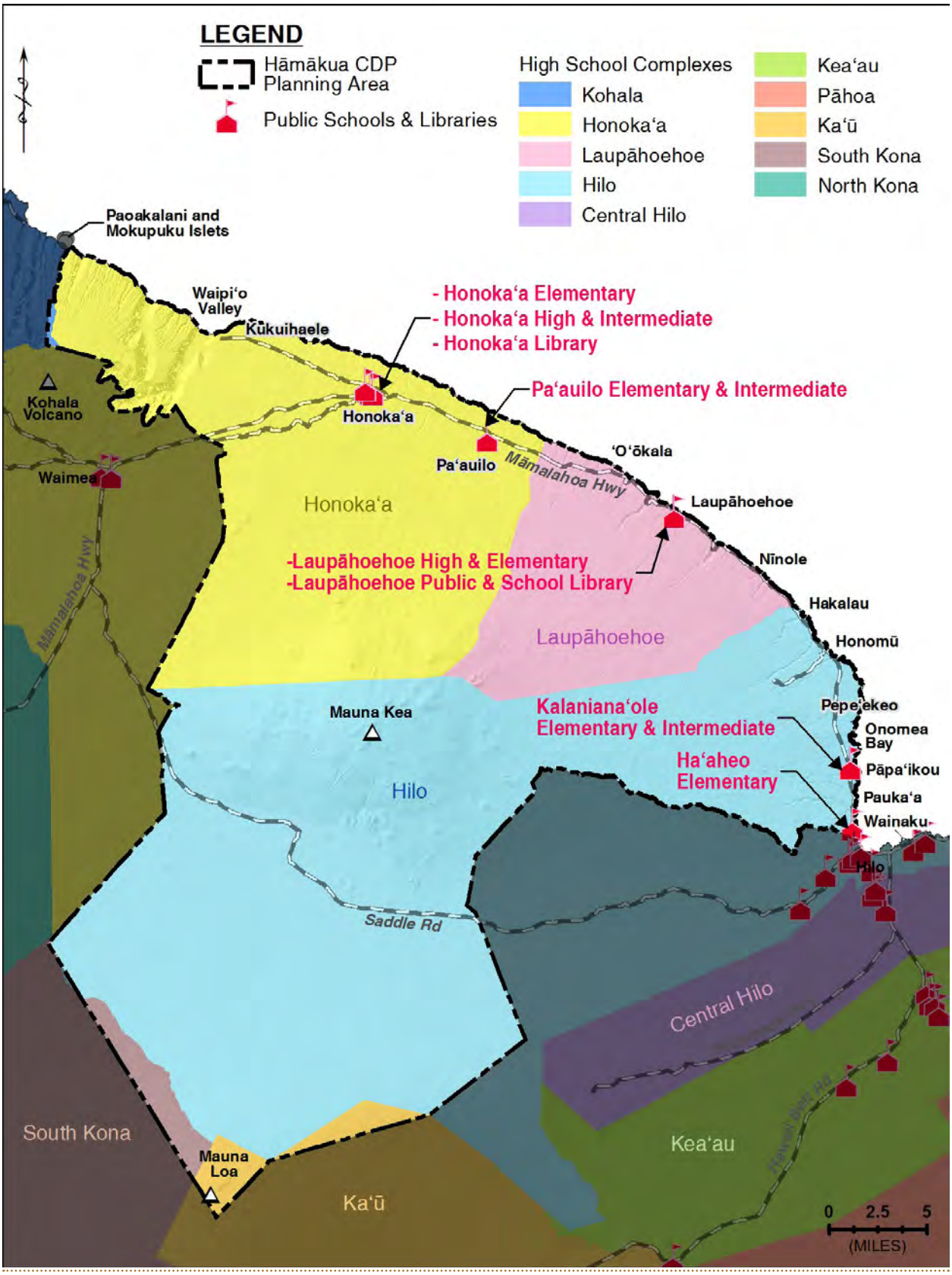
Table 5-1. Public Schools within the Planning Area

Complex	School	2009/2010 Enrollment	2009/2010 Capacity
Honoka'a	Honoka'a High & Intermediate	764	993
	Honoka'a El	351	405
	Pa'auilo El and Intermediate	276	340
Laupāhoehoe	Laupāhoehoe High & El (K-12)	205	298
Hilo	Kalaniana'ole Intermediate	261	670
	Ha'aheo Elementary	166	228

Libraries

There are two public libraries within the Planning Area, Honoka'a and Laupāhoehoe (see Figure 5-6).

Figure 5-6. Schools and Libraries



5.8. Fire

The County Fire Department provides fire fighting, emergency medical service, search and rescue, hazard materials response, and life guarding services. As a guide for response times, the National Fire Protection Association (NFPA) standards are more applicable to urban areas, requiring a fire station nearly every 10 miles (4 minute response time 90% of the time). Presently, the average response time in the Planning Area is __ minutes for fires and __ minutes for emergency medical services [citation]. The fire stations located at Honokaʻa and Laupāhoehoe, together with the fire stations in Hilo, are located approximately 10 miles apart and do provide adequate response times for fire fighting (see Figure 7). However, only the Honokaʻa station presently provides EMS. A volunteer fire station had been proposed at Paʻauilo, but [status].

Proposed improvements in the Planning Area include: [CIP projects]

For wildfires in the Planning Area, the area is divided into response zones. In general, the Planning Area's population centers along the coast are served by the Hawaiʻi County Fire Department. Areas surrounding the summits of Mauna Kea and Mauna Loa are primarily served by the State Department of Forestry and Wildlife (DOFAW). Other mauka areas that include the Forest reserve areas are served cooperatively between DOFAW and the County. Lands surrounding Pōhakuloa are jointly served by the military and DOFAW.

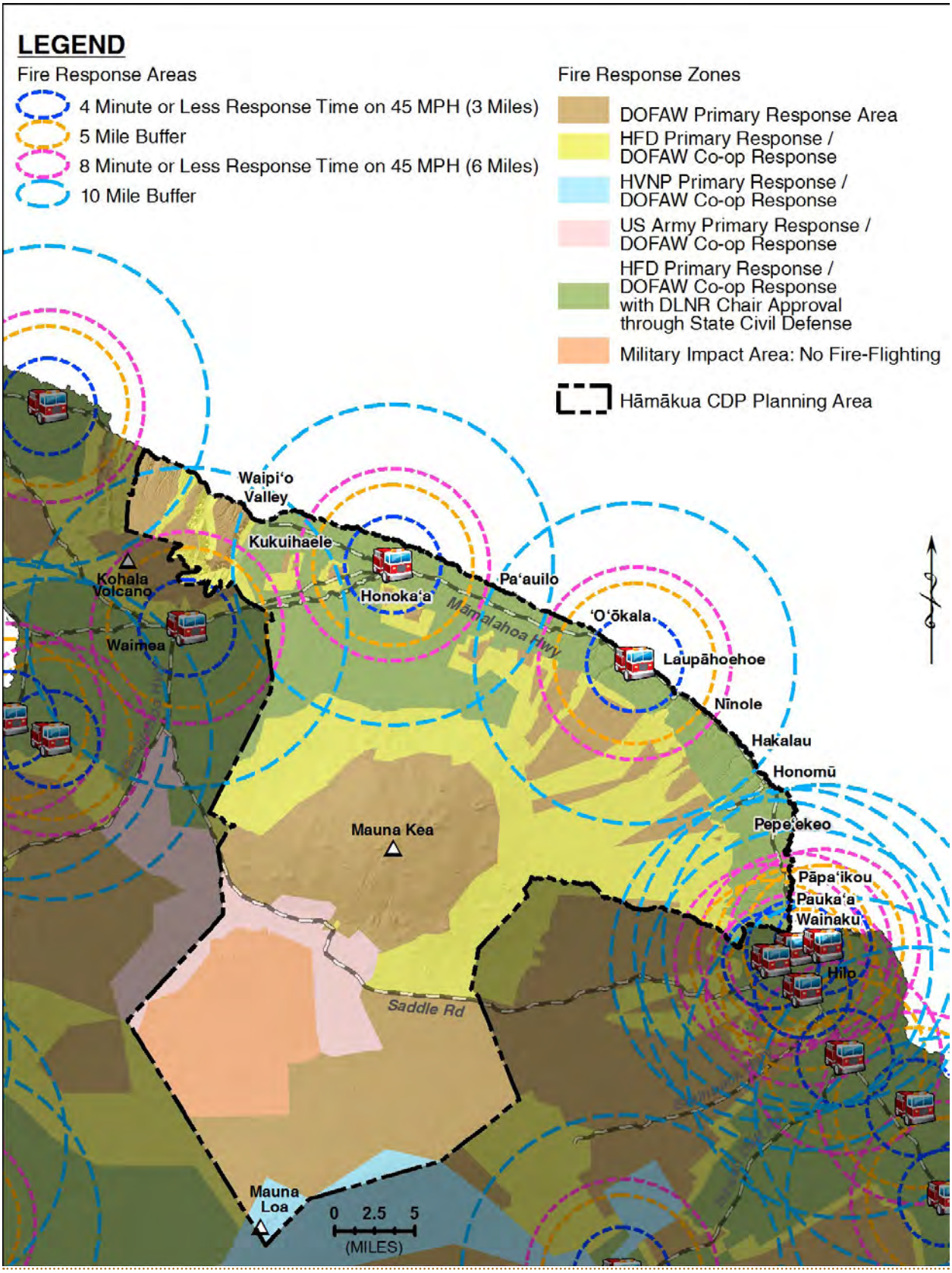
5.9. Police

The Planning Area extends over Hāmākua Patrol District as well as portions of the North and South Hilo Patrol Districts. The Hāmākua patrol District covers 223 square miles and 18 sworn positions are assigned to this area. Several initiatives are underway in this district including Crime Reduction Units, to eliminate offense at parks and community functions. In 2007, two Waipiʻo Rangers were commissioned as information officers at Waipiʻo Lookout. A School Resource Officer is also assigned to Honokaʻa High School.

The North Hilo District encompasses 144 square miles and is assigned 12 sworn positions. The District coordinates with the Hāmākua District to offer drug-free events for the community.

The South Hilo District encompasses 635 square miles and in addition to a portion of the Planning Area, includes the majority of urbanize Hilo. 80 sworn positions are dedicated to this District.

Figure 5-7. Fire Stations



5.10. Medical

Hale Ho'ola Hāmākua (HHH), originally known as Honoka'a Hospital, has served the healthcare needs of the communities of Hāmākua, North Hawaii and South Kohala since 1951. In November 1995, a new 50-bed facility was opened above the old hospital, to provide long-term-care services. The facility was renamed Hale Ho'ola Hāmākua (Haven of Wellness in Hāmākua) in 1997 to reflect its new focus (Hawaii Health Systems Corporation 2006).

HHH employs a staff of 90 of which a significant number are residents of the area who were former employees or related to employees of the now defunct Hāmākua Sugar Co. Situated next to HHH is Hāmākua Health Center, the successor to the plantation-operated Hāmākua Infirmary, which continues to provide outpatient services to the community in a building owned and leased from HHH. HHH was converted as a Critical Access Hospital on December 2005, which resulted in bed configuration changes and the provision of new Emergency Room (ER) and expanded ancillary services (Hawaii Health Systems Corporation 2006).

Services provided by HHH include (Hawaii Health Systems Corporation 2006):

- 4 Acute/Long Term Care Beds
- 46 Skilled Nursing/Intermediate Care Beds
- Emergency Room Services, 24hours/7 days per week, on call within 30 minutes
- Laboratory Services
- Radiology Services
- Dietary /Food Services
- Social Work Services
- Auxiliary and Community Volunteer Services.

Other medical facilities that serve the Planning Area's population include North Hawai'i Community Hospital (Waimea), Waiakea Health Center (Hilo) and Hilo Medical Center.

In 2007 the State of Hawai'i Primary Care Needs Assessment Data Book was prepared by the State of Hawai'i Department of Health. The book compares health statistics across 28 primary care service areas in Hawai'i to assist policymakers and health care providers in understanding the primary care needs of the community. As it relates to the Planning Area, two of the primary care service areas (Hāmākua and Hilo) are within the Hāmākua CDP boundary. In order to illustrate the relative need for health care services, the data book measures the community's health and socio-economic variables as indicators of need for primary services. When both health and socio-economic risk indicators are combined, Hāmākua and Hilo primary care service areas are considered service areas with high combined risk scores. Both service areas are also federally designated "Medically Underserved Areas" (MUA) and "Medically Underserved Population" (MUP).

6 Heritage Resources

The term "heritage" refers to the special natural areas, the cultural legacy from past generations, the features that define the rural character, and the lifestyle valued by the community.

6.1. Planning Area's History

The history is the story of the place.

Early Landscapes

Three gods native to Hawai'i Island are Pele, Poli'ahu and Kamapua'a. Poli'ahu lived on the summit of Mauna Kea, bringing snow to the highest elevations of the Planning Area. Kamapua'a lived in wet, windward Kohala and Pele made her home in the crater of Kīlauea. Pele and Poli'au's battles brought eruptions and earthquakes, giving shape to the terrain in the Planning Area. The saddle between the Mauna Loa and Mauna Kea is said to keep the two goddesses separated (Schweitzer & Hymer).

Early Hawaiian settlements in the Planning Area were small villages associated where wet land taro was grown. The largest communities are known to have been in Waimanu and Waipi'o Valleys. In 1778 Captain James Cook sailed along the Hāmākua coast on his way to Kealakekua Bay (Kona). At that time, the island was divided into six moku (districts) and many ahupua'a. The Planning Area is comprised of the Hāmākua moku in its entirety and a portion of the moku of Hilo. Connecting all moku was a system of ancient trails, or ala loa.

Within the Planning Area, Waipi'o Valley is unique as a highly productive agricultural site as well as a seat of power. Among the strong chiefs who ruled Waipi'o were Līloa and his son 'Umi. Līloa is thought to have ruled the entire island and maintained a time of peace sometime in the late 1500's. 'Umi, born of a commoner, revealed himself to Līloa as a boy and was accepted as a legitimate child. When Līloa died, 'Umi's half-brother Hākau succeeded as ruler. Hākau was known for his cruelty and exiled 'Umi, who resided during exile in Waipunalei or Laupāhoehoe. 'Umi eventually over threw his half brother and ruled the island with strength and fairness. 'Umi's resting place is thought to be in a cave in Waipi'o. Some of the most sacred sites on the Island of Hawai'i were located in Waipi'o, including Paka'alana, a temple and pu'uhonua (place of refuge and asylum).

Other heiau were known to exist within the Planning Area. Waipunalei is home to the heiau of Mamala or Ha'akoa, remnants of which still exist. Other heiau known to be in the vicinity of Laupāhoehoe include Moeapuhi, Kama'o, Lonopuha and Papaukleki'i. T.G. Thrum (1908) notes two heiau in Kukuihaele ahupua'a Kalelemauli and Pukiohuaka. Although in 1919, John F.G. Stokes places Pukiohi'aka heiau in the Kapulena ahupua'a and Kalelemauli heiau in the Ke'ahakea ahupua'a. Thrum notes Kaiponihua heiau, south of Kukuihaele. Two heiau, Paunanamoa and Hauola were known to exist in Waiko'eko'e ahupua'a. Stokes also identifies the heiau know as Hokuwelowelo at Lalakea.

An archaeological study of Waipi'o Valley and Hāmākua conducted in 1977 found that there is a scarcity of visible prehistoric habitation sites along the Hāmākua coast due to agricultural practices, although subsurface deposits may still exist (Tanaka, Inc. and EDAW, Inc. 1977).

The Monarchy

Descended from the family line of 'Umi was the Kona chief Keawe who united east Hilo and west Kona districts. Keawe's grandson Keōuakalani was father to Kamehameha I. Kamehameha was raised in the courts of Alapa'inui and later his uncle Kalani'ōpu'u, chiefs who had regained control of the whole island. After Kalani'ōpu'u's death, Kamehameha and his cousin Kīwala'ō warred over control of the island. During this time Kamehameha I spent time at Laupāhoehoe and declared the law of Mamalahoa whereby all subjects were guaranteed safe and free access to the King's roadways (. After seizing a cannon from an American trading vessel in 1790, Kamehameha overpowered Kīwala'ō's forces. In 1791, Kīlauea erupted and devastated Keōu'a's warriors in Ka'ū prompting a surrender of the entire island to Kamehameha. In 1795, Kamehameha gained control of Maui, Lana'i, Moloka'i and O'ahu. A treaty was struck with the ruler of Kaua'i, Kaumuali'i and the islands were united (Schweitzer & Hymer). Kamehameha I died in the year 1819.

Westernization

After Kamehameha's death, the ancient system of kapu was broken by his heir Liholiho (Kamehameha II) with the encouragement of Kamehameha's wife Ka'ahumanu. This left a spiritual void that was quickly filled by Christian missionaries from the west. The years between 1820 and 1854 saw the royal court move to Honolulu, the rise of disease (including bubonic plague which persisted in the Planning Area until 1949), and strengthening of western religion. The influence of western religion was also felt in the Planning Area, with missionaries establishing churches and schools in the Hawaiian villages. Kamehameha II was succeeded by his brother Keauikeaouli (Kamehameha III). During Kamehameha III's reign, land was divided under the 1848 Mahele. The new system of land tenure was unfamiliar to Hawaiians and most of the kingdom's lands found their way into the hands of settlers from the United States, Europe and Asia.

From the onset of western interest, the natural resources of the Hawaiian Islands were extracted for markets elsewhere. The sandalwood trade flourished on the island of Hawai'i until the 1820's when the sandalwood forests were depleted and ruling chiefs were badly in debt. After 1810, whalers brought cash to spend while wintering in Hilo between years at sea. During this time on Hawai'i Island, a growing population of cattle gave rise to ranching. The cattle provided salted beef for the whalers as well as tallow and hide. The new ranch economy saw an influx of Spanish-Mexican cowboys whose culture evolved to be the Hawaiian cowboy or paniolo. The vast Parker Ranch, located outside the Planning Area, was born and expanded during this time.

A product important to the local diet throughout was poi. The Mock Chew poi factory, headquartered in Waipi'o Valley supplied many Waimea paniolo. Poi was transported to both Waimea and Honoka'a by mule train.

In the Planning Area, dairies were also important. The late 1800's saw the first import of Holstein cattle to

Kūkaʻiau Ranch. Tomich documents the Gonsalves Dairy, Camara Dairy, Nobriga Dairy, Kūkaʻiau Ranch Dairy, Honokaʻa Dairy Farm and Pāʻauhau Dairy as being located within the Planning Area.

There are several "homestead" lots in the Planning Area created and conveyed under the Land Act of 1895. This homesteading program, which is not the same as the lots made available to persons of Hawaiian ancestry under the Hawaiian Homes Commission Act of 1921, converted public land to private use as places to live and provide a livelihood open to any citizen. The homesteads in the Planning Area include: Āhualoa (86 lots), Kaapahu (40), Kaunamano (18), Paʻauilo (30), Kaauhuhu (13), Kainehe (14), Kalōpā, and Pohakea (Tomich 2008).

The Land Act of 1895 dates back to the Republic of Hawaii. The small group of westerners who engineered the overthrow of the Kingdom in January 1893, established the Provisional Government. The Legislature of the Provisional Government passed a law in March 1894 to convene a Constitutional Convention to adopt a Constitution to form the Republic of Hawaii. The Constitution of 1894 was declared to be the law of the land by proclamation, and Sanford B. Dole became the President of this Republic. The Republic functioned for four years until annexation under the administration of U.S. President William McKinley who signed the Joint Resolution of Annexation on July 7, 1898. Under the 1894 Constitution, the Republic took possession of the Crown Lands (which in 1894 consisted of about 971,463 acres), lumped them together with the Government Lands (which were alienable), and authorized the sale of Crown Lands, thereby reversing the Act of January 3, 1865 which had rendered Crown Lands inalienable (Van Dyke 2007).

Sanford B. Dole believed that the best approach for Hawaii would be to promote "the development of a hardy, intelligent, peaceful agricultural population" by "the opening up of public lands to settlers." (Van Dyke 2007, quoting from Sanford B. Dole, "The Political Importance of Small Land Holdings in the Hawaiian Islands" (paper presented to the Honolulu Social Science Association, March 23, 1891). In August 1895, President of the Republic Dole signed the Land Act of 1895 establishing a program to encourage homesteading patterned after American family farming. After annexation, President McKinley appointed Dole as Governor of the Territory of Hawaii (The Organic Act of April 30, 1900 created the Territory of Hawaii), a role he served until 1903.

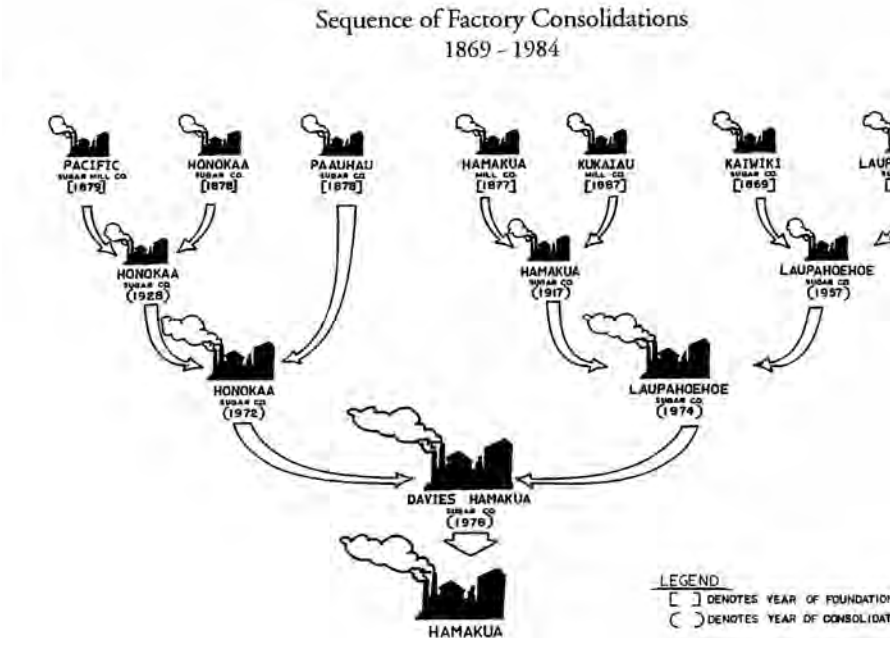
Under the 1895 Act, homesteaders had three options: 999-Year Homestead Lease (rescinded in 1951), Right of Purchase Lease (21-year contract in which the holder had the option of buying at any time after the third year), and Cash Freehold Agreement (four payments of 25% each to acquire the parcel at the end of the third year). As an example of the homesteading experience, Āhualoa was generally an untamed forest in 1895. The new settlers cleared the forest for grazing and cultivation, selling the wood to Honokaʻa Sugar Plantation to fuel the factory boilers. Other homesteaders grew sugar cane as independent farmers under contract to the larger plantations (Tomich 2008).

Rise of Sugar

The most prominent agricultural crop associated with the Planning Area is sugar. Small, start-up plantations took root in the mid-1830's. Isabella Bird's travels in 1872 from Onomea to Waipiʻo document an early sugar cane mill at Kaiwiki and plantation Onomea. But it wasn't until 1876 when Hawaiʻi signed a reciprocity treaty with the United States that tariffs were lifted and the sugar economy began. Hāmākua

had a late start in sugar relative to the other parts of the island due to the challenge of the high cliffs and rough seas to bring in supplies and ship out the sugar and molasses.

In the Rural South Hilo area, five plantations started that eventually merged into Hilo Coast Processing Company: Papa'ikou, Onomea, Pepe'ekeo, Honomu, and Hakalau. In the North Hilo and Hāmākua districts, seven plantations formed that eventually merged into Hamakua Sugar Company: Kaiwiki Sugar Company (1869), Hāmākua Mill Company (established 1877 at Pa'auilo), Honoka'a and Pā'auahu Sugar Companies (1878), Pacific Sugar Mill Company in Kukuihaele (1879), Laupāhoehoe Sugar Company (1880), and Kūka'iau Plantation Company (1887). During this time, land in the Planning Area was acquired and consolidated by the sugar companies; labor was imported from China, Korea, Japan, Portugal, Puerto Rico and the Philippines; and plantation villages to house the growing worker population were established. Plantation villages typically included housing, an infirmary, school and recreational facilities. Commercial enterprises and religious facilities grew in association with the villages including mom and pop stores, theatres, hongwanji missions and churches. The sugar industry also necessitated new infrastructure to transport the raw material from fields to mill and eventually to steam ship. The infrastructure included extensive flume systems, narrow gauge railways, bridge trestles spanning major gulches and landings for ships at the base of sea cliffs. Sugar was the dominant agricultural crop in the Planning Area until global competition overcame the Hawaiian sugar industry and by 1994, the last sugar plantation in Hāmākua closed.



Source: Bouvet 1995

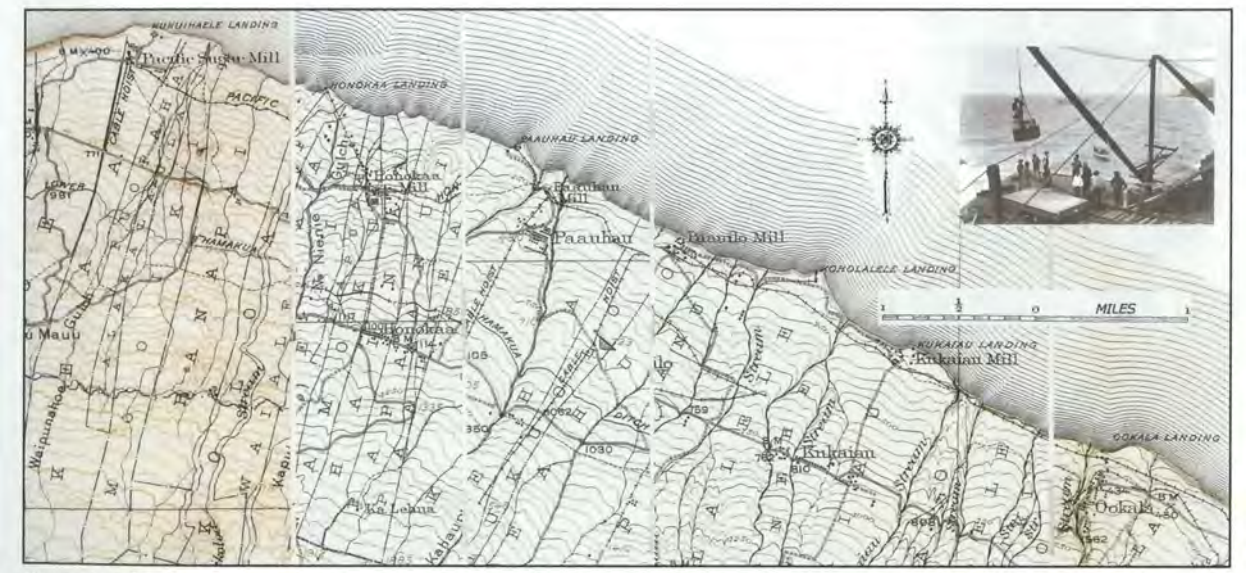


Figure 1. *Selected segments of the Hāmākua District coastline from Kukuihaele to 'Ōōkala, compressing the land into manageable units for review of detail at each of six landing sites. Note also the related stream systems, topography, infrastructure and communities. These five land segments represent about 8.5 miles of the actual 21 miles of seashore. From: USGS topographic maps of the 1911-13 surveys, Waipi'o and Hāmākua Quadrangles. Scale and contour intervals as indicated. Inset photo: Bishop Museum.*

Source: Tomich 2008

Post-Sugar Era

After the close of the sugar plantations, the economy and land use of the Planning Area dramatically changed. Residents lacked work in the area, plantation-owned housing was in jeopardy of being sold off or falling into disrepair and social services such as medical facilities and gyms once subsidized by the plantations were closed.

Several community organizations came together to help stabilize the Planning Area's population and economy.

- Hāmākua Community Development Corporation (HHCDC)
- Hawai'i Island Economic Development Board (HIEDB) – Hilo Hāmākua Economic Development Plan (1994)
- Big Island Resources Conservation and Development Council (RC&D) – Heritage Corridor Planning (1995)
- Hāmākua Housing Corporation (HHC) – conversion of plantation housing to fee simple ownership

However, the downturn in the area's economy has meant that many of the Planning Area's physical and cultural resources have become unmaintained remnants of time gone by.

6.2. Historical and Cultural Resources

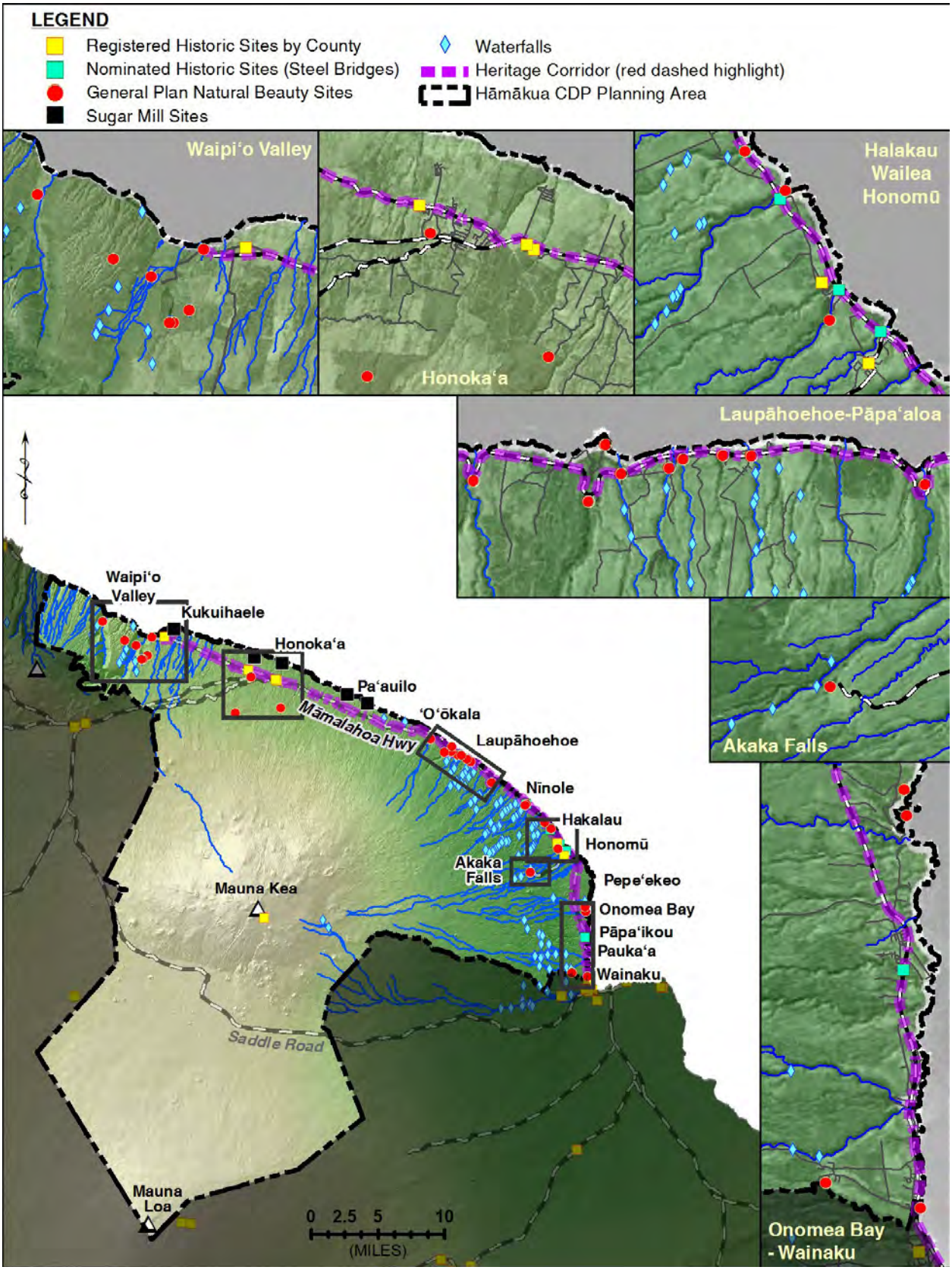
Fortunately, several physical reminders of the Planning Area's history remain (see Figure 6-1). Some of the more significant of these features have been placed on the National and/or State Register of Historic Places (see Table 6-1).

Most of the registered historic sites within the Planning Area relate to the historic era reflecting the area's plantation history. Isabella Bird's travels in 1872 from Onomea to Waipi'o document an early sugar cane mill at Kaiwiki and plantation Onomea. The Hāmākua and Kūkai'au Mill Companies were established in 1877 and 1887 respectively, spurred undoubtedly by the reciprocity treaty between the Kingdom of Hawai'i and the United States that reduced import duties on Hawaiian sugar. The demand for Hawaiian sugar lead to a labor shortage, thus, Japanese, Chinese, Korean, Filipino, Puerto Rican and Portuguese laborers were hired to keep pace. Sugar was the dominant agricultural crop in the Planning Area until global competition overcame the Hawaiian sugar industry and by 1994, the last sugar plantation closed.

Table 6-1. State and National Registered Historic Places

Site Name	TMK	Ahupua'a	Site Number	State Register Date	National Register Date
H. Tanimoto Residence	2-3-28:44	Honomū	10-50-5501	9/28/92	-
Yamamoto Store	2-9-03:18	Wailea	10-16-7518	7/25/98	-
East Hāmākua Protestant Church	4-4-06:1	Keahua/Pā'ahau	10-08-7184	8/15/87	-
Pā'auhau Plantation House	4-4-06:22	Pā'auhau	10-08-7499	11/26/86	-
Mauna Kea Adz Quarry	4-4-15: 1, 9, 10	Ka'ohe	10-23-4136	5/21/81	12/29/62
Chee Ying Society Clubhouse	4-5-09:9	Nienie	10-08-7194 (demolished)	1/19/78	7/20/78
Honoka'a Plantation Manager's Residence	4-8-06:13	Kanahonua	10-08-7514	2/24/96	-

Figure 6-1. Historic, Cultural, and Scenic Resources



6.3. Scenic Resources

The General Plan identifies Natural Beauty Sites (see Table 6-2 and Figure 6-1). The list includes natural park areas, scenic roads, waterfalls, lush gulches, streams, embayments, and vantage points.

Table 6-2. Natural Beauty Sites Listed in the General Plan

Site	Tax Map Key	Ahupua'a or Region
Kalōpā State Park	4-4-14:1	Kalōpā, Hāmākua
Mauna Kea State Park areas	4-4-16:3	Ka'ohe, Hāmākua
Āhualoa Road	4-5-10	Ka'ao-Nienie, Hāmākua
Nienie Native Forest	4-6-12:25	Nienie, Hāmākua
Waipi'o Valley Lookout	4-8-04:17	Lālākea, Hāmākua
Windward Valley System	4-9-01 to 15	Waipi'o, Muliwai-'Āwini, Waimanu, Hāmākua
Hi'ilawe Falls	4-9-09	Waipi'o, Hāmākua
Ka'awali'i Gulch	3-6-05, 3-9-01	Waipunalei-Humu'ula, N. Hilo
Laupāhoehoe Gulch	3-6-4	Laupāhoehoe, N. Hilo
Scenic Lookout – Laupāhoehoe Point	3-6-01:9	Alaea, N. Hilo
Kilau Gulch	3-6-01	Laupāhoehoe, N. Hilo
Kuwaikahi Gulch	3-5-04	Kihalani, N. Hilo
Kihalani Gulch	3-5-04	Kihalani, N. Hilo
Manawaiopae Gulch	3-5-03	Manawaiopae, N. Hilo
Kaiwilahilahi Gulch	3-5-03	Kaiwilahilahi, N. Hilo
Maulua Gulch	3-4-04:9, 11, 12	Maulua Iki, N. Hilo
Honohina Falls	3-2-01:11	Nanue, N. Hilo
Viewpoint of Falls in Umauma Gulch (mauka)	3-1-01:23, 30	Wailua, N. Hilo
Viewpoint of Falls in Umauma Gulch (makai)	3-1-01:24	Wailua, N. Hilo
Hakalau Bay/Gulch	2-9-02, 3-1-01	Hakalaunui-Kamae, S. Hilo
Kolekole Gulch	2-8-15, 2-9-03	Kuhua-Kaiwiki, S. Hilo
Akaka and Kahuna Falls	2-8-10:34	Honomū, S. Hilo
Onomea Arch (fallen)	2-7-10:1	Onomea, S. Hilo
Onomea Bay Area	2-7-09:1,2, 26; 2-7-10:1	Kahali'i-Onomea, S. Hilo
Honoli'i Beach and Stream	2-6-24:1-4	'Alae, S. Hilo

Other scenic resources that may not be included in the General Plan list include the geological features in "Figure 2-2. Geology" the tell the natural history story of the Planning Area, segments of the Old Māmalahoa Highway, and other treasured features identified by the Planning Area communities (see Figure

6-1).

6.4. Exceptional Trees

The County of Hawai'i designates certain trees of outstanding beauty or historic value as "Exceptional" that are protected by ordinance (Hawaii County Code chapter 14, article 10). At the Kalōpā State Recreation Area, a grove of 'ohia Lehua, koa, hame (Antidesma platyphyllum Mann) and kōpiko 'ula (Psychotria Hawaiiensis) are designated as such. A pua kenikeni (Fragraea berteroana/Berteriana) in Laupāhoehoe is also designated as exceptional (see Figure 6-1).

6.5. Heritage Corridor

The Hāmākua Heritage Corridor follows Māmalahoa Highway (State Route 19) from Hilo to the Waipi'o Lookout. Historic and scenic sites along the route include Akaka Falls, Onomea Scenic Drive, Hawai'i Tropical Botanical Garden, Umauma Falls at the World Botanical Gardens, Laupāhoehoe Point, Laupāhoehoe Train Museum and Kalōpā State Park. Although this Heritage Corridor does not presently have a legal status, the County in 2007 adopted a means to designate scenic corridors that also facilitates accessing national and state scenic byways programs (Hawaii County Code §25-6-60 et seq).

The State Department of Business Economic Development and Tourism (DBEDT) provided assistance through the Big Island Resource Conservation District (RC&D) to the region for community-based heritage corridor plans after the demise of the sugar plantations. In 1995, four communities prepared heritage corridor plans. The plans were community driven and involved inventorying places/themes of historic value and cultural significance, selection of a "heritage feature site" and development of a business plan to support the selected site. The four plans are summarized below.

North Hilo. The North Hilo Heritage Corridor Strategic Plan identifies the following places and events as those of historic value and cultural significance:

- 'O'ōkala Mill Museum, Chicken Fights
- Camps
- Trains
- Waterfalls
- Smallest Post Office – Nīnole
- The Point, Landing, Old School, Mill
- Old Road to the Point
- Walking Trail
- John M. Ross School
- Papa'aloa
- Interpretive Signs
- Heiau Waipunalei
- Gulches – Ponds
- Destination Signs
- Trees
- Horse races – Rodeo Arena

- Entertainment area
- Holua races
- Soapbox Races
- Slaughter Houses – Puʻuʻalaea and the Point Parks
- Local Newspaper
- Bike routes
- Enhance plantings around town
- Tidal Wave
- History of Laupāhoehoe Point
- Kapehu and ʻOʻōkala Schools
- Train Station
- Churches
- Grave site Waipunalei
- Flume System – water puka
- Sakada Homesite -- Kīlau

Of these sites and events, the community that participated in the North Hilo Community Heritage Corridor Plan selected the Laupāhoehoe Train dock and keeper's home as the heritage feature site to focus on as a heritage development project. The train station was selected because of the high level of community support, cost, marketability, potential for extending visitor length of stay as well as indirect business potential. The railroad played an important part in the development of Laupāhoehoe and the project's purpose was to reinforce appreciation of the local history while being an attraction to visitors. The museum was opened in 1998 and according to the museum's website (http://www.thetrainmuseum.com/) the museum hosts 5,000 visitors annually. Regionally, the North Hilo Community Heritage Corridor Plan recommended development of an "ecotourism map"; improved signage along the Māmalahoa Highway; and, collective marketing with other heritage areas for island-wide exposure.

Paʻauilo. The Paʻauilo Heritage Corridor Strategic Plan identifies the following places and events as those of historic value and cultural significance:

- Plantation Manager's residence
- Plantation Industrial Relations Building
- Paʻauilo Landing (Koholālele Landing)
- Kūkaʻiau Landing
- Old Hāmākua Mill site
- Water Tunnel
- Field Office Building
- Kim Chee/Bagog factory sites
- Stables
- Train Turn around/old hotel
- Lava Tubes
- Jelly Factory

Of these sites, the community that participated in the Paʻauilo Community Heritage Corridor Plan selected the Plantation Manager's residence and the Plantation Industrial Relations building as the heritage feature sites to focus on as a heritage development project. As with North Hilo, these sites were selected

based on factors such as community support, cost, marketability, potential of extending visitors' stay and potential to generate indirect business. The plantation manager's residence and plantation industrial relations building are highly visible from Māmalahoa Highway and were identified as a complex that could be a center for information about the local area as well as a place for displays and exhibits.

Honokaʻa. The Honokaʻā Community Heritage Corridor Plan included a study bounded by Waipiʻo Valley to the north and Kalōpā State Park to the south. The community involved with the study categorized community resources by those that were in existence and those that needed to be developed. They are as follow:

"Activities/sites already there"

- Biking
- Horseback riding
- Hiking
- Guided Tours (Waipiʻo Valley shuttles)
- Picnic spots
- Fruit stands
- Farmer's Market
- Kamakawiwoʻole Church
- Paʻauhau mauka, plantations manager's house (currently a B&B)
- All churches from Kalōpā to Waipiʻo

"Needs To Be Developed"

- Trail system
- Plantation Landings
- Information Booth
- Restroom Facilities
- Murals for all ethnic groups
- Coordination and expansion of existing festivities with cultural heritage corridor such as Haina Mill, museum and cultural center, papaya factory & poi factory
- Okada Hospital
- Jodo Mission
- History of Rickard and Awong families
- Trail system and coastline road
- Waipiʻo Trail System
- Three landings with trails
- People's Theatre (picture slide shows)
- Downtown Walking Tours
- Pacific Sugar Mill

Using the criteria of level of community support, cost, marketability, potential for extending visitors' length of stay as well as indirect business potential, the community involved with the project decided to focus on the entirety of Honokaʻa town as the area's heritage feature. The consensus philosophy was that if Honokaʻa town were revitalized, it would have positive benefits to visitor related businesses in the surrounding area. The concept plan included taking advantage of the town's remaining historic architecture,

facilitating a mural project that was under way and looking toward development of a historical museum and heritage information center.

6.6. Public Access

In the "Talk Story" sessions meant to identify what residents value about their community and districts, many participants identified access into the mountains and ocean as a treasured characteristic of the rural lifestyle and important to their quality of life. Residents mentioned that they hunt, fish, dive, or gather (e.g., *`opihi*, lei-making materials) but have concerns over the loss of accessible areas, notably with the close of sugar plantations. To better understand the changes that have been occurring in public access it helps to look at the area's history.

History of Public Access in the Planning Area

In Early Hawai`i

"Hāmākua i ke ala 'ūlili." (Hāmākua of the steep trails.)

A land of precipices and gulches where the old trails were often steep and difficult to travel on. [1]

The ancient Hawaiians characterized and praised Hāmākua as a land of cliffs, gulches and valleys. Waipi`o Valley, abundant in natural resources and accessible by sea, was a favored residence of the highest chiefs and a major population center.

The original inhabitants of the Planning Area, the ancient Hawaiians, depended on an extensive network of trails as their only means of overland transportation. While the canoe was a principal means of travel, human survival depended on trails for gathering of food and water, and harvesting of materials used for shelter, clothing, medical care, tools, canoe building, religious observances and much more.

Little has been written by early Hawaiian historians and scholars about the rules and regulations that specifically governed the use of trails in ancient Hawai`i, but we know that Hawaiians were subject to strictly observed cultural rules. Because natural resources were so precious to survival, it was essential to manage the resources in each ahupua`a[2] carefully. Land was managed by resident chiefs, and a kapu system helped to protect and conserve resources. It is reasonable to assume that restrictions on the use of

1 Ōlelo No`eau: Hawaiian Proverbs & Poetical Sayings by Mary Kawena Pukui

2 Traditional land divisions containing natural resources needed to sustain life.

trails were related to general cultural restrictions that were in effect at the time. Extensive trails that were built to facilitate travel across the island, across ahupua`a boundaries, and along the coast were open to all people. Historic accounts describe most ahupua`a residents prior to the 1800s as seldom traveling far from home and frequenting trails to visit neighboring villages and to fish, farm and gather within nearby lands. Canoes and long-distance trails enabled rulers and chiefs to send messages, gather taxes and communicate in times of war.

Kanawai Māmala-hoe ("Law of the Splintered Paddle"). The Law of the Splintered Paddle is often mentioned when speaking of Hawaiian trail traditions. In 1792 Kamehameha the First declared the *kanawai Māmala-hoe*, "the great life-saving law," which not only guaranteed the safety of travelers on Hawai`i's trails and highways, but also stopped the slaughter of men, women and children who were defeated in battle. This law demonstrated Kamehameha's unlimited power at a time when many battles were being fought and granted mercy to the vanquished by enabling them to return home safely rather than being killed or taken as slaves.[3] The Law of the Splintered Paddle is remembered and memorialized today in Hawai`i's State Constitution (Article IX Section10) as a symbol of the State's concern for public safety.

From Monarchy to Statehood

Dramatic cultural, social and economic changes occurred in Hawai`i in the 111 years from the *Great Mahele* (Great Division) of 1848,[4] which established private landownership for the first time in Hawai`i, to statehood in 1959. Native Hawaiians[5] in particular have had to make major cultural adjustments. In terms of public access and modes of transportation, Hawai`i transitioned from foot travel to horseback and from animal-drawn carts to horseless carriages, cars and trucks. Today there are physical remnants of all of these pathways and old roads that help to tell the story of changing modes of transportation as Hawai`i modernized.

In the Planning Area, sugar plantations began in the 1860s – 1880s in Kaiwiki/O`ōkala, Pepe`ekeo, Honomū, Wainaku, Hakalau, Pāpa`ikou, Pa`auilo, Honoka`a, Pā`auhau, Kukuihaele, Laupāhoehoe, and Kūka`iau, Sugar cultivation transformed the landscape as the remains of Hawaiian settlements, religious shrines and historic trails were destroyed or plowed under in the fields. Historic sites from the early years of sugar, such as old sugar landings, ditch systems, mills, bridges, irrigation pumps, etc. lie in silent testimony to the enduring engineering, courage and hard labor of the ancestors of people who still reside in the Planning Area. Laborers were imported from many foreign countries, resulting in the rich cultural heritage and ethnic diversity that make up Hawai`i's unique society. Over time, these laborers and their descendants developed family traditions of using trails and roads to fish, hunt and gather wild fruits and vegetables. This was not simply recreational activity. It helped to supplement the family food budget.

Not all of the trails and roads used in this manner were public rights-of-way. Many were privately owned but not closed to the public. Sugar companies made sure to formally close cane haul roads for one day

3 *The People of Old* by Samuel M. Kamakau

4 Decreed by King Kamehameha III, this law resulted in dividing Hawai`i's lands between the chiefs, king, Hawaiian government, foreigners and the native tenants.

5 Native Hawaiians are defined as descendants of Native Hawaiians who inhabited the Hawaiian Islands prior to 1778.

every four years to prevent implied dedication[6] (surrender) of the roads to the public. In these early years landowners of large tracts of land tended to tolerate trespassing, because the numbers of people involved were few; liability lawsuits were infrequent or non-existent; and in many cases, the landowners knew the people involved and could identify offenders. Of course entering private land without first asking permission was not okay then, just as it is not okay now. People using the gulches (publicly and privately owned) to discard large amounts of trash is a problem that has persisted for decades.

Sugar's Demise to Present Day

A year after statehood Hawai`i County's resident population stood at 61,332. Since then it has nearly tripled to an estimated 177,835 in 2009. This population increase is bound to be reflected in the numbers of people seeking outdoor experiences.

Public access options appear to be decreasing because:

- Most cane field roads that were informally open and afforded motorized access to the ocean and the mountains have been closed after the closing of the sugar plantations. Hilo Coast Processing Company and Hamakua Sugar Company closed in 1994. It took a few years, but as former cane lands have been sold and/or leased for different purposes, new owners and land managers have chosen to close the former cane haul roads to the public.

- As in the case of former sugar plantation lands, other privately owned pathways and roads used informally by the public in the past have increasingly been closed due to growing impacts from greater numbers of users, change of landowners, and fear of liability.

- Guide books encourage people to find Hawai`i's "hidden and secret" places, without regard to whether these places are safe, managed for public use, or closed to public use. This has resulted in greater numbers of people finding their way to areas that are not legally open to the public, leading to reactions of closing off areas completely.

- Though the State of Hawai`i is the largest single landowner on this island (approximately 41% of the island's area), access to state-owned lands can be restricted by surrounding private landowners, and state lands can be leased to private interests without provisions for public access. Severe cutbacks in funding for public parks and trails limit the ability of both state and county agencies to manage and maintain areas presently open to public use. Under such fiscal circumstances it has become more difficult to acquire and open new parks and trails to meet the expanding needs and desires of residents and visitors for outdoor activities.

The above trends are in effect throughout the island and statewide, leading many to believe that public accesses are being "lost." Long-time residents have enjoyed access to areas and resources that were not technically open to the public. Closures of these informally used, often unmanaged accesses may be offset by (1) identifying accesses over which the public does have the right to travel; (2) working to keep them open and adequately managed; and (3) creating new public accesses with the help of laws that

6 Hawai`i Revised Statutes (HRS) §264-1(c)(2)

support public access provision.

Key Legal Principles Related to Public Access

While informally open accesses on both private and public lands can be legally closed to the public, there are a few laws that identify and protect public access rights and provide for creation of new public accesses. The following summary highlights laws that are especially relevant. It is not intended to be a complete list or comprehensive review of the laws. A word of caution: all laws cited in this section are more complex than the brief summaries provided and are subject to interpretation by the courts. Readers are encouraged to look up the actual laws cited to verify and obtain more information.

Laws in Support of Public Access Over and Across Private Lands

Public Access Requirements of Subdivisions (Ocean and Mountain Access). Creation of new public accesses can occur through the subdivision application process. In 1973 the State directed the counties to adopt ordinances that would require subdividers of six or more lots to dedicate land for public access for pedestrian travel from a public highway to "the land below the high-water mark on any coastal shoreline" or to "areas in the mountains where there are existing facilities for hiking, hunting, fruit-picking, ti-leaf sliding, and other recreational purposes, and where there are existing mountain trails." It is important to note the law's reference to "existing" facilities and trails, when it pertains to mountain public access.[7]

To comply with the State's directive, Hawai`i County adopted a Public Access Ordinance in 1996[8], and in 2005 approved Planning Department Rule 21, which regulates the use and management of the public accesses that are created under HCC Chapter 34. Like the State law, HCC Chapter 34 is silent about lateral shoreline public access but details standards for spacing between *mauka-makai* shoreline public accesses. Flexibility in the standards is allowed when "extremely hazardous or impassable conditions, such as steep cliffs" exist, and the Planning Director is given some discretion in determining the frequency and locations of public access requirements to the mountains and the shoreline in subdivision applications that trigger HCC Chapter 34. Like the State law, HCC Chapter 34 specifies that mountain access is to be from a public highway or public street to public mountain areas where there are existing facilities and existing public mountain trails. The requirements of Chapter 34 are too numerous to detail, and only a few highlights are being mentioned here.

Laws in Support of Shoreline Public Access

Public Access To and Along Shorelines. The Federal Coastal Zone Management Act of 1972 encouraged the states to enact laws that would better protect and manage coastal natural resources. This resulted in HRS §205A, Hawai`i's coastal zone management law, which established the Special Management Area (SMA).[9] Hawai`i's coastal zone management law has enabled the state and county to enact laws, rules and regulations that support the public's ability to (1) travel along the shoreline (lateral access) and (2) to the shoreline from the nearest public road (*mauka to makai* access). SMA permits for oceanfront properties frequently require the applicants to allow some form of shoreline public access as

7 Hawai`i Revised Statutes (HRS) §46-6.5

8 Hawai`i County Code (HCC) Chapter 34

9 HRS §205A – Part II

a condition of receiving approvals.

Rights of the public to laterally traverse the shoreline and seaward (*makai*) of the shoreline are clearly supported in state and county laws. To understand what this means, one must understand where the "shoreline" is. The shoreline is the dividing line *makai* of which the public has the right to traverse. That line is at the "...upper reaches of the wash of the waves, other than storm and seismic waves, at high tide during the season of the year in which the highest wash of the waves occurs, usually evidenced by the edge of vegetation growth, or the upper limit of debris left by the wash of the waves."[10] When shorelines are "certified," the public is given the opportunity to review and comment on where the shoreline will be determined. Once a shoreline certification is approved by the State Land Surveyor, the location of structures, landscaping, swimming pools and other land development decisions are decided in relation to that shoreline.

In cliff situations the shoreline is close to the base of cliff. This means that much of the Planning Area's shoreline is accessible to the public only by boat. There are extremely few areas where there are breaks in the cliffs allowing for entry into the ocean. Cliffs present major safety (and liability) concerns when seeking *mauka to makai* and lateral shoreline public access.

HRS §115-5 acknowledges that cliffs and other topographic features can leave the public with "no reasonably safe transit" along the shoreline below the private property lines. This law authorizes the counties to establish (through condemnation of private property) "public transit corridors which shall be not less than six feet wide."

Laws in Support of Public Access Over and Across Public Lands

"Highways Act of 1892". Enacted in 1892 by Queen Lili`uokalani and the Legislature of the Hawaiian Kingdom, this act is still in effect today in HRS §264-1 and §264-2. It gives fee-simple ownership to government over roads, alleys, streets, ways, lanes, trails, bikeways and bridges that were opened, laid out, or built by government or otherwise surrendered to public use in 1892 or prior. If the State of Hawai`i declares a trail or other non-vehicular pathway to be a public right-of-way by virtue of the Highways Act of 1892, that trail is determined to be a public trail and under the jurisdiction of the State Board of Land and Natural Resources. More government resources and protection are available for those ancient and historic trails that are declared owned in fee by the state. It is important to note that a government claim of ownership does not automatically mean that the state is prepared to open the trail or road to public use.

Old Government Roads and Trails. Certain old government roads and trails lead to coastal or mountain areas of importance to the public. Others are within neighborhoods and have value as walking or bicycling paths separated from busy highways. Even though an old government road or trail has been unused by the public for many years and has physically deteriorated, it continues to be owned by government until public ownership by the state or county is formally relinquished, as required in HRS §264-1(d). Some old government roads exist only on maps (referred to as "paper roads"), because they were never actually built. Although never built, the alignment is still government-owned. It is not unusual for the physical location of a well-used old government road to differ from its alignment on a map. This

10 HRS §205A-1

can complicate efforts to keep such a road open to the public. Not all old government roads are suitable for vehicular access. A few old government roads are actually narrow cart paths that probably should be protected as historic sites and not converted to motorized use. The state and county have a long history of debating who should bear the responsibility for maintaining and repairing old government roads that can be substandard, hazardous and vulnerable to erosion. Such roads have been referred to as "Roads in Limbo." Even though a government road may be "in limbo," it is against the law (and subject to prosecution) to obstruct any state or county street, road or path.[11]

When Public Lands Are Leased. Most publicly owned lands are part of the "Public Land Trust" to be held in trust for Native Hawaiians and the general public.[12] As mentioned earlier the State of Hawai`i is the largest single landowner on this island but it is not correct to assume that the public has the right of access on all state-owned lands. Some state-owned lands are surrounded by privately owned properties, thereby limiting access to them. When state-owned lands are leased to private interests, those lands are governed by the lease agreement which may or may not contain public access provisions.

There are laws intended to support public access over and across publicly owned lands to areas of public value. HRS §171-26 requires the State Board of Land and Natural Resources (BLNR): "Prior to the disposition of any public lands,….. shall lay out and establish over and across such lands a reasonable number of rights-of-way… in order that the right of the people to utilize the public beaches, game management areas, public hunting areas, and public forests and forest reserves shall be protected." HRS §171-37 allows the BLNR to withdraw lands from existing leases for public uses or purposes, including "rights-of-way and easements of all kinds," under certain conditions. The counties also have a responsibility to manage real and personal property in the public interest.[13]

Liability Protections

Fear of liability overshadows every attempt to create new public accesses. The fear is compounded when there are any natural conditions or human activities involved that are considered potentially hazardous. There are laws that protect and reduce liability exposure of public and private landowners and land managers, but the existing protections are apparently not sufficient to address the fears and concerns.

Laws in Support of Liability Protection of Private Landowners

Hawai`i's Recreational Use Statute, HRS Chapter 520. All states have Recreational Use Statutes (RUS) that are intended to encourage private landowners (including farmers and ranchers) to make land and water areas available to the public by limiting their liability toward those who would access their lands for recreational purposes. Hawai`i's RUS was first adopted in 1969 and contains many of the same provisions of the RUS's of other states. A few highlights of this law:

1. "Recreational purposes" covered under this law are very broad and include but are not limited to "hunting, fishing, swimming, boating, camping, picnicking, hiking, pleasure driving, nature study , water skiing, winter sports, and viewing or enjoying historical, archaeological, scenic, or scientific sites."

11 HRS §28-2 and HCC §22-2.4 and §22-8

12 HRS §171-18

13 HRS §46-1.5

2. The owner who permits public recreational access "owes no duty of care to keep the premises safe," or "to give any warning of a dangerous condition, use, structure, or activity" on the premises to recreational users or to those who enter to provide rescue, medical care, or other form of assistance to the recreational user. Nor does the landowner assume any responsibility for any injury to the recreational user or the user's property while entering his property for recreational purposes.

3. The law's protection extends to landowners who are required to provide access or parking for public access because of "state or county land use, zoning, or planning law, ordinance, rule, ruling, or order, etc."

4. The law does not require the landowner to open his/her property to every member of the public in order to receive protection of the statute.

5. No prescriptive rights can result from use of the land under this statute.[14]

6. Protection under this law does not extend to the landowner's house guests, or if any admission price or fee has been asked in return for invitation or permission to enter the land. Also there is no protection under this statute for "willful or malicious failure to guard or warn against a dangerous condition… which the landowner knowingly creates or perpetuates."

7. If the landowner receives compensation from leasing the land to the State or other government entity, that will not be considered a "charge" for use of the land and protection under this law will still be given.[15]

The RUS's of other states may contain provisions worth considering as amendments to Hawai`i's RUS, such as Colorado's, which states, "The prevailing party in any civil action by a recreational user for damages against a landowner who allows the use of the landowner's property for public recreational purposes shall recover the costs of the action together with reasonable attorney fees as determined by the court." This protects the landowner from frivolous lawsuits. RUS's do not prevent landowners from being sued, but they make it difficult for the injured recreational user to win a lawsuit.

"Agreements to Defend and Indemnify," HRS §198D-7.5. In 1988 the Hawai`i Statewide Trail and Access System, known as Nā Ala Hele was first established and HRS §198D details its purposes and mandates. The System is administered by the State Department of Land & Natural Resources' (DLNR) Division of Forestry and Wildlife. HRS §198D-7.5 allows the DLNR to enter into agreements with owners of public or private land who open their lands to public access. These agreements "may provide that the

14 Prescriptive easements can be created where open and continuous public passage over private land can be proven to have occurred over a period of at least 20 years. Prescriptive easements are difficult to successfully claim.

15 This provision has been used extensively in the North Maine Woods – Multiple Ownership – Multiple Use Management Area where over 2 million acres of privately owned forested lands are jointly managed by private landowners and state governmental agencies for forest resource management and public recreational day use, hunting and camping.

State will defend the owner, its affiliates, and their respective heirs, executors, (etc.)….. from claims made by public users of the owner's land." These agreements may also "provide that the State will indemnify the owner, its affiliates, (etc.)……for property losses incurred due to public use." These agreements contain conditions that are negotiated between the state and the owner. Owners' claims for compensation under such agreements are subject to review by the attorney general, and claims for property loss greater than $10,000 per fiscal year require legislative appropriation.

Special Liability Protections for Commercial Recreational and Equine Activities. Owners and operators of businesses providing recreational activities that are inherently risky, such as scuba or skin diving, bicycle tours, mountain climbing, etc. are liable for injuries to patrons and expected to take reasonable steps to ensure their patrons' safety. They are also given some protection under the law (HRS §663-1.54) when the patron "voluntarily signs a written release waiving the owner or operator's liability for damages for injuries resulting from the inherent risks."

HRS §663B-2 deals with equine activities and states that "in any civil action for injury, loss, damage, or death of a participant, there shall be a presumption that the injury, loss, damage, or death was not caused by the negligence of an equine activity sponsor, equine professional, or their employees or agents, if the injury, loss, damage, or death was caused solely by the inherent risk and unpredictable nature of the equine." The law goes on to describe conditions under which the activity sponsor etc. can be found liable.

Recreational and commercial bicycle activities have raised serious safety and liability concerns on public highways for both bicyclists and motorists. A law passed in 2007 enables the counties to adopt laws to regulate commercial guided bicycle tours and unguided bicycle rental operations (HRS §46-16.3).

Acts and Laws in Support of Liability Protection of Public Landowners

Acts Have Expiration Dates. Hawai`i's Recreational Use Statute does not protect state or county landowners from liability towards public recreational users. Efforts by the State Legislature are ongoing to improve the liability protection of public landowners ever since eight people were killed in Sacred Falls State Park on Mother's Day in 1999 and the State had to pay millions in damages. The Sacred Falls tragedy was a wake-up call for state and county governments and the taxpayers who pay for such settlements. Since then a number of Acts[16] have been passed by the legislature that seek to limit state and county liability while allowing recreational areas and public beach parks with potentially dangerous natural conditions to remain open to the public. It is considered to be in the public's interests to keep such outdoor recreation areas open despite the risks from acts of nature. However, few of the liability protections for the state and county have been made permanent and continue in the form of Acts that have sunset (expiration) dates.

These Acts seek to improve public safety in public parks and recreation areas by (1) ensuring adequate and maintained warning signage and systems; (2) providing adequate county lifeguard services to save lives while protecting county lifeguard services from liability, "except for gross negligence or wanton acts or omissions;" and (3) reducing state and county liability over "unimproved public lands."

16 Act 170 (2002); Act 82 (2003); Act 152 (2007); Act 144 (2008); and Act 81 (2009)

Regarding Unimproved Public Lands. The State owns over a million acres on the Island of Hawai`i, including extremely remote and rugged lands with natural features that can be very hazardous but attractive, such as waterfalls, thick native forests, and volcanic activity. While there is clearly an obligation to monitor and manage lands where public visitation is encouraged, Act 82 (2003) recognizes that the same standards for warning people of dangerous natural conditions should not apply to unimproved public lands as apply to improved public lands. Act 82 is set to expire in 2014 (per Act 81 of 2009). It requires the state and county to plan, implement and maintain a comprehensive system of adequately designed hazard warning signs, devices and systems on improved public lands. It also contains the provision that "The State or a county shall have no duty to warn of dangerous natural conditions on unimproved public lands."

Act 82 does not define "unimproved public lands," but Act 144 (2008), which extends the sunset date for Act 82, defines "improved public lands" as "lands designated as part of the state park system, parks and parkways under chapter 184[17], or as part of a county's park system, and lands which are part of the Hawaii statewide trail and access system under chapter 198D, excluding buildings and structures constructed upon such lands. For purposes of this part, 'improved public lands' excludes ocean and submerged lands."

In 2009 a special task force formed by the legislature to examine the effectiveness of the liability protections called for in Acts 170 (2002) and 82 submitted a report to the legislature concluding that the protections are working. The potential result of allowing these Acts to sunset is the state and the counties may have little choice but to close more public parks and unimproved public lands or risk costly lawsuits.

Laws Limiting Liability Over Unimproved Public Lands. There are a few liability protections that have been made permanent in recent years that help to keep certain unimproved public accesses open even though there are potentially dangerous natural conditions acknowledged to be present:

HRS §198D-7.6 limits the State's liability for any injury to any person using unimproved lands owned or controlled by the State and regulated by the State's Nā Ala Hele program, unless the injury results from gross negligence by the State.

HRS §663-1.56 deals primarily with duties to warn of dangers in public beach parks and §663-1.56(e) states: "Neither the State nor a county shall have a duty to warn on beach accesses, coastal accesses, or in areas that are not public beach parks of dangerous natural conditions in the ocean."

Native Hawaiian Traditional and Customary Access Rights Are Not Public Access Rights

Native Hawaiian traditional and customary rights are possessed by those who are descendants of Native Hawaiians who inhabited the Hawaiian Islands prior to 1778. These rights are uniquely held by this group of people and not shared by the general public. What those rights are and how they are exercised is determined on a case-by-case basis, as there are no definitions that apply across all situations or in all places. Customary practices can also change over time. The term "PASH Rights" refers to the case, *Public Access Shoreline Hawaii (PASH) vs. County of Hawaii Planning Commission.* It is one of several lawsuits that have reaffirmed that Native Hawaiian Rights lawfully exist and must be protected.

17 HRS Chapter 184 deals with State Parks and Recreation Areas.

Shoreline and Mountain Public Access Inventory

Two government agencies have ongoing public access inventory projects:

Nā Ala Hele: The Statewide Trail and Access System

This is the only government agency in Hawai`i exclusively dedicated to the planning, development, acquisition, management and maintenance of trails and trail accesses. It is part of the Department of Land and Natural Resources' Division of Forestry and Wildlife. It is a small but important program with a shrinking budget. Its purposes and assignments are detailed in HRS §198D, and it is required to inventory "all trails and accesses in the State." This is a major undertaking that will probably take many years to complete.

County Planning Department's Public Access Inventory

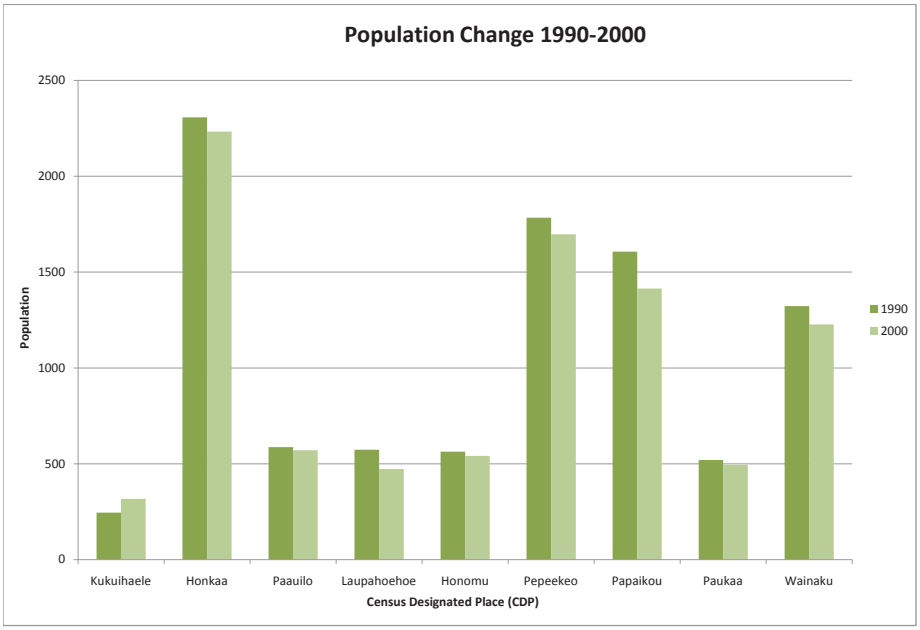
HCC §34-4(b) requires the County Planning Department to work with the State DLNR and County Department of Parks and Recreation to compile an inventory (including maps) of "public-owned areas and the approximate location of the existing public trails." The inventory currently consists of just shoreline public accesses. An inventory of mountain public accesses is yet to be undertaken. The Hāmākua CDP will be helpful in the County's effort to include mountain accesses in the inventory for the Planning Area.

7 Socio-Economic Characteristics

The decennial census is the primary source of demographic and socio-economic data. The census analyzes the data in geographical districts ranging from districts to census tracts to census blocks, and census designated places. The Planning area encompasses portions of five census tracts. Within those tracts there are nine Census Designated Places (from north to south): Kukuihaele, Honokaʻa, Paʻauilo, Laupāhoehoe, Honomū, Pepeʻekeo, Pāpaʻikou, Paukaʻa and Wainaku.

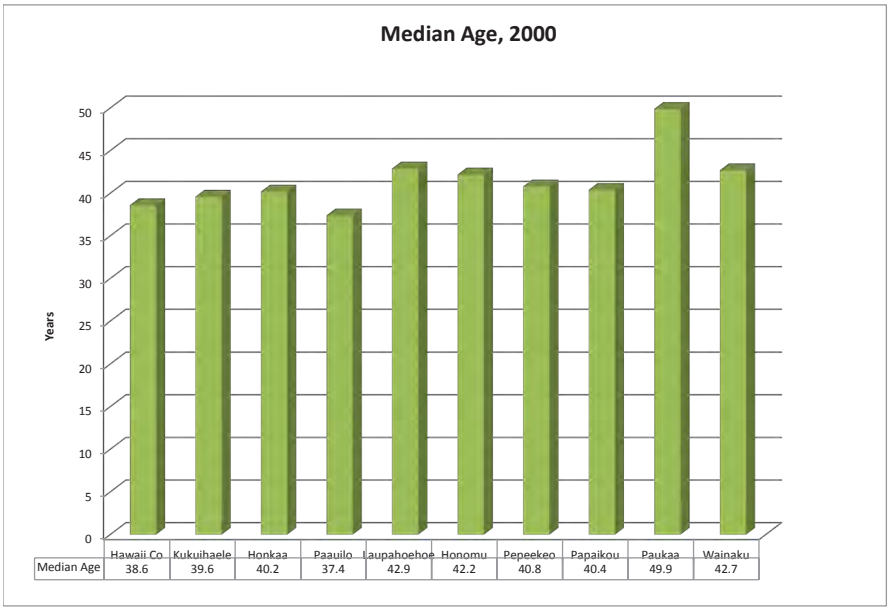
7.1. Population Change

Hawaiʻi Island has seen a steady population growth since the late 1800's. Census data from the turn of the century (1900) show a county-wide population of 46,843 persons. By the year 1990 the county population had nearly tripled to 120,317. And by the 2000 census, Hawaiʻi County's population had reached 148,677 persons. Looking ahead, The State Department of Business Economic Development and Tourism (DBEDT) expects the County's population to increase at an average annual growth rate of 1.3 percent to 279,700 persons in 2035 (DBEDT, 2009). However, for the communities within the Planning Area, resident population has generally declined in the last 20 years. The loss in population in the Planning Area is likely attributable to the decline in the sugar industry, closure of sugar mills and resulting loss in employment opportunities. The population decline illustrates Hawaiʻi County's transition from an economy centered on agriculture to one oriented towards tourism. Communities within Hawaiʻi County that have seen marked population growth are those in close proximity to growing resort areas, such as Waikoloa Village (South Kohala) which has doubled its population from 2,237 persons in 1990 to 4,806 persons in 2000 and Holualoa (Kona) which has grown from 3,736 persons in 1990 to over 6,100 persons in 2000.



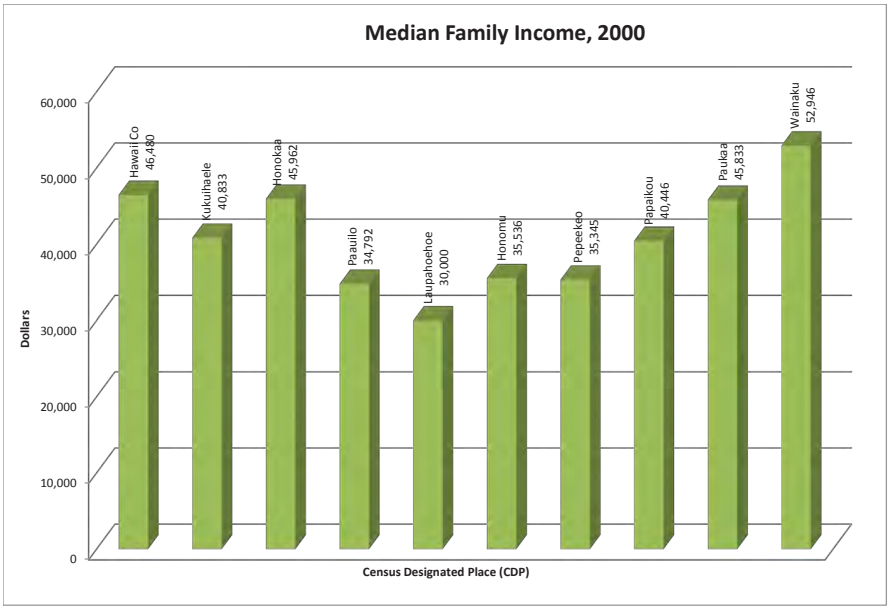
7.2. Population demographics

Age. Compared to the median age of County residents, the communities within the Planning Area are generally older, with exception of Pa'auilo. The Hawai'i County median age is 38.6, while the median age for most communities in the Planning Area is over 40. Pauka'a is notable in that its median age is 49.9 years of age.

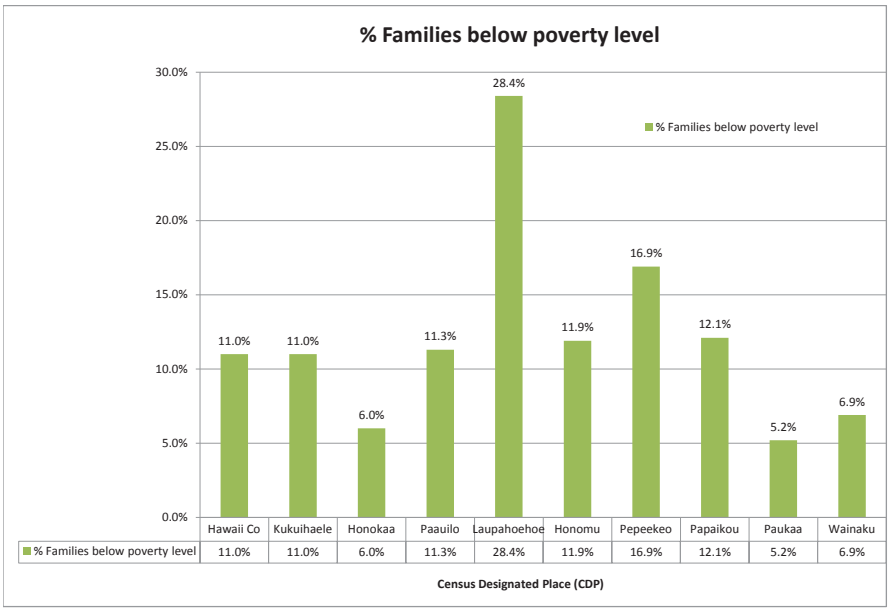


	Hawaii Co	Kukuihaele	Honkaa	Paauilo	Laupahoehoe	Honomu	Pepeekeo	Papaikou	Paukaa	Wainaku
Median Age	38.6	39.6	40.2	37.4	42.9	42.2	40.8	40.4	49.9	42.7

Income. In 2000, the median family income for the communities in the Planning Area ranged from $30,000 in Laupāhoehoe to $52,946 in Wainaku. The median family income for the County of Hawai'i for the same year was $46,480. Thus, with the exception of Wainaku, the median family income for the communities within the Planning Area were below the County median.



Poverty Level. Based on US poverty thresholds established in 1999, the 2000 census found that 11% of the families in Hawai'i County were below the poverty level. For the communities within the Planning Area, Laupāhoehoe had 28.4% of families below poverty level, Pepe'eko 16%, Pāpa'ikou 12.1%, Honomū 11.9%, Pa'auilo 11.3%, Kukuihaele 11%, Wainaku 6.9%, Honoka'a 6% and Pauka'a had 5.2% families below poverty level.



	Hawaii Co	Kukuihaele	Honokaa	Paauilo	Laupahoehoe	Honomu	Pepeekeo	Papaikou	Paukaa	Wainaku
% Families below poverty level	11.0%	11.0%	6.0%	11.3%	28.4%	11.9%	16.9%	12.1%	5.2%	6.9%

Educational Attainment. Pauka'a and Kukuihaele had the highest rates of persons with a high school diploma. Pauka'a also had the highest rate of persons with a bachelor's degree or higher educational attainment. A comparison of educational attainment for Hawai'i County and the communities of the Planning Area follows.

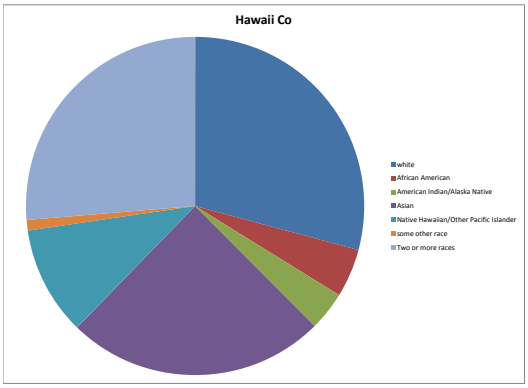
	% High School Degree or Higher	% Bachelor's, Degree or Higher
Hawai'i County	84.6%	22.1%
Kukuihaele	80.1%	16.3%
Honoka'a	73.1%	11.6%
Pa'auilo	70.5%	6.5%
Laupāhoehoe	76.9%	9.1%
Honomū	72.5%	12.1%
Pepe'ekeo	67.5%	9.6%
Pāpa'ikou	72.3%	10.6%
Pauka'a	81.6%	24.3%
Wainaku	74.5%	18.6%

Projected Age and Income Growth by Household. According to the State Department of Business Economic Development and Tourism (DBEDT), the State of Hawai'i will grow in population from

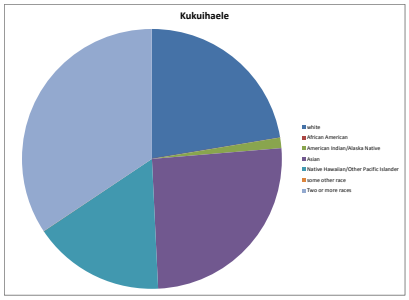
1,277,356 people in 2007 to 1,598,700 people in the year 2035. The population of Hawai'i County is projected to grow from 172,547 persons in the year 2007 to 279,700 people in the year 2035. DBEDT bases their projection on three variables, birth, death and net migration.

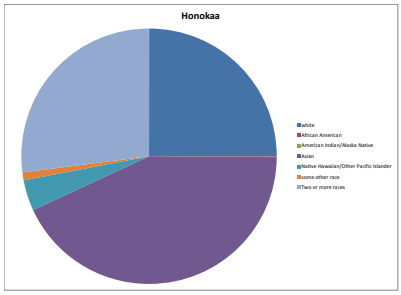
Table XX showed that communities in the Planning Area lost population between the years 1990 and 2000 as compared to Hawai'i County as a whole, which grew in population. A conclusion was drawn that the population loss may be attributable to the loss of employment opportunities in the Planning Area, causing an out-migration of population. Table XX also showed that the communities within the Planning Area are also more advanced in age as compared to the County as a whole. Thus, a conclusion may also be drawn that more persons in the Planning Area are advanced beyond child-bearing years as compared to the rest of the County.

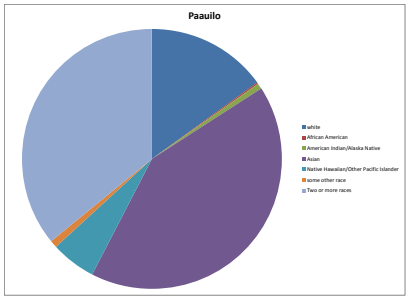
Ethnicity. The year 2000 Census found that Hawai'i County was comprised by three dominant ethnic



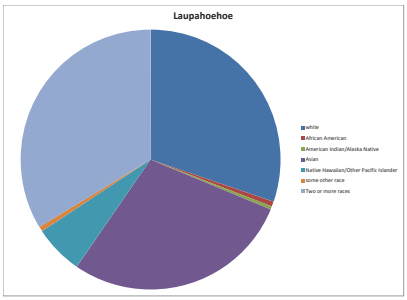
categories: white (31.5%), Asian (26.7%), and individuals of two or more races (28.4%). The County is comprised to a lesser extent by other Pacific Islander ethnicities (11.2%), African Americans (5%), Native Americans/Alaskans (4%) and those of other races (1.1%). This dominance of three ethnic groups is similar in the Kukuihaele community, differing in a greater population of Pacific Islanders and no African Americans. However, the remainder of the Planning Area communities have a larger percentage of indi-

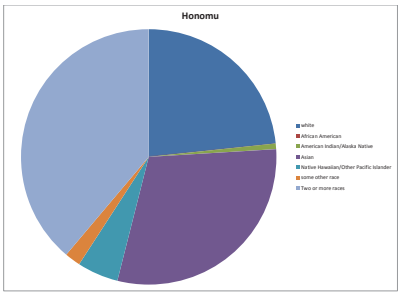


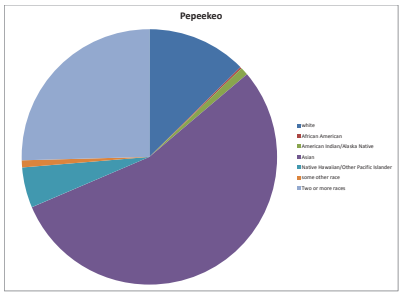


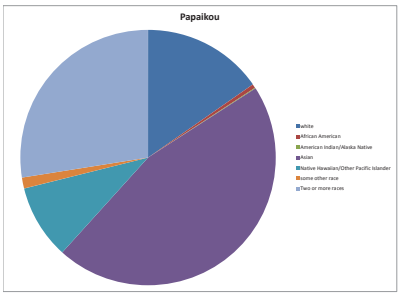


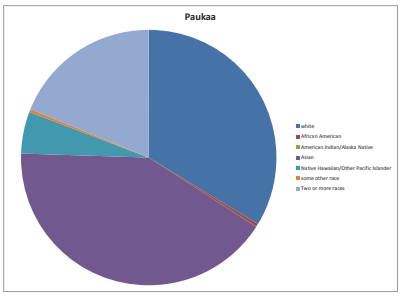
viduals that are Asian in ethnicity.

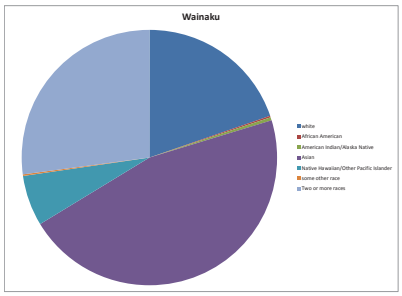










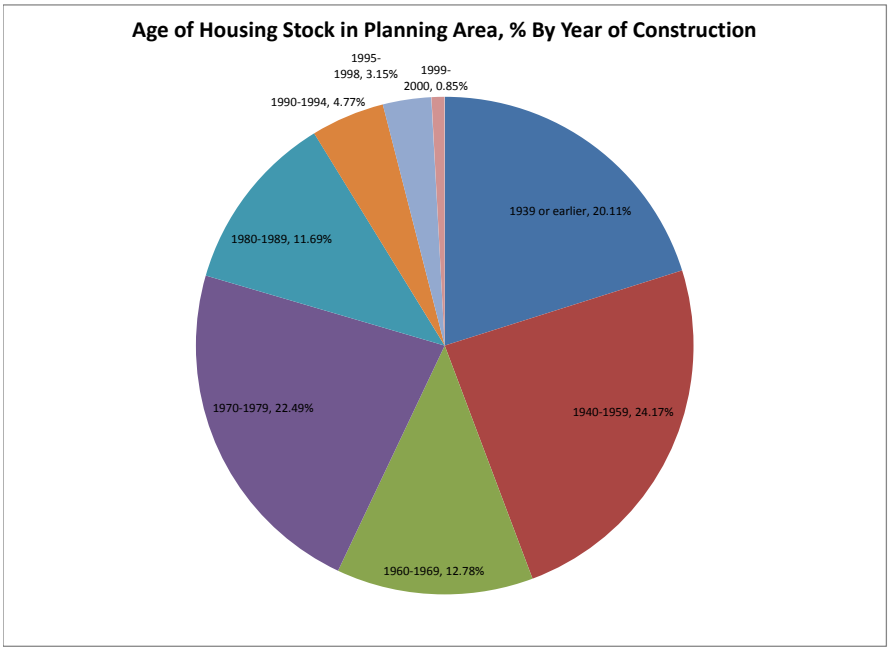


7.3. Housing

Data collected from the 2000 census show a high rate of home ownership (between 85.5% owner occupied housing units in Kukuihaele to up to 96.5% owner occupied units in Pa'auilo). Of the vacant housing units, low percentages are documented as "seasonal or occasional" use. Kukuihaele had the highest percentage of seasonal use homes (5.6%) and Pa'auilo had virtually no seasonal/occasionally occupied homes. The low percentage of seasonal housing indicates that there is a year-round community in the Planning Area. The higher percentage of seasonal housing in Kukuihaele may indicate that this community has more part time residents and may have more homes that serve as short or long-term vacation rentals.

Housing Vacancy Rates

CDP	Total Housing Units	Occupied Units (%)	Vacant Units (%)	
			Seasonal/Occa-sional Use	Other Vacant
Kukuihaele	106	85.5%	5.6%	8.9%
Honokaʻa	835	91.1%	1.7%	7.2%
Paʻauilo	198	96.5%	-	4.5%
Laupāhoehoe	196	90.8%	4.6%	4.6%
Honomū	213	90.6%	.9%	8.5%
Pepeʻekeo	650	95.8%	.6%	3.6%
Pāpaʻikou	502	94.6%	.6%	4.8%
Paukaʻa	215	91.2%	1.4%	7.4%
Wainaku	453	93.2%	1.3%	5.5%

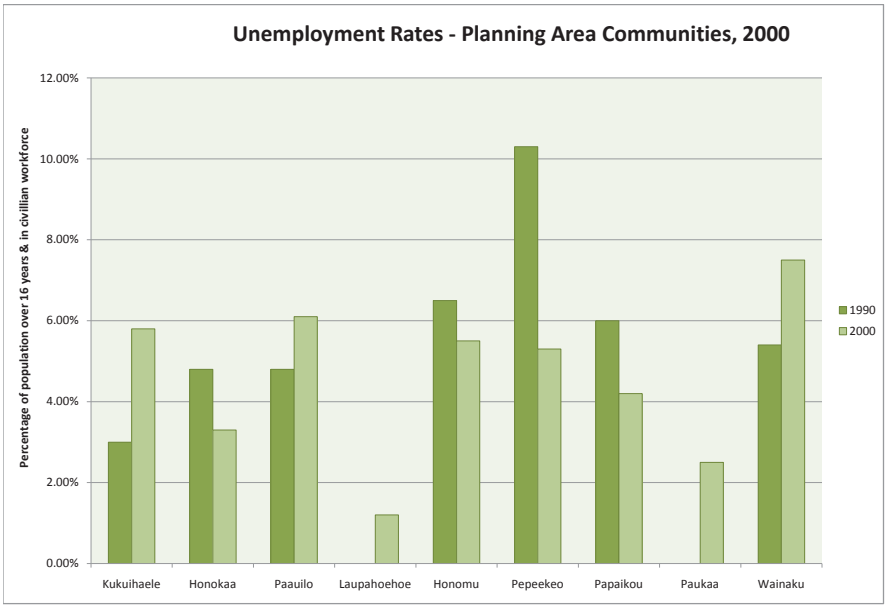


Owner-Occupied vs. Renter-Occupied Housing

CDP	Occupied Units	
	Owner – Occupied	Renter – Occupied
Kukuihaele	72.6%	27.4%
Honokaʻa	65.6%	34.4%
Paʻauilo	84.8%	15.2%
Laupāhoehoe	73.0%	27.0%
Honomū	73.6%	26.4%
Pepeʻekeo	65.3%	34.7%

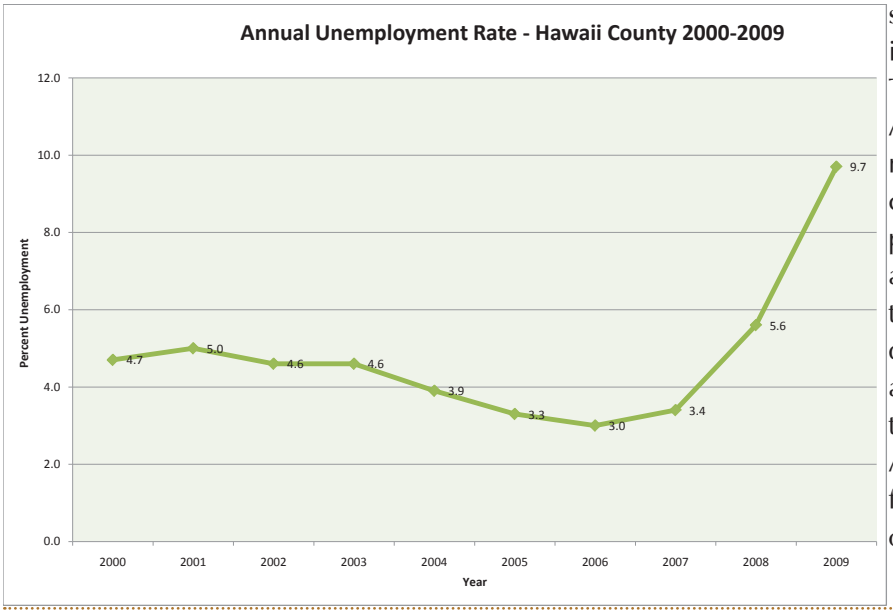
Pāpa'ikou	74.9%	25.1%
Pauka'a	82.7%	17.3%
Wainaku	70.4%	29.6%

Census data also includes information about the age of a community's housing stock. Viewed together, 20% of the housing stock in the nine Planning Area Census Designated Places was built prior to 1939. Over 24% of the housing stock was built between 1940 and 1959, nearly 13% was built in the 1960's and over 22% was constructed in the 1970's. Thus at the time of the year 2000 census, nearly 80% of the housing stock was over 20 years old.



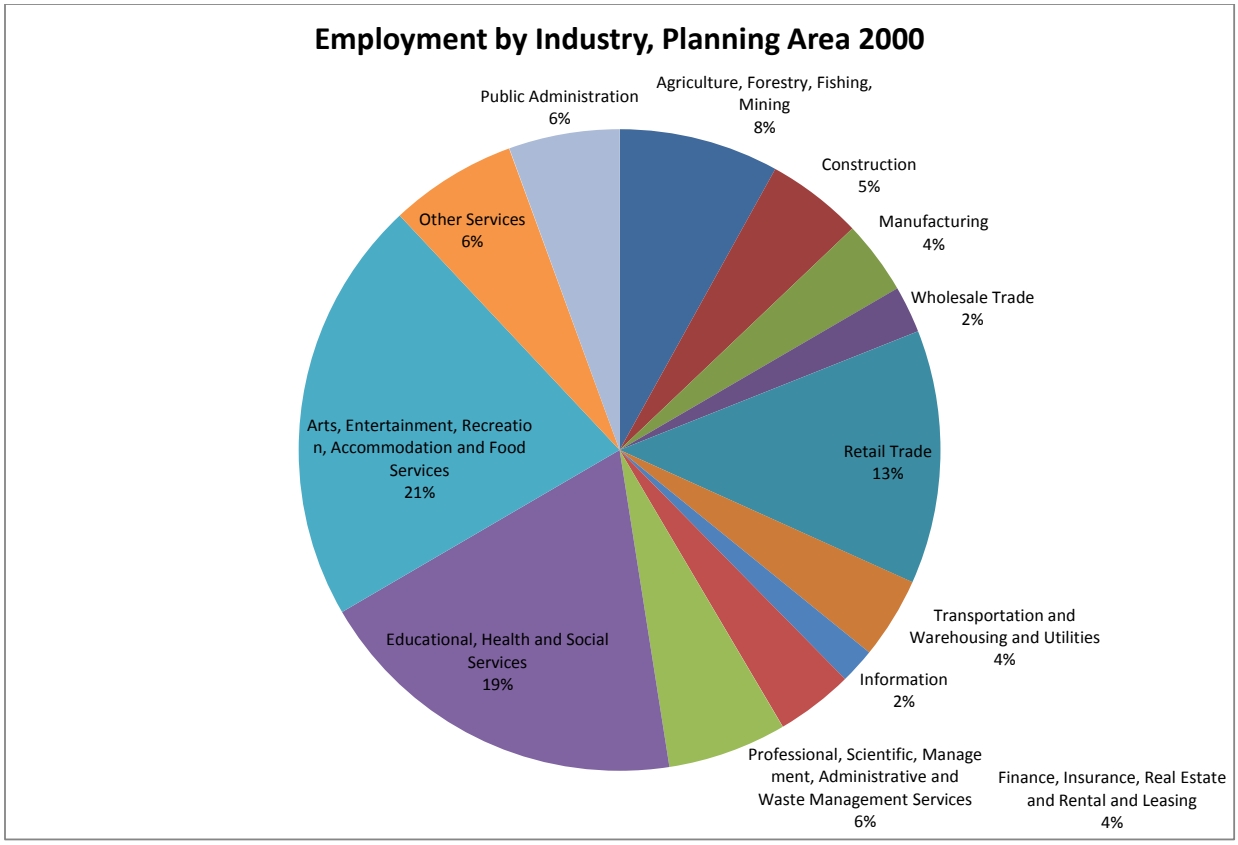
7.4. Employment and Employers

For over 100 years, the sugar industry dominated economics of the Planning Area. By the middle of the 19th Century, sugarcane was planted and small mills were operational and by the late 1800's, the larger-scale sugar industry was gaining a foothold in Hāmākua. Throughout the Planning Area, plantation communities retain their street grid and architectural form, although the people of those communities are no longer employed by the industry. Despite sugar's departure by the mid-1990's, agriculture remains an important industry in the Planning Area. Ranching/grazing and forest products/silviculture operations are ongoing as are



farms growing specialty crops such as landscape nurseries, orchid farms, ʻawaphui, tropical fruit and macadamia nuts. In addition to agriculture, people within the Planning Area have been employed by a variety of other industries, including arts/ entertainment/ recreation/ accommodation/ food services, educational/ health/ social services and professional/ scientific/ management/ administrative/ waste management services Thus, despite the loss of a major industry, unemployment rates did not spike between the years of 1990 and 2000.

In the years since the 2000 census, the economy has gone through a recession and the percent of those unemployed rose across the US. The recession was also felt in Hawaiʻi, with Hawaiʻi County unemployment rates rising to nearly 10% by the end of 2009.



Source: Bureau of Labor Statistics

Hawaii County Forecast of Jobs by Employment Sector

Employment Sector	2010	2035	% Change
Agriculture	6,753	8132	20%
Construction	7,500	9466	26%
Food processing	732	835	14%
Manufacturing	1,448	1710	18%
Transportation	2,711	3512	30%
Information	968	1430	48%
Utilities	548	792	45%
Wholesale trade	2,071	2807	36%
Retail trade	11,907	16459	38%
Finance and insurance	2,072	3290	59%
Real estate and rentals	5,971	8233	38%
Professional services	3,580	5733	60%
Business services	5,180	7842	51%
Educational services	1,442	2191	52%
Health services	8,301	13912	68%
Arts, entertainment, and recreation	3,300	5050	53%
Accommodation	7,350	10348	41%
Eating and drinking places	5,827	8163	40%
Other services	5,612	9228	64%
Government	13,701	19870	45%
Total	96,974	139,003	43%

Source: Hawai'i Statewide Transportation Plan: 2035 Population and Socio-Economic Forecasts

8 Land Use

8.1. Landownership

The majority of the land acreage in the Planning Area are owned publicly by the Federal, State, or County government (see Table 8-1 and Figure 8-1). The Federal and State lands are largely in the Conservation District or protected reserves (see Section "2.5. Flora/Fauna" which discusses reserves). The County received the bulk of its lands in the Planning Area from the bankrupt Hāmākua Sugar Company as a settlement for property taxes due. These County lands are in the Agricultural District and located in Kapulena (__ acres), Pa'auilo (__ acres), Koholālele (__ acres), and 'O'ōkala (__ acres).

For the privately owned lands in the Planning Area, the following eleven landowners own 31% of the total Planning Area or 80% of the private lands within the Planning Area: Kamehameha Schools, Parker Ranch, Beverly Ing Lee, Kuka'iau Ranch, Ohana Sanctuary, Queen Lili'uokalani Trust, Lanpāhoehoe Nui, Omaoma, C. Brewer, Hawaii Forest Preservation, and T.L. Prekaski. Each of them owns more than 1,000 acres of lands within the Planning Area. Some other major landowners in the Planning Area are Kuka'iau Estates, T. Mallick, Kaiwiki Orchards, Bishop Museum, and Mauka-Makai. The approximate size of their lands ranges between 500 to 700 acres. Bishop Museum's holdings are concentrated in Waipi'o Valley.

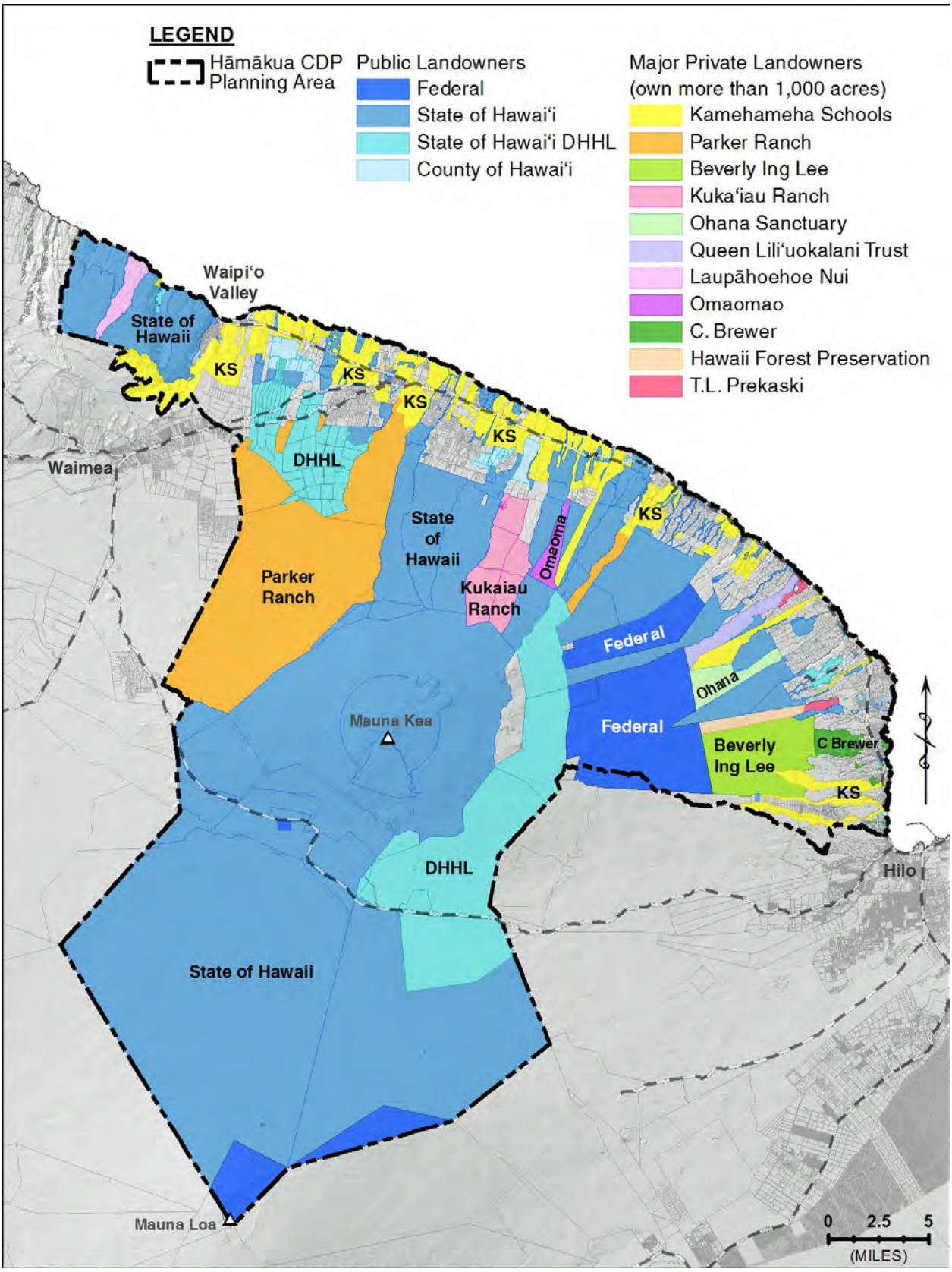
Table 8-1. Major Landowners

Major Landowners	Approximate Acreage	% Total
Public Landowners		
State of Hawai'i	345,534	46.4%
State of Hawai'i DHHL	60,836	8.2%
Federal	42,361	5.7%
County of Hawai'i	3,816	0.5%
Private Landowners		
Kamehameha Schools	143,132	19.2%
Parker Ranch	54,718	7.3%
Beverly Ing Lee	11,395	1.5%
Kūka'iau Ranch	8,556	1.1%
Ohana Sanctuary	3,137	0.4%
Queen Lili'uokalani Trust	2,821	0.4%
Laupāhoehoe Nui	2,607	0.3%
Omaoma	1,946	0.3%

Major Landowners	Approximate Acreage	% Total
C. Brewer	1,890	0.3%
Hawai'i Forest Preservation	1,735	0.2%
T.L. Prekaski	1,248	0.2%
Kūka'iau Estates	614	0.1%
T. Mallick	581	0.1%
Kaiwiki Orchards	577	0.1%
Bishop Museum	538	0.1%
Mauka-Makai	522	0.1%
Others	56,580	7.6%
TOTAL	745,144	100%

Source: County of Hawaii GIS Parcel Layer dated May 2010

Figure 8-1. Major Landowners



8.2. State Land Use Districts

The State of Hawai'i Land Use Commission (LUC) classifies all lands in the State into one of four land use districts: Urban, Agricultural, Rural and Conservation (Hawaii Revised Statutes, Chapter 205). The counties have jurisdiction to regulate land uses in the Urban District. The State has exclusive jurisdiction in the Conservation District. The State and counties share regulatory jurisdiction in the Agricultural and Rural Districts. Compared to the other judicial districts in the County, the Planning Area has one of the highest proportions of lands in the Conservation District, modest proportion of Agricultural District, and one of the lowest proportions of lands in the Urban District, distinguishing the Planning Area as one of the most rural in character (see Figure 8-2).

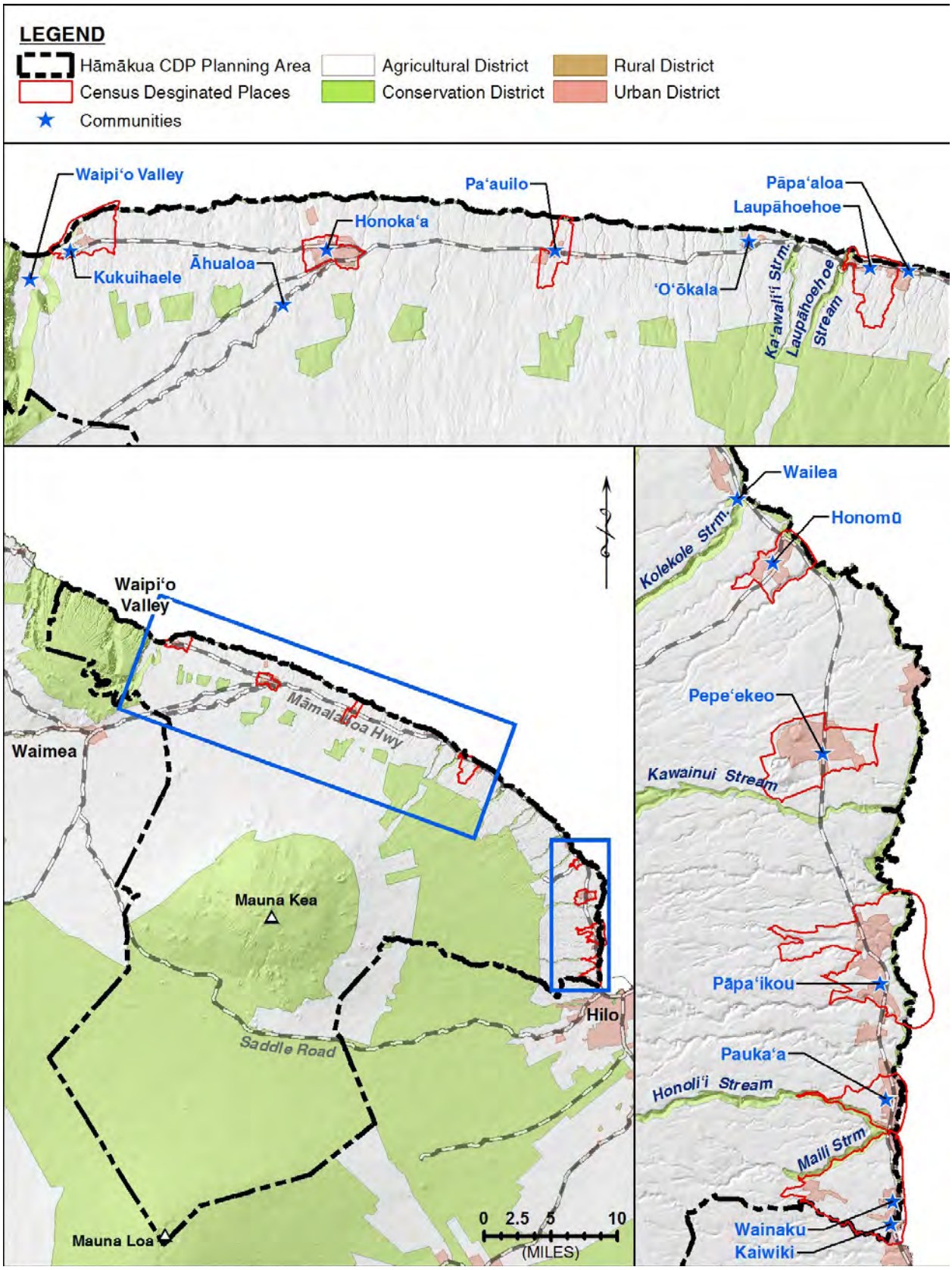
Figure 8-2. State Land Use Districts Comparison by Judicial Districts

	Hawaii County	Puna	South Hilo	North Hilo	Hamakua	North Kohala	South Kohala	North Kona	South Kona	Kau
Conservation	52.0%	43.3%	66.6%	68.9%	59.1%	15.8%	8.7%	51.0%	23.9%	64.5%
Agricultural	45.8%	54.7%	28.4%	30.8%	40.7%	81.1%	85.1%	43.6%	75.5%	35.2%
Rural	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.1%	0.0%	0.0%
Urban	2.17%	2.01%	4.99%	0.33%	0.26%	3.05%	6.08%	5.34%	0.56%	0.28%

Agricultural District

The Agricultural District includes lands suitable, marginal, and unsuitable for agriculture. Within the Planning Area, the lands classified as Agricultural are located primarily along the coast below the elevation of 2,000 feet from North Hilo to Waipi'o Valley, the west and north flanks of Mauna Kea, and mauka lands east of Mauna Kea above the elevation of 5,000 feet (see Figure 8-3).

Figure 8-3. State Land Use Districts



The State Land Use Law sets forth the permissible uses in the Agricultural District (HRS §205-4.5) which include agricultural activities (e.g., cultivation, aquaculture, raising livestock, agricultural parks), agricultural-related activities (e.g., agricultural processing facilities, farm dwellings or employee housing, public facilities necessary for agricultural practices, roadside stands for products grown on the premises, agricultural tourism on a working farm, agricultural-energy facilities, agricultural education), open-air recreation (e.g., day camps, picnic grounds, parks), historic or scenic sites improvements, infrastructure (e.g., utility lines, roadways, transfer stations), wireless communication antennas, and wind energy facilities. Recently, the State Legislature permitted biofuel processing facilities, defined as "a facility that produces liquid or gaseous fuels from organic sources such as biomass crops, agricultural residues, and oil crops, including palm, canola, soybean, and waste cooking oils; grease; food wastes; and animal residues and wastes that can be used to generate energy;" provided that the processing facility does not impact agricultural uses in the vicinity (Act 145/2008).

Special Permits

Uses that are not included in the list of permissible uses may still be permitted by a Special Permit if they are "unusual and reasonable uses" (HRS §205-6). The counties approve Special Permits for applications involving less than 15 acres. The State Land Use Commission approves applications greater than 15 acres or lands designated as "Important Agricultural Lands".

As of 2009, there have been 87 Special Permits approved within the Planning Area. Only four of the approved Special Permits were on prime agricultural land defined as Land Study Bureau Class A or B, and of these four, three were telecommunication towers (see Figure 8-4 and Table 8-2). None of the Special Permits involved large traffic-generating uses such as major school or shopping center. The approved uses include overnight accommodations (bed and breakfasts, inns, retreats), quarries, churches, and offices, as well as uses that the State Land Use law has since included as permitted uses in the Agricultural District (e.g., communication towers, wastewater and solid waste facilities). There were seven Special Permits for agricultural processing facilities. The State Land Use Law permits "Buildings and uses, including mills, storage, and processing facilities, maintenance facilities, and vehicle and equipment storage areas that are normally considered directly accessory" (Hawaii Revised Statutes section 205-4.5(a)(10)). Thus, it seems a Special Permit would be required only if the processing facilities were the primary, rather than accessory, use on the site. The Planning Department has not been clear on their criteria to determine "accessory." They seem to not only consider the extent of the land used for crop or animal production versus processing, but also consider the source of the processed goods-- i.e., if more than 50% comes from off-premises, then a Special Permit may be required. Moreover, the zoning code has a definition for "food manufacturing" that is permitted only in the Industrial or Mixed Commercial-Industrial zoning districts, which further complicates whether a proposed processing activity is permitted outright, requires a Special Permit, or requires rezoning.

Figure 8-4. Special Permits

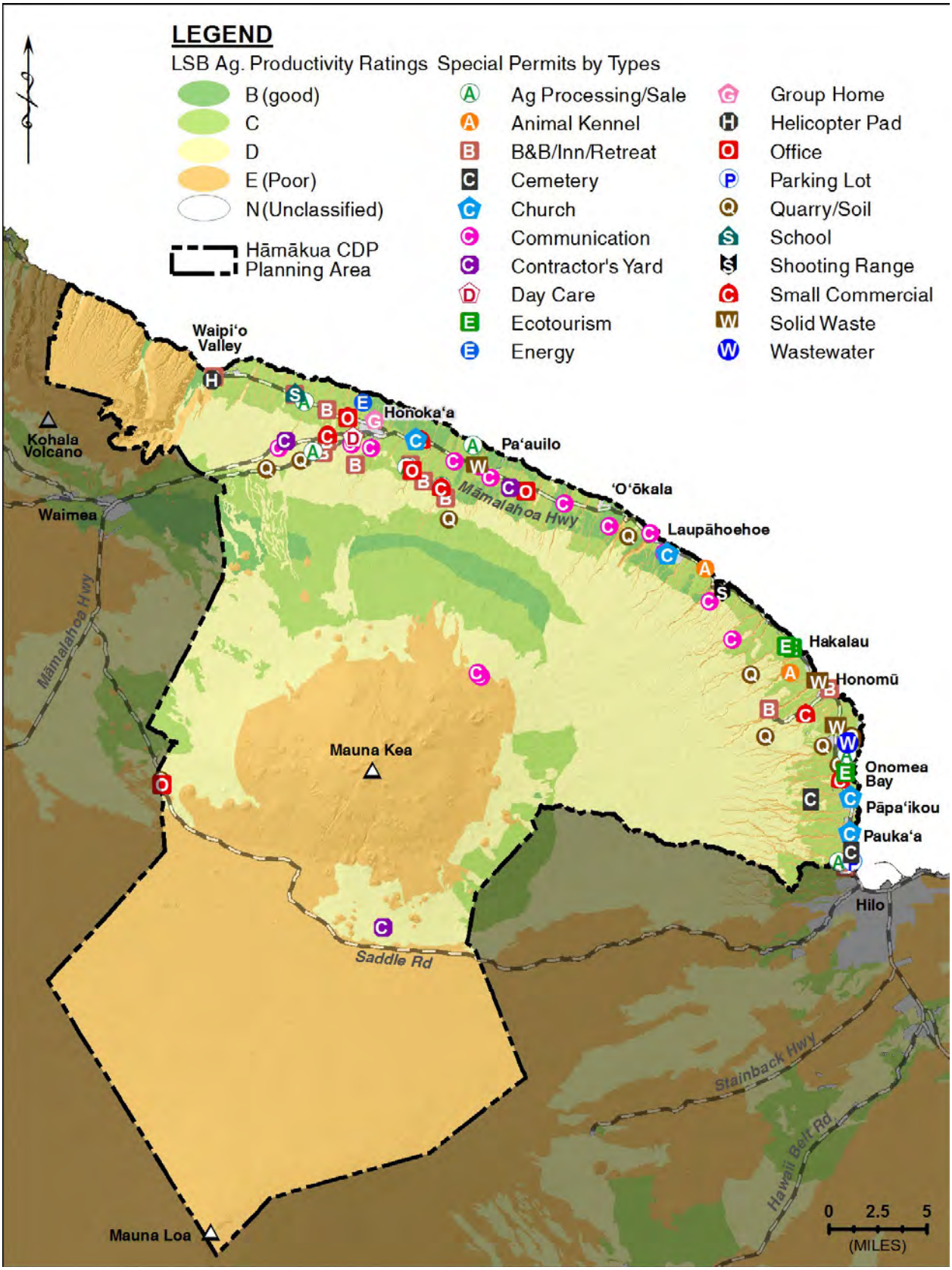


Table 8-2. List of Special Permits Issued in the Planning Area

APPLICANT	DATE	TYPE	TYPE1	DISTRICT	STATUS
Freitas, Antoinette L.	7/25/96	Certified Kitchen	ag processing/ sale	Hamakua	Approved
Timothy and Patsy Withers	2/5/10	Fruit/Smootie/ Snack Stand	ag processing/ sale	S. Hilo	Approved
Kapulena Orchards, Inc.	4/14/87	Macadamia Nut Husking Plant	ag processing/ sale	Hamakua	Approved
Motta, Gilbert Jr.	8/13/81	Meat Process-ing Plant	ag processing/ sale	Hamakua	Approved
Hamakua Sugar Co.	12/30/85	Slaughterhouse and Meat Pro-cessing Plant	ag processing/ sale	Hamakua	Approved
Kilauea Agrono-mucs, Inc.	1/12/78	Processing Plant	ag processing/ sale	S. Hilo	LUC - Approved
Jose, Robert	5/26/77	Processing Plant	ag processing/ sale	Hamakua	LUC - Approved
Young, Theodore E. M.	2/25/93	Boarding Ken-nel for Dogs/ Cats	animal kennel	S. Hilo	Approved
Monka, Paul	8/24/95	Quarantine Sta-tion for Cats	animal kennel	Hamakua	Approved
Thomas & Dianne Brookman	2/21/03	4-Bedroom Bed and Breakfast	B&B/Inn/Retreat	South Hilo	Approved
Lotus Sanderson	8/4/06	5-Bedroom Bed and Breakfast	B&B/Inn/Retreat	S. Hilo	Approved
Gamble, John & Michele	9/15/00	8-Bedroom Inn	B&B/Inn/Retreat	S. Hilo	Approved
Souza, Wayne	3/22/02	Bed and Break-fast	B&B/Inn/Retreat	Hamakua	Approved
Salisbury, Carol A. dba Waianuhea	12/21/01	Bed and Break-fast	B&B/Inn/Retreat	Hamakua	Approved
Hirata, Miles & Colette	1/16/98	Bed and Break-fast	B&B/Inn/Retreat	Hamakua	Approved
Nelson, Mark and Malia	12/12/91	Bed and Break-fast	B&B/Inn/Retreat	Hamakua	Approved
Cowan, James M.	2/08/90	Bed and Break-fast	B&B/Inn/Retreat	Hamakua	Approved
Horne, Jacqueline	6/28/88	Bed and Break-fast	B&B/Inn/Retreat	Hamakua	Approved
Steve and Nancy Roberson	9/4/09	Bed and Break-fast	B&B/Inn/Retreat	Hamakua	Approved

APPLICANT	DATE	TYPE	TYPE1	DISTRICT	STATUS
Hawaii United Methodist Union	8/15/02	Educational Retreat Center	B&B/Inn/Retreat	Hamakua	Approved
Marcel and Connie Hernandez	1/8/10	Naturopathic Retreat Center	B&B/Inn/Retreat	Hamakua	Approved
Cascavilla, Carolyn	2/15/02	Six-room Inn	B&B/Inn/Retreat	Hamakua	Approved
Girl Scout Council of the Pacific, Inc.	7/01/74	Overnight Sleeping Quarters	B&B/Inn/Retreat	Hamakua	LUC - Approved
Hawaii Memorial Gardens	12/18/70	Cemeteray Expansion	cemetery	S. Hilo	LUC - Approved
County of Hawaii, P&R	3/06/75	Expansion of Cemetery	cemetery	S. Hilo	LUC - Approved
Kaumana Drive Baptist Church	7/17/98	Church	church	N. Hilo	Approved
Honoka'a Congregation of Jehovah's Witnes	8/08/88	Church	church	Hamakua	Approved
Wainaku Congregation of Jehovah's Witnes	7/30/87	Church	church	S. Hilo	Approved
Pāpa'ikou Hongwanji Mission	11/29/79	Church Social Hall/Parking	church	S. Hilo	Approved
Cello Partnership dba Verizon Wireless	2/2/07	150' Monopole / Shelter	communication	Hamakua	Approved
American Tower Corporation	11/15/02	160-Foot Monopole With Antennas	communication	N. Hilo	Approved
Nextel Partners, Inc.	7/18/03	80-Foot Telecommunication Monopole	communication	North Hilo	Approved
Mobile Telephone & Paging	4/20/00	Radio Communication Tower	communication	Hamakua	Approved
Crown Castle USA	5/8/08	Retain Exist. Telecom. Tower & Rel.	communication	Hamakua	Approved
Verizon	1/18/02	Telecommunication Tower	communication	Hamakua	Approved
USCOC of Hawaii 3, Inc.	10/20/00	Telecommunication Tower	communication	Hamakua	Approved
USCOC of Hawaii 3, Inc.	9/15/00	Telecommunication Tower	communication	N. Hilo	Approved
Voicestream PCS II	9/15/00	Telecommunication Tower	communication	Hamakua	Approved
USCOC of Hawaii 3, Inc.	12/28/99	Telecommunication Tower	communication	Hamakua	Approved

APPLICANT	DATE	TYPE	TYPE1	DISTRICT	STATUS
USCOC of Hawaii 3, Inc.	10/20/00	Telecommunication Tower	communication	N. Hilo	Approved
Crown Castle International	7/19/02	Telecommunication Tower	communication	N. Hilo	Approved
County of Hawaii	9/22/03	Telecommunication Tower	communication	Hamakua	Approved
Cellco Partnership dba Verizon Wireless	6/5/09	Telecommunication Tower	communication	Hamakua	Approved
Anthem Telecom,LLC	7/1/09	Telecommunication Tower	communication	Hamakua	Approved
Sprintcom, Inc.	11/23/09	Telecommunication Tower	communication	Hamakua	Permitted Use
Melvin W. Miranda	8/5/05	Contractor's Yard on 1 Acre of Land	contractor's yard	Hamakua	Approved
County of Hawaii, DPW	4/4/08	Dev. Hwy. Maintenance Baseyard and Rel.	contractor's yard	Hamakua	Approved
Hawaiian Bitumuls & Paving	5/09/89	Temporary Camp Base	contractor's yard	N. Hilo	Approved
Waller, Deirdre	1/20/77	Day Care Center	day care	Hamakua	LUC - Approved
World Botanical Gardens, Inc.	5/12/05	Visitor Center, Parking & Rel. Imp.	ecotourism	N. Hilo	Approved
Hawaii Tropical Botanical Garden	11/22/95	Visitor Center/ Gift Shop	ecotourism	S. Hilo	Approved
C. L. Carlile Enterprises, L.P.	1/8/10	Visitor Center; Kitchen; Retail	ecotourism	N. Hilo	Approved
Enserch Develop. Corp.	6/24/97	Haina Cogeneration Project	energy	Hamakua	Approved
Brantley Center, Inc.	1/16/92	Residential Project for the Chronically,	group home	Hamakua	Approved
Shupe, Scott	10/28/86	Helicopter Landing Area	helicopter pad	Hamakua	Approved
KSBE	10/15/99	Land Management Office	office	Hamakua	Approved
Broussard, John	8/08/85	Office	office	Hamakua	Approved
Emerson, Gail D.	5/09/89	Physical Therapy Office	office	Hamakua	Approved
Girl Scout Council fo the Pacific, Inc.	3/29/76	Offices/Dining/ Kitchen Facilities	office	Hamakua	LUC - Approved

APPLICANT	DATE	TYPE	TYPE1	DISTRICT	STATUS
State of Hawaii, DAGS	5/28/92	Expansion of Parking Lot	parking lot	S. Hilo	Approved
Leonard Cardoza	11/15/02	Legitimize the Sale of Topsoil	quarry/soil	S. Hilo	Approved
Edwin Deluz Trucking & Gravel, LLC	11/16/99	Quarry	quarry/soil	Hamakua	Approved
Ramos, Abraham	9/27/88	Quarry	quarry/soil	Hamakua	Approved
Allied Aggregates Corp.	8/08/85	Quarry	quarry/soil	Hamakua	Approved
Davies Hamakua Sugar Co.	3/27/80	Quarry	quarry/soil	N. Hilo	Approved
Hawaiian Rainbows Soil Blending, LLC	6/20/03	Removal & Sale of Stockpiled Topsoil	quarry/soil	S. Hilo	Approved
Hawaiian Rainbows Business Dev. LLC	1/15/09	Removal & Sale of Stockpiled Topsoil	quarry/soil	S. Hilo	Approved
Hawaiian Rainbows Business Dev. LLC	1/15/09	Removal & Sale of Stockpiled Topsoil	quarry/soil	S. Hilo	Approved
Richard Smart dba Parker Ranch	3/14/77	Quarry	quarry/soil	Hamakua	LUC - Approved
Hilo Coast Processing Co.	11/26/74	Quarry	quarry/soil	S. Hilo	LUC - Approved
Hilo Coast Processing Co.	11/26/74	Quarry	quarry/soil	S. Hilo	LUC - Approved
Hilo Coast Processing Co.	11/26/74	Quarry	quarry/soil	S. Hilo	LUC - Approved
Hilo Coast Processing Co.	11/26/74	Quarry	quarry/soil	N. Hilo	LUC - Approved
County of Hawaii, DPW	9/25/70	Quarry	quarry/soil	Hamakua	LUC - Approved
State of Hawaii, DAGS	6/04/92	Expansion of Elem. School	school	S. Hilo	Approved
E Ala Ike	2/27/97	Special Needs Education/ Treatment	school	Hamakua	Approved
County of Hawaii, Police	8/16/78	Outdoor Pistol Range	shooting range	N. Hilo	Decision/Order - Approved
Charles and Jelena Clay	9/16/04	Construction Business\Art Business	small commercial	S. Hilo	Approved
Hasegawa, Rikizo	7/18/89	Manufacturing of Baked Goods	small commercial	Hamakua	Approved

APPLICANT	DATE	TYPE	TYPE1	DISTRICT	STATUS
Hawaiian Vanilla Company, Inc.	5/8/08	Market Ag. Prod., Ed. Tours, Culinary Pr	small commercial	Hamakua	Approved
Hawaii Johns Inc.\ Mr. John Cummings	7/1/09	Portable Rental Toilet Storage	small commercial	Hamakua	Approved
Dena & Sergio Ramirez	12/1/06	Revoc. SPP 700 & Estab. Restuarant	small commercial	Hamakua	Approved
Jieyu Shepard	9/7/07	Stor. File Cabinets & Home Furn.	small commercial	S. Hilo	Approved
County of Hawaii, DPW	7/17/75	Solid Waste Transfer Station	solid waste	S. Hilo	LUC - Approved
County of Hawaii, DPW	7/17/75	Solid Waste Transfer Station	solid waste	S. Hilo	LUC - Approved
County of Hawaii, DPW	7/17/75	Solid Waste Transfer Station	solid waste	S. Hilo	LUC - Approved
Mauna Kea Sugar Co.	8/23/73	Sewage Treatment Plant	wastewater	S. Hilo	LUC - Approved

Important Agricultural Lands

Source of Authority and Definition. In 1978, Hawaii's voters amended the Hawaii State Constitution to include special protections for "important agricultural lands:"

> *Section 3. The State shall conserve and protect agricultural lands, promote diversified agriculture, increase agricultural self-sufficiency and assure the availability of agriculturally suitable lands. The legislature shall provide standards and criteria to accomplish the foregoing.*
>
> *Lands identified by the State as important agricultural lands needed to fulfill the purposes above shall not be reclassified by the State or rezoned by its political subdivisions without meeting the standards and criteria established by the legislature and approved by a two-thirds vote of the body responsible for the reclassification or rezoning action. [Article 11, Section 3]*

The State Legislature only recently adopted the specific requirements to implement this constitutional provision after over 20 years of debating how to protect the State's agricultural lands. In 2005, Act 183 created the important agricultural land (referred to as "IAL") designation but effectively deferred implementation until the enactment of "incentives" to provide economic benefits to support preservation. In 2008, the required incentives were enacted.

Act 183 specified the objectives for the "IAL" designation as follows:

- Conserving and protecting agricultural lands;
- Promoting diversified agriculture;

- Increasing agricultural self-sufficiency;

- Assuring the availability of agriculturally suitable lands.

Act 183 also set forth the criteria for determining IAL by defining 'IAL' as lands that:

1. Are capable of producing sustained high agricultural yields when treated and managed according to accepted farming methods and technology;

2. Contribute to the State's economic base and produce agricultural commodities for export or local consumption; or

3. Are needed to promote the expansion of agricultural activities and income for the future, even if currently not in production.

Designation Process. The IAL statute (codified in Hawaii Revised Statutes chapter 205) provides landowners a three-year period to voluntarily designate their lands as IAL, prior to the Counties determining what lands should be recommended to the State Land Use Commission (LUC) for designation. The voluntary designation period expires in July 2011. Upon expiration of the 3-year voluntary period, Hawaii Revised Statutes §§205-47 to -49 set forth the IAL designation process that the counties and LUC must follow:

- County Process to Identify Eligible IAL (HRS §250-47)
    - The counties, through their planning departments, shall develop an inclusive process to identify potential IAL lands based on the IAL criteria. To be inclusive, the counties may consider establishing advisory committees, use an existing planning process such as an ongoing general plan or community development process, hold a series of public meetings throughout the process, and consult with key stakeholders such as the landowners, State Department of Agriculture, agricultural interest groups (e.g., Hawaii Farm Bureau Federation), U.S. Department of Agriculture NRCS, and Office of Planning.
    - Upon completion of the mapping, the counties shall take reasonable action to notify each landowner affected by the potential designation.
    - The counties shall submit a recommendation report to the county council to support the IAL map addressing how the map supports and is consistent with:
        - Standards and criteria set forth in section 205-44;
        - County's adopted land use plans, as applied to both the identification and exclusion of important agricultural lands from such designation;
        - Comments received from government agencies and others identified in 205-47;
        - Viability of existing agribusinesses; and
        - Representations or position statements of the owners whose lands are subject to the potential designation.
    - The county council shall adopt the map by resolution with or without changes.

- The counties shall transmit the adopted map and report to the LUC.

- Review by State Agencies (HRS §205-48)
  - The LUC shall request and receive comments from the Office of Planning and Department of Agriculture within 45 days of the LUC's receipt of the map and report;
  - The review by the Office of Planning and Department of Agriculture shall evaluate the degree that the:
    - County recommendations result in an identified resource base that meets the definition of important agricultural land and the objectives and policies for important agricultural lands in sections 205-42 and 205-43; and
    - County has met the minimum standards and criteria for the identification and mapping process in sections 205-44 and 205-47.

- LUC IAL Designation (HRS §205-49)
  - The relevant information for the LUC to consider include:
    - County maps and report;
    - Recommendations of the Office of Planning and Department of Agriculture;
    - IAL declaratory orders issued by the LUC during the 3-year period;
    - Landowner position statements and representations;
    - Other relevant information.
  - The LUC's decision criteria include the extent to which:
    - The proposed lands meet the standards and criteria under section 205-44;
    - The proposed designation is necessary to meet the objectives and policies for important agricultural lands in sections 205-42 and 205-43; and
    - The commission has designated lands as important agricultural lands, pursuant to section 205-45; provided that if the majority of landowners' landholdings is already designated as important agricultural lands, excluding lands held in the conservation district, pursuant to section 205-45 or any other provision of this part, the commission shall not designate any additional lands of that landowner as important agricultural lands except by a petition pursuant to section 205-45.
  - The LUC shall base their decision on written findings of fact and conclusions of law, presented in at least one public hearing conducted in the county where the land is located, and shall be approved by two-thirds of the membership to which the commission is entitled.
  - The LUC shall transmit copies of the adopted map to each county planning department and county council, the Department of Agriculture, the agribusiness development corporation, the Office of Planning, and other state agencies involved in land use matters.
  - The LUC shall have sole authority to interpret the adopted map boundaries delineating the IAL.

Criteria. Whether by voluntary designation or by the County recommendation process, Hawaii Revised Statutes §205-44 lists the standards or criteria to identify lands that qualify as IAL. In applying these

standards, §205-44(a) states that the lands "need not meet every standard and criteria." Rather, "lands meeting any of the criteria . . . shall be given initial consideration," provided that the designation shall be made "by weighing the standards and criteria with each other." The standards and criteria are as follows (HRS §205-44(c)):

1. Currently used for agriculture;

2. Soil qualities and growing conditions that support agricultural production of food, fiber, or fuel-and energy-producing crops;

3. Identified under agricultural productivity rating systems, such as the Agricultural Lands of Importance to the State (ALISH);

4. Associated with traditional native Hawaiian agricultural uses (e.g., taro cultivation), or unique agricultural uses (e.g., coffee, vineyards, aquaculture, energy production);

5. Available water to support viable agricultural production;

6. Consistent with County general or community plans;

7. Contributes to maintaining a critical land mass to agriculture operating productively;

8. With or near support infrastructure (e.g., transportation to markets, water, power).

The County's General Plan included an "Important Agricultural Land" designation in the General Plan update adopted in 2005, which pre-dated and used different criteria from the State's IAL designation. The General Plan's criteria included (General Plan 2005 §14.1.1):

1. Lands identified as "Intensive Agriculture" on the 1989 General Plan Land Use Pattern Allocation Guide (LUPAG) maps;

2. Lands identified in the Agricultural Lands of Importance to the State of Hawaii (ALISH) classification system as "Prime" or "Unique";

3. Lands classified by the Land Study Bureau's (LSB) as Class B (there are no Class A soils on the Island of Hawaii);

4. Lands classified as at least "fair" for two or more crops, on an irrigated basis, by the USDA NRCS's study of suitability for various crops;

5. The "coffee belt" in North and South Kona;

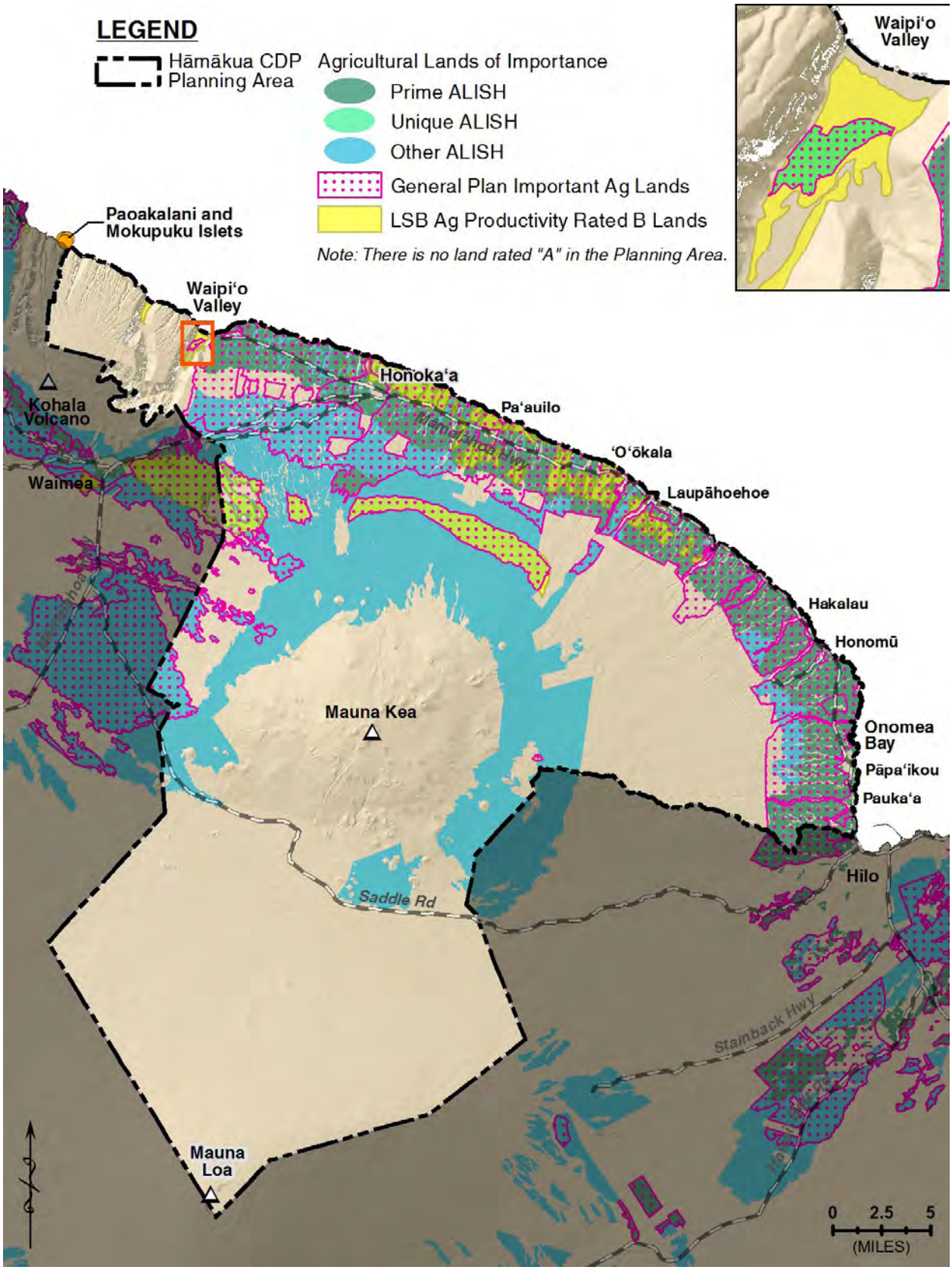
6. State agricultural parks.

Data Assessment. The following data is available to assist in evaluating the extent to which the lands

in the Agricultural District meet the IAL criteria:

- Currently used for agriculture-- compiled from aerial photographs as of 2005 by the Redlands Institute (Redlands Institute 2009):
    - Croplands: 6,200 acres
    - Forest (eucalyptus and alien/plantation trees): 33, 600 acres
    - Rangelands: 221,900 acres
    - Total: 261,700 acres
- Soil qualities and growing conditions that support agriculture—judgment required to determine the relevant parameters; the following parameters are available derived from the NRCS Soil Survey and other sources (Redlands Institute 2009):
    - Depth to restrictive layer
    - Depth to bedrock
    - T factor (tolerable soil loss)
    - Drainage
    - Surface texture
    - Insolation
    - Slope
    - Elevation (and indirectly temperature) (see Figure 2-1)
    - Aspect
- Identified under agricultural productivity rating system. Within the Planning Area, the ALISH "prime" includes all of the LSB "B" lands plus other LSB classifications lower than "B" (see Figure 8-7). However, there are LSB "B" lands in the mauka areas that are ALISH "other" rather than "prime".
    - ALISH (see Figure 2-6)
        - Prime: 60,100 acres
        - Unique: 100 acres
        - Other: 201,800 acres
        - Total: 262,000 acres
    - Land Study Bureau "A" or "B" (see Figure 2-5): 29,000 acres
- Associated with traditional native Hawaiian agricultural uses or unique agricultural uses
    - Traditional—taro in Waipi'o Valley
    - Traditional—predictive model (Ladefoged, T., et al 2009)
    - Unique (e.g., coffee)—none
- Available water to support viable agricultural production
    - Lower Hāmākua Ditch service area (see)
    - Rainfall > 80 inches average annual which is the entire Planning Area in the Agricultural District

Figure 8-7. Agricultural Suitability Comparisons: ALISH vs. LSB vs. General Plan IAL



- Consistent with County general or community plans-- The General Plan IAL includes all of the ALISH "prime" lands, plus some lands designated "other", and some lands not included in the ALISH designations. The General Plan IAL did not include the LSB "B" mauka lands that were designated by ALISH as "other". In Waipi'o Valley, the LSB designation covers most of the valley floor, while the General Plan designates only the portion corresponding to the ALISH "unique" as IAL, and the remaining valley floor as Extensive Agricultural. GP IAL acreage: 170,600 acres.

- Contributes to maintaining a critical land mass to agriculture operating productivity. No current data.

- With or near support infrastructure. Distance to Hilo Harbor and Hilo International Airport.

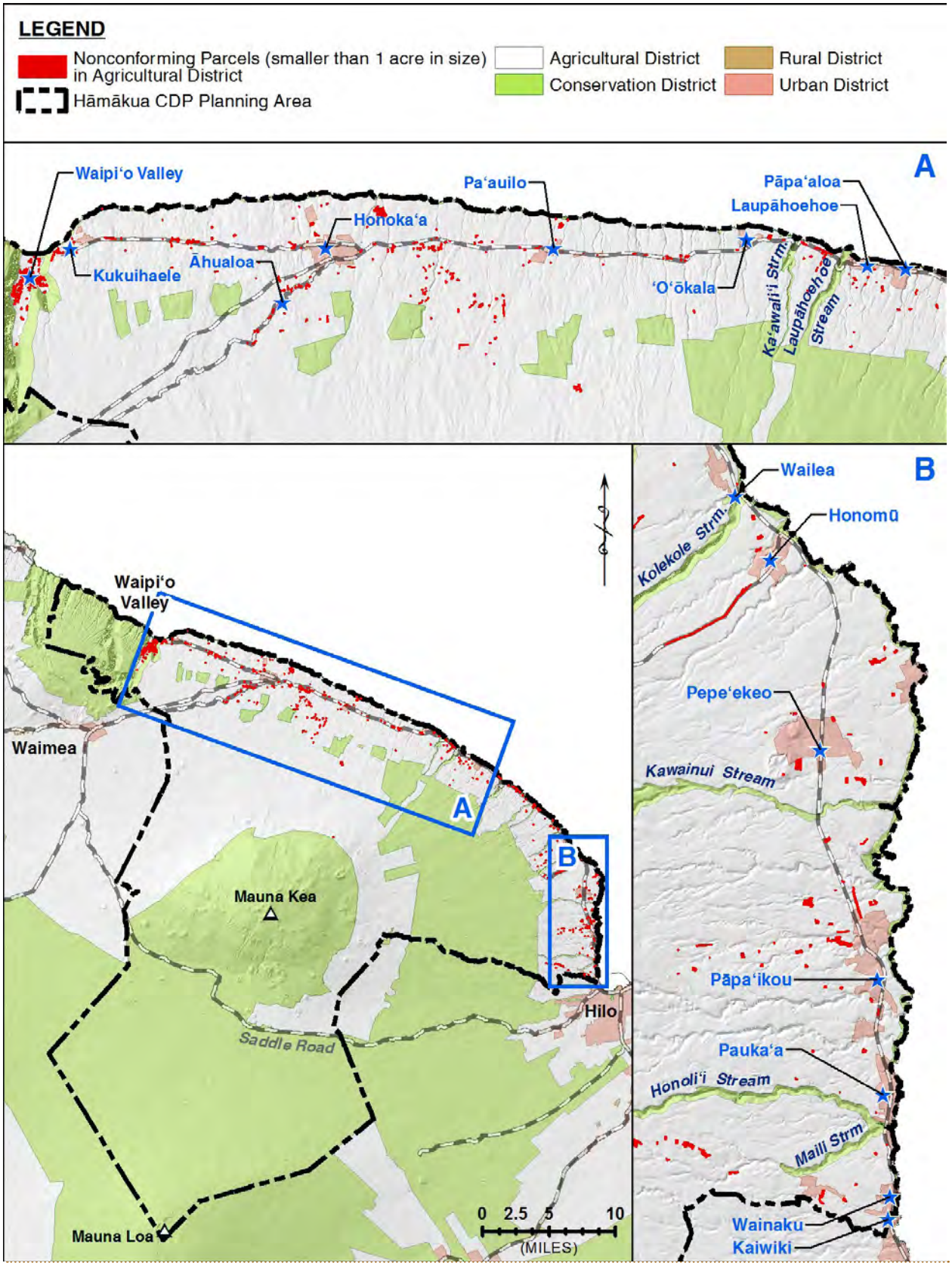
In comparing the data, the LUPAG IAL is the most inclusive (69% of the Agricultural District), followed by ALISH (only the Prime and Unique classes) (24%), then LSB B (12%).

Designation	Acres	% Ag District
Agricultural District	247,700	100%
ALISH Prime/Unique	60,200	24%
ALISH Prime/Unique/Other	262,000	106%
LSB B	29,000	12%
LUPAG IAL	171,600	69%

Urban District

The Urban District includes lands currently in urban use and reserves for future development. In the Planning Area, the Urban District generally coincides with the locations of existing communities, typically surrounded by Agricultural District lands. There are exceptions of existing communities with parcel sizes less than one acre, many of which were created as plantation camps, that are in the Agricultural District instead of the Urban District. Examples of these clusters include: portion of Haina Camp, mauka of Mamane Street in Honoka'a, Pā'auhau Village, makai portion of Pa'auilo Camp, Nakalei Camp, Kaohe Tract Subdivision, Milo Subdivision and Niu Camp in 'O'ōkala, periphery portions of Wailea and Honomū, portions of Andrade Camp and Kulaimano Homesteads in Pepe'ekeo, and periphery portions of Pāpa'ikou, Pauka, and Kaiwiki (see Figure 8-8). Since one acre is the minimum lot size in the Agricultural District, parcels less than an acre are nonconforming (i.e., legally "grandfathered" but may have other restrictions such as not being able to qualify for ohana or additional farm dwellings).

Figure 8-8. Nonconforming Parcels < 1 Acre in the Agricultural District



Conservation District

The remainder of the Planning Area is in the Conservation District. The Conservation District primarily consists of mauka areas that encompass existing reserves with fingers of Conservation extending to the ocean along major drainage channels. The land near the summits of Mauna Kea and Mauna Loa, as well as the saddle between the two mountains are designated Conservation District. Waipiʻo Valley's floor is in the Agricultural District while the valley walls are in the Conservation District. The major stream basins in the Conservation District include: Honolii, Kawainui, Kolekole, Hakalau, Nanue, Waikaumalo, Maulua, Laupāhoehoe, and Kaʻawaliʻi (see Figure 8-3). There are no other stream basins in the Conservation District north of Kaʻawaliʻi. Many outstanding streams in the Planning Area (see section 2.4) are not in the Conservation District.

Rural District

The Rural District is generally small farm lands mixed with low-density residential lots with a minimum size of one-half acre. There are 34 acres classified in the Rural District within the Planning Area located in the vicinities of Kaiwiki, Nīnole, Laupāhoehoe, and Honokaʻa (see Figure 8-9). There are no restrictions on the type of residential use in the Rural District as there is for the Agricultural District where the residential use must meet the requirements of a "farm dwelling" as defined by the State Land Use Law (i.e., "'farm dwelling' means a single-family dwelling located on and used in connection with a farm, including clusters of single-family farm dwellings permitted within agricultural parks developed by the State, or where agricultural activity provides income to the family occupying the dwelling," HRS §205-4.5).

8.3. General Plan LUPAG

The County of Hawaiʻi General Plan is a policy document that guides the long-range development of the island and County of Hawaiʻi. The plan was last amended in 2005 and consists of goals, objectives, policies, courses of actions, and maps including a land use map referred to as the Land Use Pattern Allocation Guide (LUPAG) Map. The LUPAG guides the long-term pattern of development.

The LUPAG Conservation lands in the Planning Area correspond with the State Conservation District lands, mainly consisting of Mauna Kea, Mauna Loa, and protected reserves (see Figure 8-10).

The LUPAG designations that are urban in character include High Density Urban, Medium Density Urban, Low Density Urban, Industrial, Resort, Resort Node, and Urban Expansion. Within the Planning Area, these LUPAG urban designations correspond with the State Land Use Urban Districts, but also encompass lands beyond the State Urban District (see Figure 8-11). Locations where the LUPAG envisions significant urban growth beyond the State Land Use Urban District include: Honokaʻa, Paʻauilo, ʻOʻōkala, Pepeʻekeo, Pāpaʻikou, Paukaa, and Kaiwiki.

The LUPAG designates the remaining lands within the Planning Area as Important Agricultural Lands and Extensive Agriculture. Important Agricultural Lands are primarily located along the shoreline as a band below the elevation of 2,000 feet from North Hilo to Waipiʻo Valley. Extensive Agriculture is present in mid elevations at the bottom of Mauna Kea.

Figure 8-9. Rural Districts

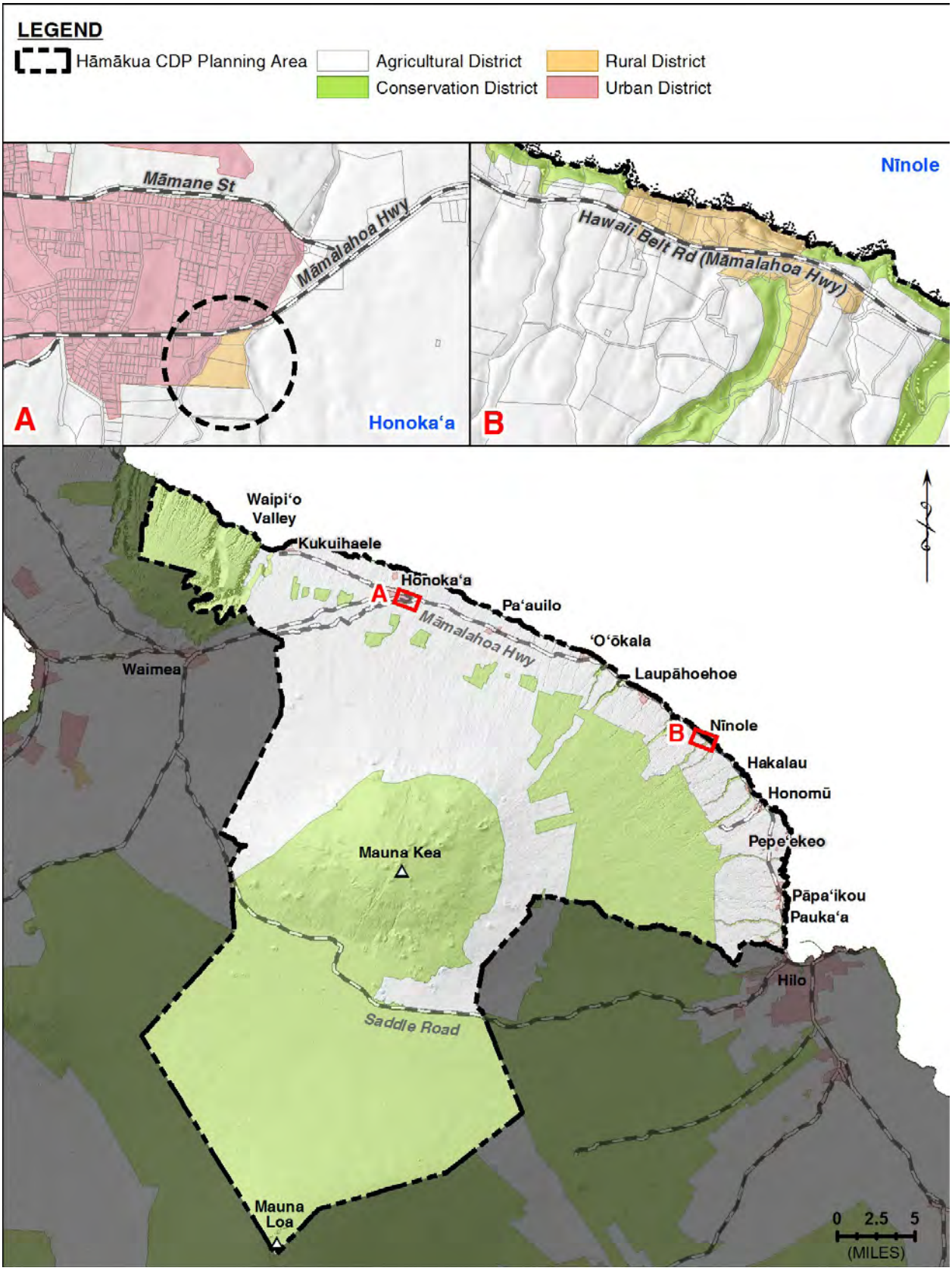


Figure 8-10. General Plan Land Use Pattern Allocation Guide (LUPAG)

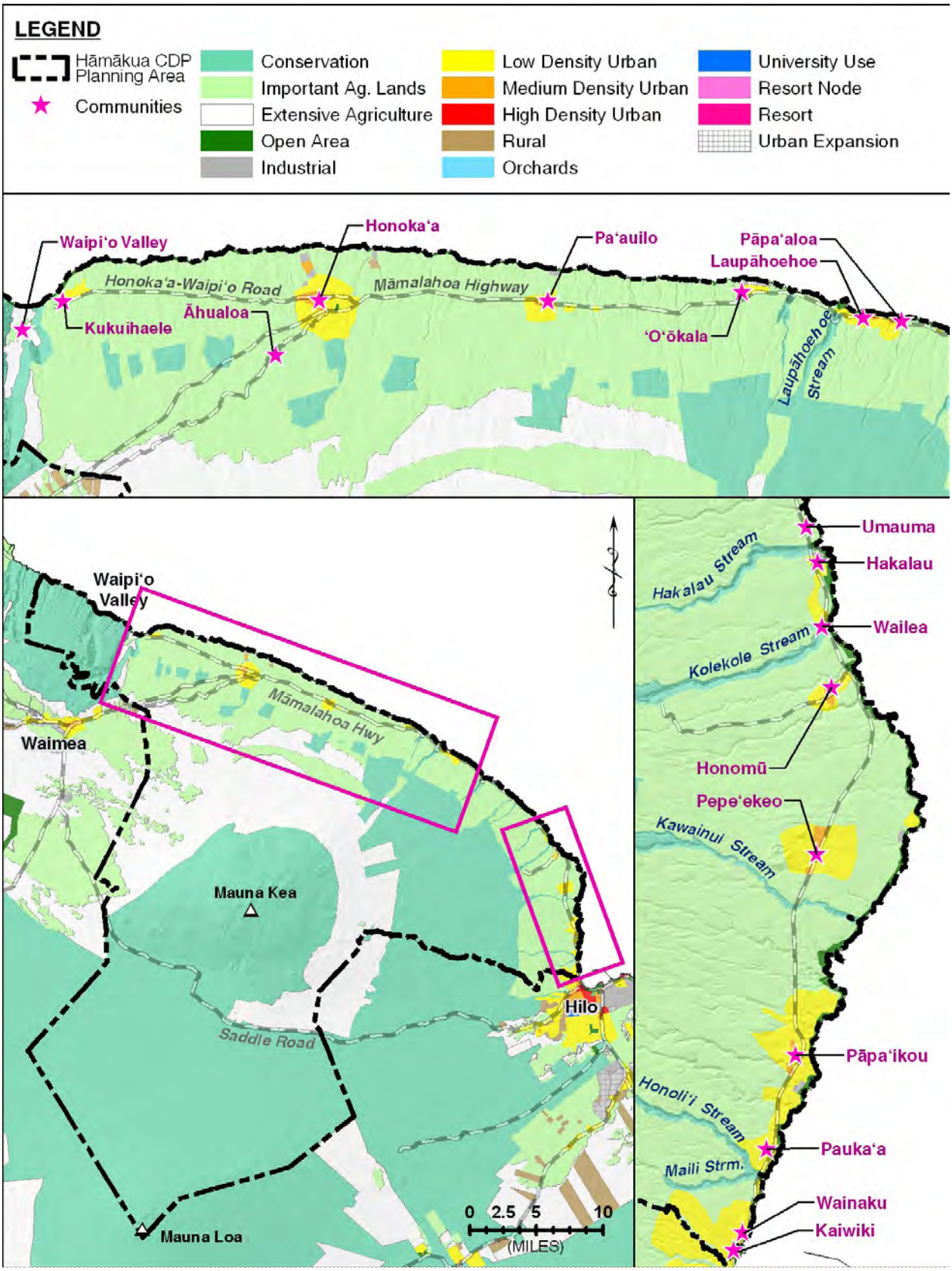
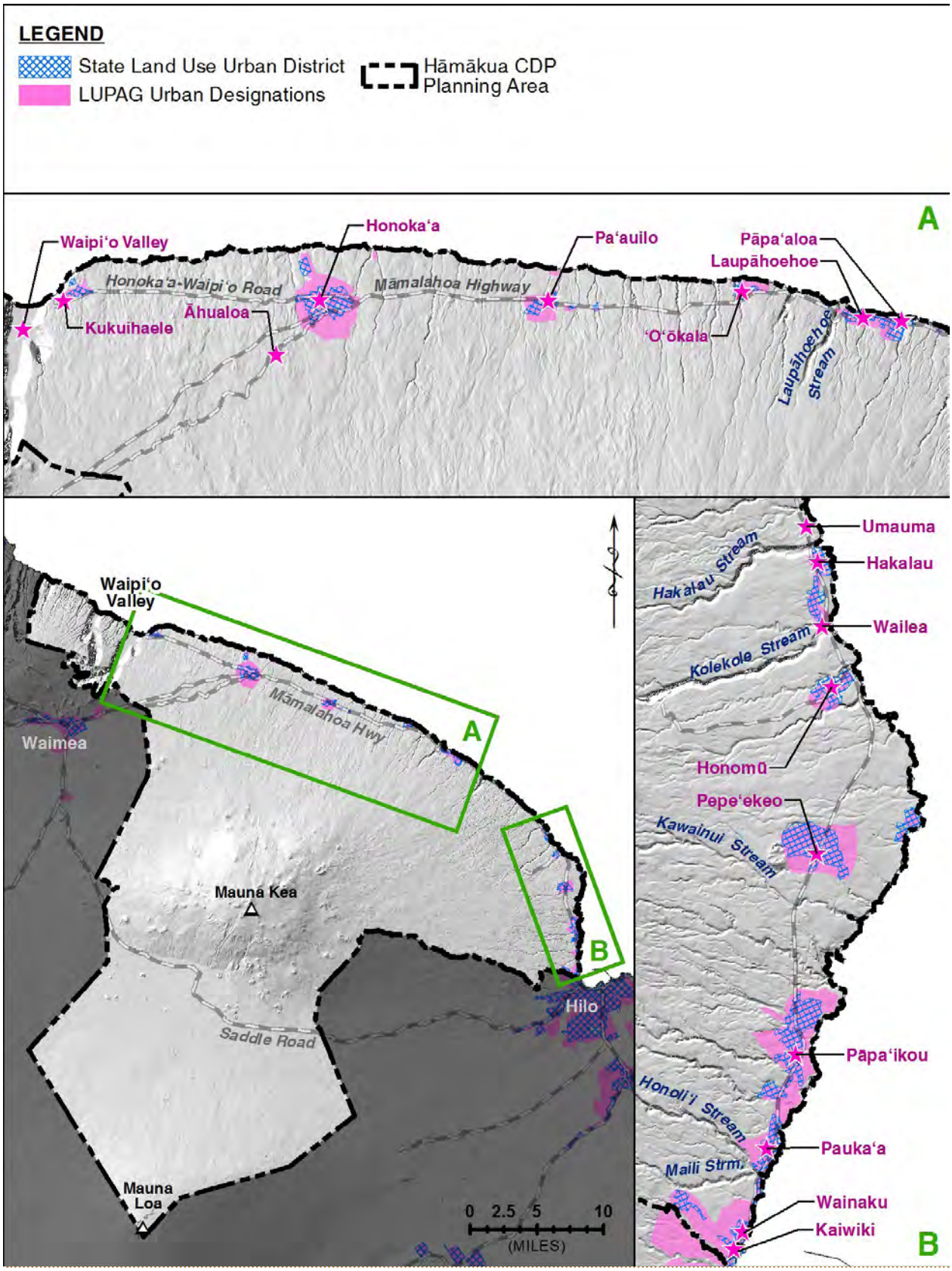


Figure 8-11. Comparison of LUPAG-Urban Designations with State Land Use Urban District



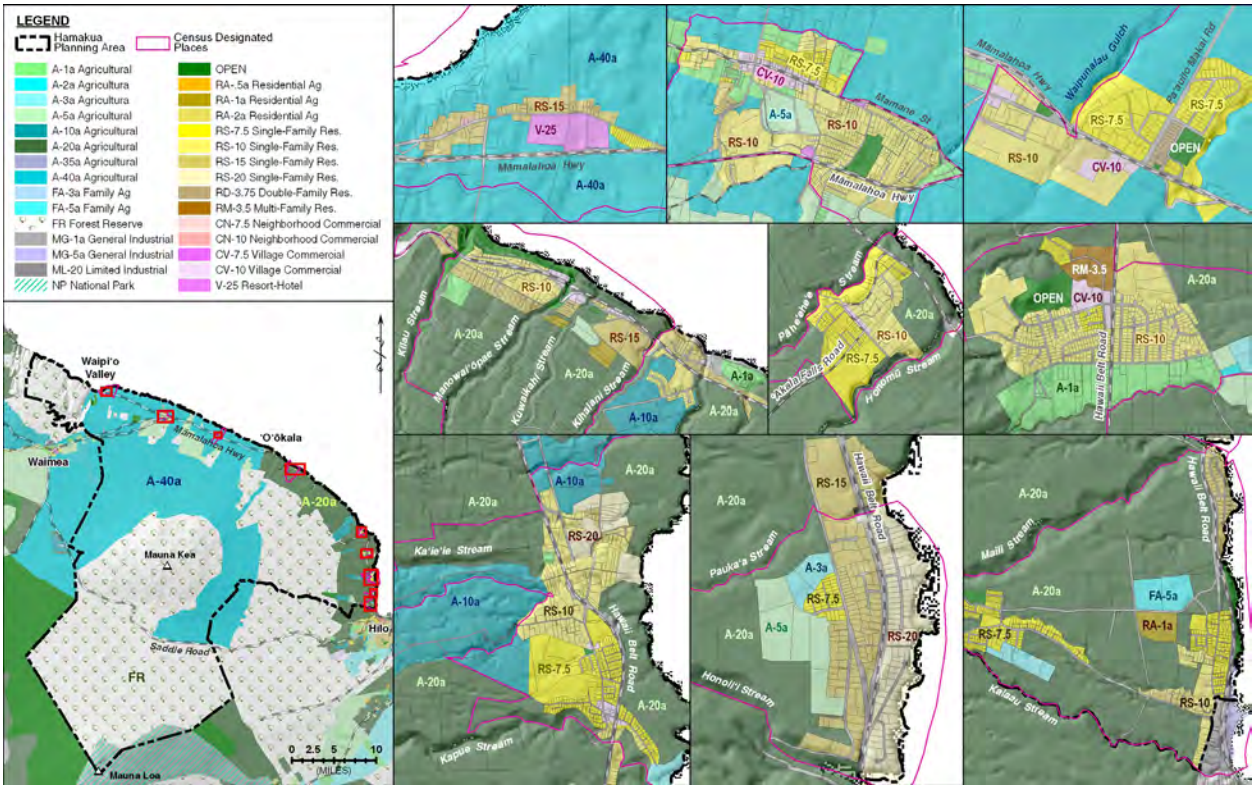
8.4. County Zoning

The County zoning should be consistent with the State Land Use and LUPAG designations. The zoning further classifies the State and LUPAG designations into more specific zones and regulates permitted land uses, allowable density, setbacks, and height limits.

The State Agricultural District lands in the Planning Area are largely zoned Agricultural with a minimum lot size of 40 acres from Waipi'o Valley to 'O'ōkala and Agricultural with a minimum lot size of 20 acres from 'O'ōkala to North Hilo (see Figure 8-12).

The State Urban District lands in the Planning Area are primarily zoned Single-Family Residential with a minimum lot size ranging from 7,500 to 20,000 square feet. The commercial areas (zoned CV or CN) are located in the centers of Kukuihaele, Honoka'a, Pa'auilo, Kukaiau, 'O'ōkala, Laupāhoehoe, Pāpa'aloa, Wailea, Honomū, Pepe'ekeo, and Pāpa'ikou The Commercial zoning (CV) is inconsistent with the General Plan LUPAG in 'O'ōkala and Pāpa'aloa, both of which are in the IAL designation instead of HDU, MDU, or LDU. The Industrial zoning is located in Haina, 'O'ōkala, Pāpa'aloa, Hakalau, Pepe'ekeo, and Wainaku. The Industrial zoning (MG) is inconsistent with the General Plan LUPAG (should be Industrial or Urban Expansion) in Haina ((MDU and IAL), portion of 'O'ōkala (LDU and IAL), Pāpa'aloa (IAL and Open), portion of Pepe'ekeo (IAL), and Wainaku (Open). The General Plan Industrial areas are not zoned Industrial at Haina former mill site (A-40a), Pā'auhau former mill site (a-40a), Pa'auilo former mill site (A-40a), a portion of 'O'ōkala (A-40a), portion of Hakalau former mill site (RS-7.5), and former Pāpa'ikou mill site (RS-7.5). There are approximately 100 parcels in the Planning Area that are Agricultural-zoned but located in the State Land Use Urban District that are potential candidates for upzoning.

Figure 8-12. County Zoning



8.5. Special Management Area and Shoreline Setback Area

The County designated a Special Management Area (SMA) to regulate land uses along the shoreline pursuant to the Coastal Zone Management Act (HRS chapter 205A, Part II). Within the Planning Area, the SMA boundary is generally defined by the Hawaii Belt Road up to Ka'awali' Gulch. North of Ka'awali' Gulch, the SMA is makai of the Hawaii Belt Road extending as a band averaging approximately 500-700 feet wide from the shoreline until Waipi'o Valley. At Waipi'o Valley, the SMA extends inland encompassing most of the valley floor to the extent of the Agricultural District.

Any proposed use that meets the statutory definition of "development" requires a SMA Major or Minor Permit (HRS §205A-22). The Planning Commission approves a SMA Major Permit, while the Planning Director approves a SMA Minor Permit (Hawaii County Planning Commission Rule 9).

Within 40' of the shoreline, there is an additional shoreline setback regulation pursuant to the Coastal Zone Management Act (HRS chapter 205A, Part III) that restricts most activities except those permitted or determined to be "minor" (Planning Department Rule 11-7 identifies the permitted activities and §11-8 sets forth the procedures for determination of a "minor activity" or "minor structure"). The Planning Commission must approve a shoreline setback variance to permit any other structures or activities (Hawaii County Planning Commission Rule 8), which also triggers environmental review under the Environmental Impact Statements law (HRS chapter 343).

A determination of the "shoreline" is necessary in order to determine the inland extent of the 40' setback area. Usually, the Planning Department requires a certified shoreline conducted by a licensed surveyor pursuant to specified procedures (HRS §205A-42). However, the Planning Department also has the authority to waive the requirements for a certified survey "where there may be special or unusual physical circumstances or conditions of the land or where a structure or activity is proposed at a considerable distance inland" (Hawaii County Planning Department Rule 11-4(c)). Within the Planning Area, the sea cliffs often present a special condition where the Planning Department has generally allowed the applicant to avoid the time and cost of a certified shoreline by defining the shoreline as the "top of cliff," which usually sets the boundary further inland than a certified shoreline survey along the toe of the cliff.

8.6. DHHL Memorandum of Agreement

The County and the Department of Hawaiian Home Lands (DHHL) entered into a Memorandum of Agreement (MOA) in 2002 to clarify real property tax payment obligations, county maintenance obligations on DHHL property, applicability of County land use and building requirements, and enforcement obligations. The basic premise of the MOA is that County zoning cannot override the authority of the Hawaiian Homes Commission to control the uses of its property. This premise is based on the Hawaii Supreme Court's statement in Kepo'o v. Watson, 87 Haw. 91, 952 P.2d 379 (1998), that zoning restrictions would not apply on DHHL property because they had the ultimate effect of controlling the use (87 Haw. at 101). Although this is not a binding statement of the law, because the case did not directly involve county zoning, it is the closest statement made by the court on the issue. On the other hand, the court also said in Kepo'o that DHHL property could be subject to other governmental regulations enacted to promote the public health and safety, such as environmental laws, as long as they had only an incidental or indirect effect upon the use of the property. This opinion, therefore, is the legal basis for applying other

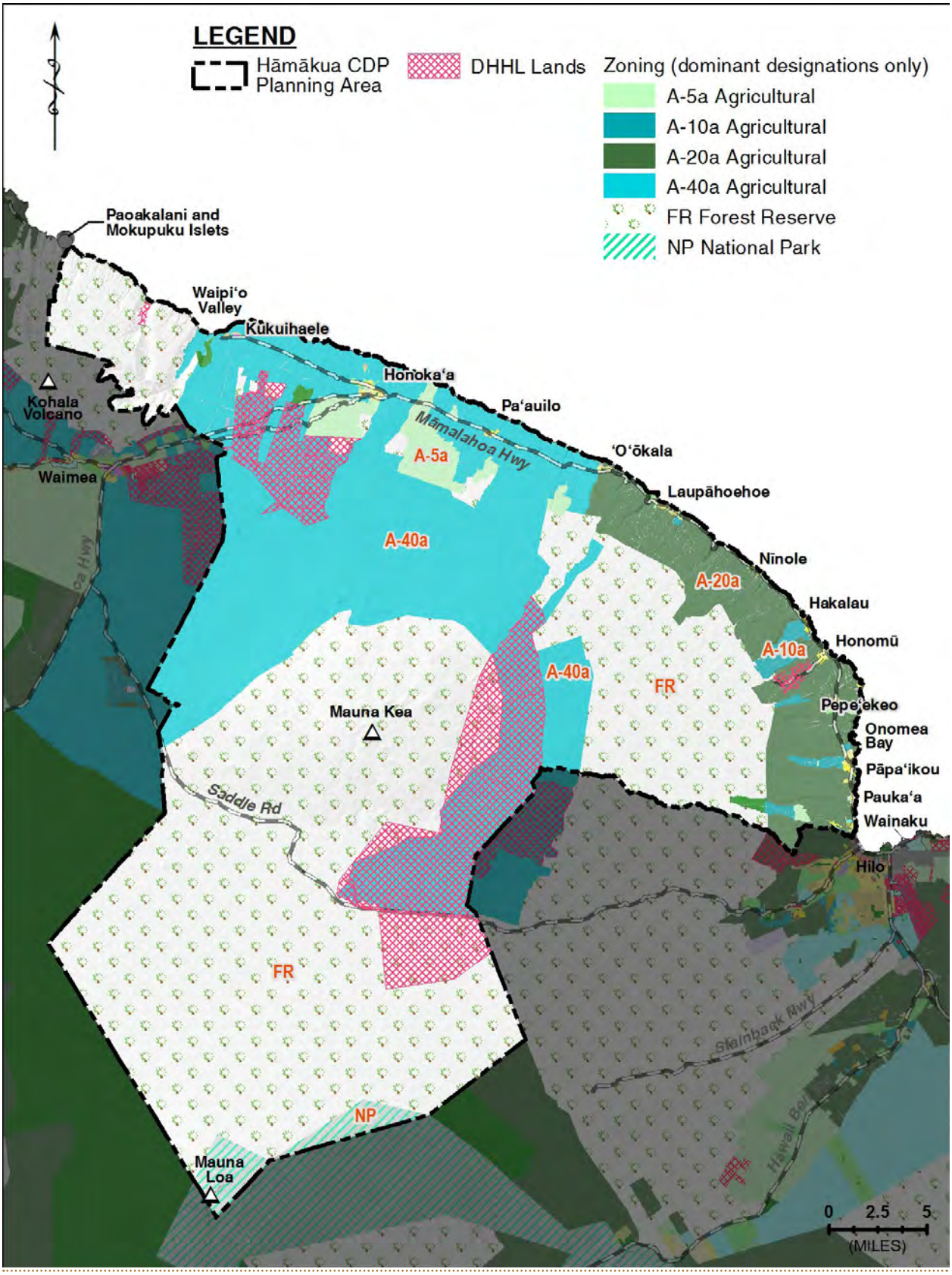
regulations such as the various standards of the zoning code (setbacks, required parking areas, etc.), the building code, the subdivision code, grading ordinance, and flood control laws. Much of what the Planning Department does—subdivision approval, plan approval, building permit review—happens after the determination of the basic use has been zoned. These Planning Department services are necessary for the orderly development of land in this county. They are a service both to the affected landowner and the general community.

Under the MOA, DHHL determines the uses for its lands through its own planning system, and will follow land use plans adopted by the Hawaiian Homes Commission. Generally speaking, DHHL must go through a Chap. 343 EIS process before beginning any new projects, because of the Hawaii Supreme Court's decision in Kepo'o, so the public can comment on their plans during that process.

Once DHHL designates the zoning, the Planning Department will administer permits and approvals on DHHL property in the same way as it would for other landowners. For example, if DHHL constructs a new residential subdivision in what they have designated as an RS-10 zone, they will apply for subdivision approval in the same manner as other subdividers, and will be held to the same standards for roads and other infrastructure (unless they obtain a variance or a PUD, again through normal procedures). DHHL lessees who wish to construct buildings in commercial districts will need Plan Approval. In reviewing building permits for homes on DHHL property, Planning Department staff will look for the same elements as in the applicable zoning district, such as setbacks, parking, and heights. DHHL lessees will have to apply (with DHHL consent) for special permits on agricultural land, and for use permits on residentially-zoned land, if they wish to commence uses that would need special permits or use permits in the zone in question.

Within the Planning Area, DHHL owns land at Humu'ula (48,750 acres), Honomū-Kuhua (765.928 acres), and a cluster of lands between Honoka'a and Waimea-- Ni'eni'e (7,134.94 acres), Honokāia (3,243.04 acres), Kamoku-Kapulena (3,529.124 acres), Waikoloa-Wai'ale'ale (1,205.98 acres) (see Figure 8-13). Although DHHL has designated the zoning on other lands in the County, it has not designated the zoning for any of its lands within the Planning Area, which are predominantly zoned A-40a. Based on this existing zoning, DHHL would be restricted to subdivide at a minimum 40-acre lot size.

Figure 8-13. DHHL Lands and MOA Designations



8.7. Development Potential

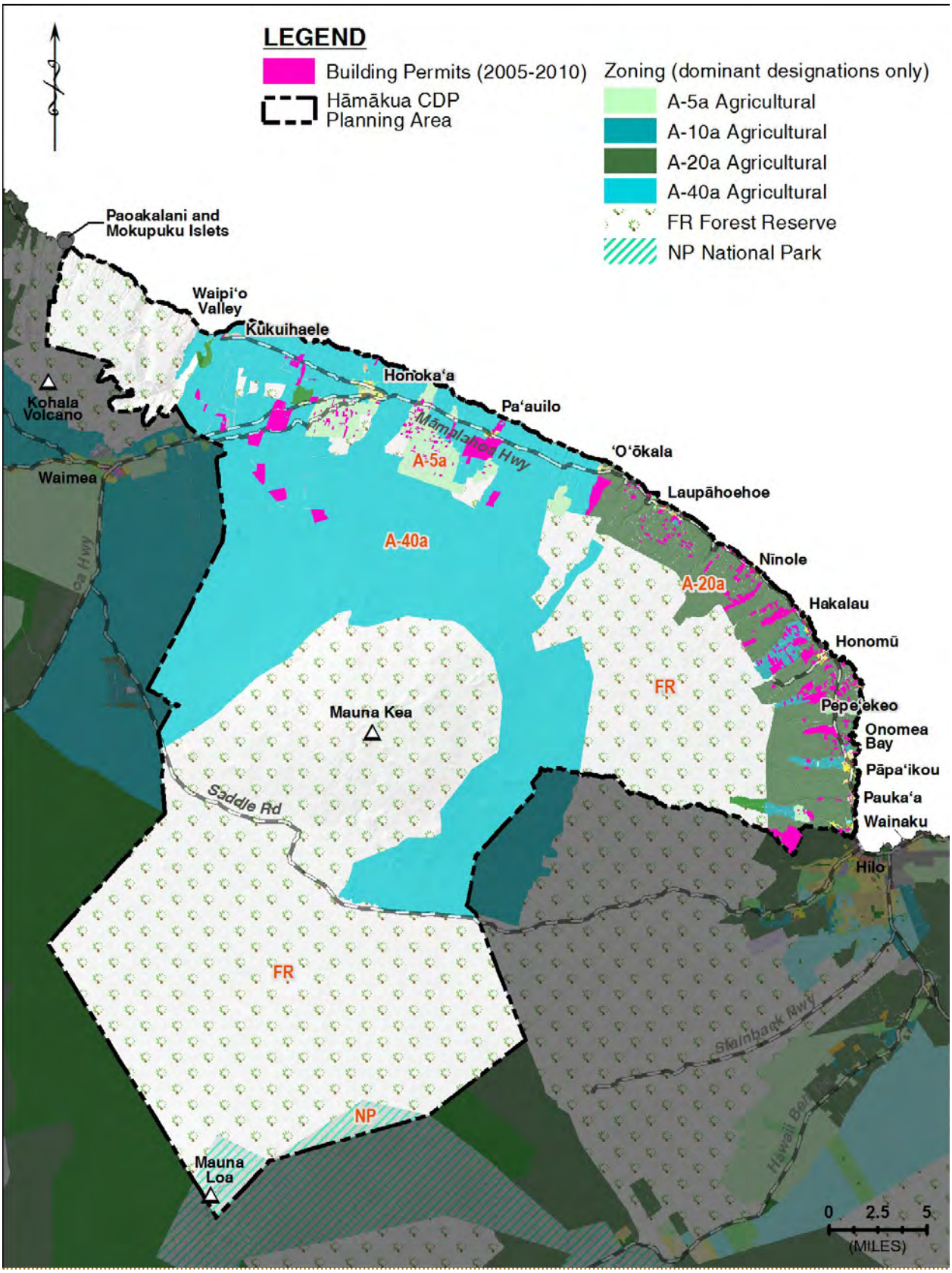
Buildout Trends

Based on building permit data from the County for the year 2005 through August 2010, there were approximately 450 new dwellings constructed within the Planning Area (see Table 8-3). Nearly half of these new dwellings were located in Rural South Hilo, between Pepe'ekeo and Hakalau (see Figure 8-14). In North Hilo, most of the new dwellings were in the vicinity of Laupāhoehoe. In Hāmākua, most of the new dwellings were in Pa'auilo Mauka and Āhualoa.

Table 8-3. Building Permits for New Dwellings in the Planning Area, 2005 to August 2010

District	2005	2006	2007	2008	2009	2010	Total	%Total
Rural South Hilo	60	34	34	32	23	15	198	44%
North Hilo	21	26	24	17	14	9	111	25%
Hamakua	32	39	34	14	15	6	140	31%
	113	99	92	63	52	30	449	100%

Figure 8-14. Building Permits (2005-2010)



Pre-Existing Lots of Record Determinations

A parcel has a unique tax map number. A parcel may be further divided into lots usually through a subdivision approval process. However, there are some parcels that contain multiple "pre-existing" lots, defined as "a specific area of land that will be treated as a legal lot of record because of actions that occurred before the enactment of the first applicable county subdivision ordinance" (Hawaii County Planning Department Rule 19-3). These actions usually relate to lots created through the Mahele and vested as Land Commission Awards, or continuously leased units created before the subdivision code such as the plantation camps (for pre-existing lot determinations based on leases, see Hawaii County Planning Department Rule 19). The subdivision code sets forth the process and criteria to recognize pre-existing lots (Hawaii County Code chapter 23, article 11).

Since the subdivision code exempts consolidations and resubdivisions resulting in the same or fewer number of lots from the requirements and standards of the subdivision code (Hawaii County Code §23-7), a determination of pre-existing lots entitles an owner to reconfigure and create lots based on the number of pre-existing lots without have to meet minimum lot size or infrastructure requirements, except that pre-existing lots "created for use as a road lot, a railroad right-of-way, a flume line, or a pole anchor, shall not be counted for purposes of section 23-7, Chapter 23, Hawaii County Code, unless it is conforming" (Hawaii County Planning Department Rule 20-4). In short, pre-existing lots of record determinations enable substandard subdivisions that are less costly to create than conventional subdivisions.

Within the Planning Area, there are 157 parcels where the Planning Department has determined pre-existing lots (see Figure 8-15 and Table 8-4). Most of these determinations are on agricultural lands zoned A-40a or A-20a where subdivision to smaller lots would be possible without having to rezone.

Table 8-4. Pre-Existing Lots of Record Determinations

TMK	Year Determination was Requested	All Associated TMKs in County File	Pre-Existing Lots	Total
326010031	2005	326010031	1	
		326010035	1	
				2
326010109	2005	326010109	1	1
326011002	2004	326011002	1	1
326012004	1997		7	7
326013007			14	14
326017017			1	1
326012031	2000	326012031	1	1
326013005	1998	326013005	13	13
326013021	2004	326013021	2	2
327003001	1995, 1997, 2001	327003001		
		327003002		

TMK	Year Determination was Requested	All Associated TMKs in County File	Pre-Existing Lots	Total
		327003003		
		327003004		9
327004025	2002	327004025	1	1
327006018	1998	327006018	1	
		327006025	1	2
327008003	1998	327008003	3	
327008003	2002	327008003	2	
327008027	2000	327008027	7	
327008052	2005	327008052	8	8
327008056	2005	327008056	2	2
327008100	2004	327008100	2	2
327009009	1996	327009009		
		327009011		
		327009012		
		327009022		26
327011005	2006	327011005	1	1
327033019	2002	327033019	2	2
327033019	2005	327033019	3	3
327038010	2005	327038010	1	
		327038016	0	1
328002006	2006	328002006	2	2
328002012	2005	328002012	1	1
328002013	2006	328002013	1	1
328006004	2004	328006004	1	1
328006007	1997	328006007	3	3
328007001	2001	328007001	3	
		328008003	2	
		328008005	2	
		328008012	3	
		328008017	2	
		328008019	1	
		328007005	1	
		328007001	18	

TMK	Year Determination was Requested	All Associated TMKs in County File	Pre-Existing Lots	Total
		pepeekeo mill plantation	1	33
328007024	2004	328007024 Lots 11 and G	10	10
328007053	2001	328007053	5	
328008010	2004	328008010 (Lot B-1 Pepe'ekeo Point Subdivision	1	1
328009001	2001	328009001	16	16
328010015	2006	328010015	2	2
328011005	2002	328011005	7	7
328011006	2001	328011006	3	3
328011013	2003	328011013	4	4
328012001	1999	328012001	3	3
328012013	1996	328012013	3	
		328012014	13	16
328012014	2002	328012014	0	0
328012015	2005	328012015	4	4
328013003	2003	328013003	2	2
328013004	2005	328013004	3	3
328013005	2002	328013005	3	3
328013053	1996	328013053	6	6
328015002	2001	328015002	4	4
328015005	2003	328015005	8	8
328016018	2004	328016018	1	1
328016025	1997	328016025	2	2
329001003	2002	329001003	1	1
329002001	1997	329002001		
		329002034		
		329002035		11
329002007	2004	329002007		
		329002014		
		329002015		2
329002023	2003	329002023	1	
		329004054	3	

TMK	Year Determination was Requested	All Associated TMKs in County File	Pre-Existing Lots	Total
		329004056	1	
		331004007	1	
		331004008	1	
		331004009	1	
		331004032	1	9
329003004	2001	329003004	5	5
329003008	2000	329003008	2	2
329003012	2001	329003012	3	3
329004007	2003	329004007	3	3
329004012	2001	329004012	1	1
329004021	2002	329004021	4	4
329004054	2003	329004054	3	3
329004057	2008	329004057	1	
		329005027	1	
		flume right of way	1	3
331001001	2000	331001001	18	18
331001006	2001	331001006	2	
		331001012	2	4
331001020	2004	331001020	3	
		331001041	1	4
331001038	2002	331001038	1	1
331003003	2002	331003003	4	4
331003018	1999	331003018	3	3
331004004	1999	331004004	4	4
331004011	1999	331004011	3	3
331004011	2001	331004011	1	
		331004007	2	
		331004008	6	9
331004020	2001	331004020	2	2
331004021	2002	331004021	2	2
331004027	2006	331004027	2	2
335001015	1999	335001015	3	3
332001020	1997	332001020	2	2
332002004	1996	332002004	6	6

TMK	Year Determination was Requested	All Associated TMKs in County File	Pre-Existing Lots	Total
332002011	2000	332002011	3	
		332002064	6	9
332002019	1998	332002019	2	2
332002035	2000	332002035	6	6
332002036	2002	332002036	1	
		332002037	1	2
332002051	2006	332002051	1	
		332002081	1	2
332003002	2004	332003002	1	1
332003011	2006	332003011	3	3
332003012	1997	332003012	2	2
332004004	2001	332004004	4	
		332004042	3	7
332004005	1999	332004005	3	3
332004027	1997	332004027	3	3
332004031	2003	332004031	1	1
334003023	2003	334003023	4	4
336003003	2001	336003003	2	2
336003008	2004	333003008	3	
		333003009	3	6
336004007	1999	336004007	6	6
336005017	2009	336005017	4	4
336005042	2006	336005042	1	1
336005078	1996	336005078	1	1
336006032	2007	336006032	1	
		336006033	1	2
336006042	2005	336006042	2	2
336006047	2000	336006047		
		336006072		
		336006079	9	
		337001005		
		337001007	1	10
336006057	2002	336006057	2	2
339001001	1998	339001001	1	
		339001002	1	
		339002007	1	
		339002008	1	

TMK	Year Determination was Requested	All Associated TMKs in County File	Pre-Existing Lots	Total
		341001006	1	
		341005001	1	6
342008007	2000	342008007	19	19
342008015	1999	342008015	0	0
343001003	2000	343001003		
		343007010		
		343007011		
		343008001		8
343005002	1997	343005002	5	5
343007004	2003	343007004	3	3
343010005	2000	343010005	2	2
343013002	2005	343013002	1	1
343013012	1999	343013012	2	2
343014008	1999	343014008	1	1
343015003	2000	343015003	3	3
344004005	1993	344004005	2	2
344008003	1994	344008003	2	2
344008041	2009	344008041	2	2
344008129	2000	344008129	2	2
344009002	1997, 1998	344009002		
		344010009		6
344009004	2000	344009004	1	1
344011015	2006	344011015	2	2
344011053	2000	344011053	3	3
344011052	1999	344011052	2	2
344012008	2004	344012008		
		344012009		
		344012021		4
344012012	1997	344012012	3	3
344012022	2009	344012022	1	1
344012029	2009	344012029	1	1
344012030	2009	344012030		
		344012031		
		344012032		3

TMK	Year Determination was Requested	All Associated TMKs in County File	Pre-Existing Lots	Total
344013008	2007	344013008	2	2
345002021	1,998		16	16
345002021 (por)	1999	345002021 (por)	1	1
345003024	2004	345003024	2	2
345004013	2006	345004013	1	1
345004060	1997	345004060	2	2
345006006	2008	345006006	1	
		345006053	1	
		345006079	1	3
345009008	2006	345009008	1	
		345009019	1	2
345010001	2000	345010001	2	
		345010121	3	5
345010017	2000, 2001	345010017	2	2
345013003	2004	345013003	4	4
346007027	2006	346007027	2	2
346007057	2004	346007057	1	1
346009001	2000	346009001		
		346009002		
		346009003		
		346009004		
		346009005		
		346009031		
		346010006		20
346009017	2006	346009017	1	1
346010005	2005	346010005	2	2
346010006	2006	346010006	9	9
346010008	1998	346010008	2	2
346011009	2005	346011009	2	2
347002036	2003	347002036	1	1
347007055	1997, 1998	347007055	1	
		347007054	1	
		347007053	1	3
347009011	2005	347009011	1	

TMK	Year Determination was Requested	All Associated TMKs in County File	Pre-Existing Lots	Total
		347009018	0	1
348003006	2003	348003006	1	
		348003007	1	
		348003008	1	3
348006036	2005	348006036	1	
		348006037	1	2
348007003	2004	348007003	1	
		348007017	1	2
348007026	2004	348007026	2	2
348008011	2005	348008011	2	2
TOTAL				609

Agricultural Condominiums

A condominium is a special form of ownership of real property administered and approved by the State's Real Estate Commission. In the past, a condominium property regime (CPR) had been used to circumvent the requirements of a county's subdivision code. In 2002, Hawaii County amended its subdivision code to require CPR's to meet minimum lot size requirements for certain residential and agricultural zones (Hawaii County Code chapter 23, article 12). Although it is difficult to identify where these CPR's have been created within the Planning Area, several exist. The CPR enables portions of a parcel corresponding to the "apartment" to be bought and sold. The Planning Department, however, does not recognize the CPR boundaries, only the parcel boundaries. An additional farm dwelling permit is necessary in order to get a building permit for more than one dwelling on a parcel in the Agricultural district (Hawaii County Planning Department Rule 13). Hence, although this additional farm dwelling permit requirement does attempt to control the density on agricultural lands, there is nevertheless increased pressure to obtain these permits when the parcel has been condominiumized and each of the separate owners seek their own dwelling on a common parcel.

Urban Zoned But Vacant Lots

There are an estimated 700 parcels in the State Land Use Urban District that are vacant that could be potentially developed (a proxy property tax assessed value of <$20,000 was used to indicate a "vacant" parcel) (see Figure 8-16). These "vacant" parcels ranged in size from .002 to 32 acres.

Figure 8-15. Pre-Existing Lots of Record Determinations

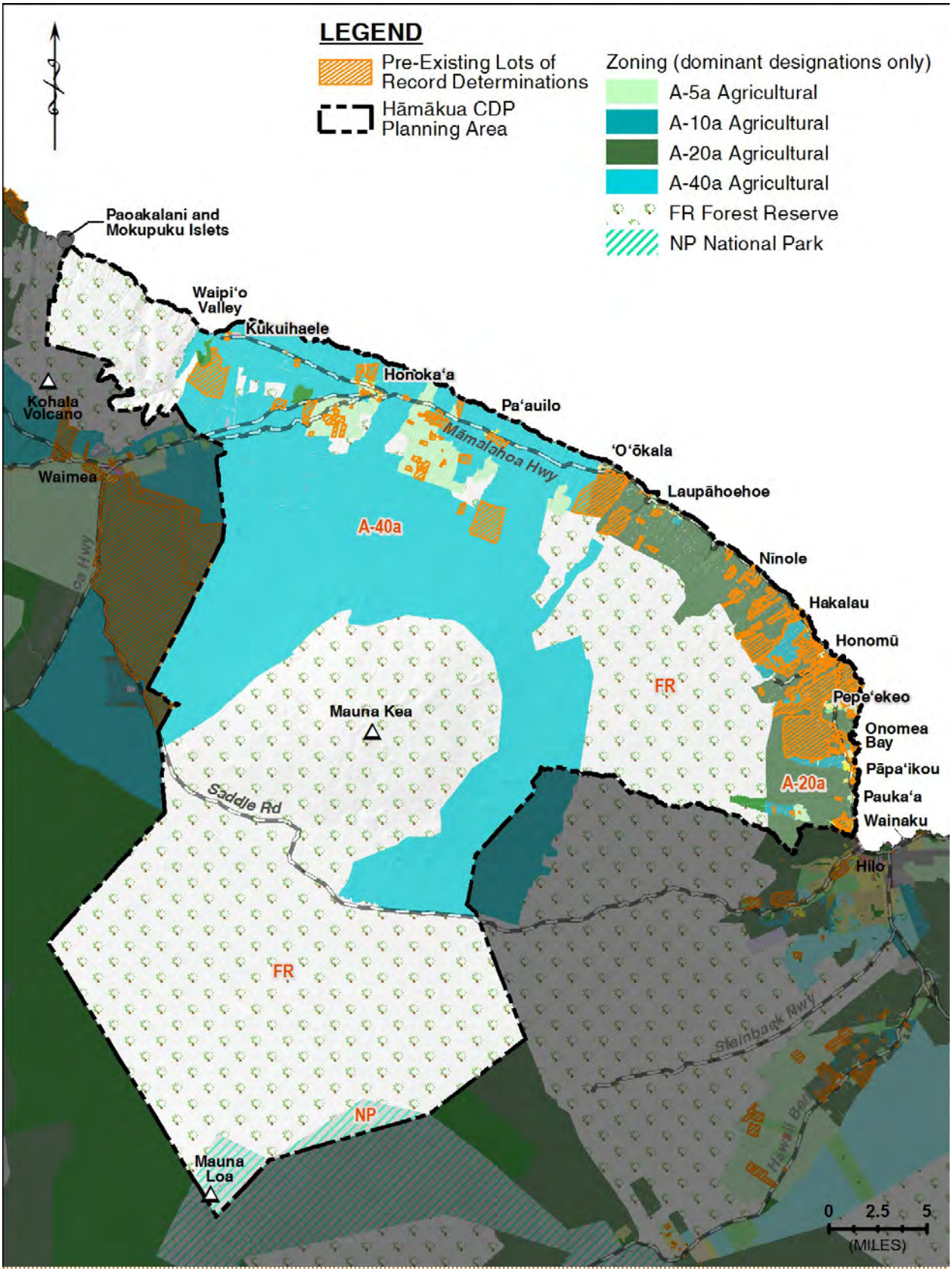
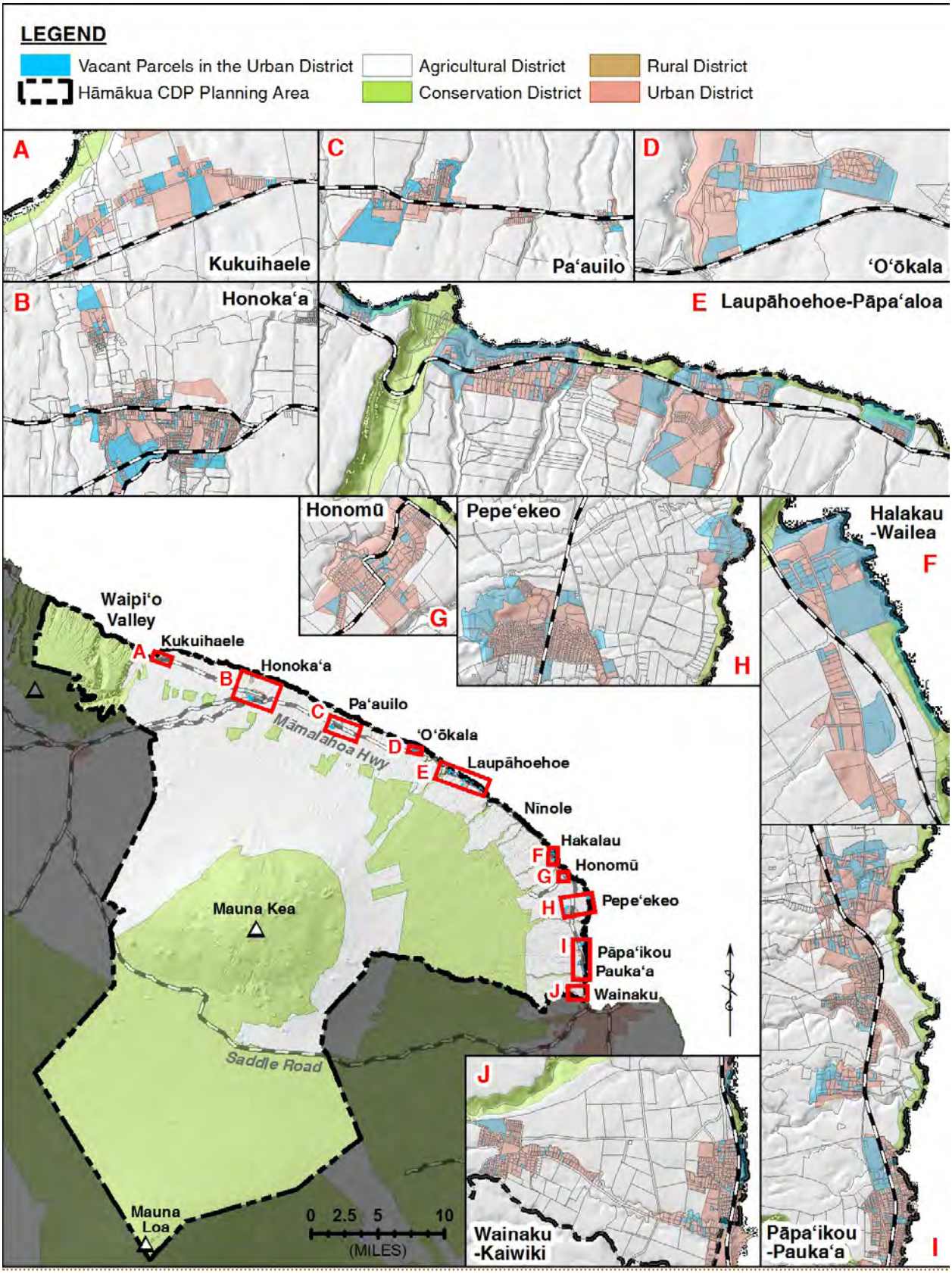


Figure 8-16. Vacant Parcels in the Urban District



9 Community Values & Vision

A vision statement is a formal expression of the overall image of what the community wants to be and how it wants to look at some time in the future. The vision is based on the community's values. With a common vision, a plan can be developed to proactively work toward the community's goals. This chapter summarizes the input received from the Talk Story sessions and survey, the data gathering workshops, and the research presented in the previous chapters of this profile to provide a basis to forge a vision statement.

9.1. Talk Story Sessions and Survey

Between September 2009 and May 2010, the County of Hawai'i invited the communities in the Planning Area to respond to two questions by survey or during small group "Talk Story" meetings: What do you LOVE about Hāmākua (to elicit values)? and What would you like to SEE in Hāmākua in 20 years (to elicit vision)? Anyone could host a Talk Story meeting in their home, with a community group, or any other venue. Talk Story meetings involved between 5 and 15 people and typically lasted less than two hours. The County provided a facilitator and all of the necessary materials. The goal of the Talk Story meetings was to create comfortable and convenient places to encourage broad and open participation. For those who preferred to reflect on their own rather than participating in a group session, the County made available a survey for people to express their values and visions. To ensure that the diversity of Hāmākua CDP planning area residents were heard, the County tracked participants' demographic information, identified gaps in participation, and made a significant effort to fill those gaps through outreach.

The response was higher than typically expected for this type of regional planning effort—15% of the Planning Area's estimated population participated. There was a balanced participation geographically, by gender, ethnically, and by income levels. There was a slight under-representation by the busy working age group between 25-44 years old; on the other hand, extra effort went into school-age participation in the classrooms. Nearly one-third of the participants were life-long residents of the Planning Area, and over half lived in the Planning Area 10 years or longer (County of Hawaii 2009).

The County synthesized the 17,000+ ideas generated by the 2,440 participants into key words and grouped these key words into the themes listed below. The number of responses represented by the key words are in parenthesis.

The list below further groups the themes by the "triple bottom line" or "three pillars of sustainability": economic, community, and environmental goals (Hawaii 2050 Sustainability Plan). This grouping by the triple bottom line goals demonstrates the Plan Area's values as consistent with the Hawaii 2050 Sustainability Plan's Guiding Principles of Sustainability:

- *We balance economic, social, community and environmental priorities.*

- *We respect and live within the natural resources and limits of our islands.*
- *We must achieve a diversified and dynamic economy.*
- *We honor the host culture.*
- *We make decisions based on meeting the present needs without compromising the needs of future generations.*
- *The principles of the ahupua'a system guide our resource management decisions.*
- *Everyone — individuals, families, communities, businesses and government — has a responsibility for achieving a sustainable Hawai'i.*

The Triple Bottom Line Approach:

Where economic, community and environmental goals are in balance. (State of Hawaii Sustainability Task Force 2008)

Table 9-1. Talk Story Sessions- Values

Based on the question: "What do you Love about Hāmākua?"

Community
COMMUNITY/OHANA
Community (887)
Aloha (224)
Education (187)
Ohana (165)
Heritage (85)
Diversity (Cultural/Ethnic) (49)
COUNTRY/RURAL LIFESTYLE
Rural/Small Town (643)
Agriculture (247)
Peace/Quiet (190)
Lifestyle (97)
No Traffic (85)
Controlled Development (69)
Safe (60)
Love it/Home (57)
Agricultural Land Preservation (51)
RECREATION

Sports Facilities & Programs (80)
Hunting (74)
Fishing (64)
Parks (57)
Environment
ʻAINA/NATURAL RESOURCES
Natural Beauty, total (651)
Viewplanes (232)
Natural Resources & Shoreline, total (358)
ʻAina (43)
Soil (43)
Public Access (41)
Weather (e.g., likes the climate) (252)
Open Space (160)
Environmental Quality, total (126)
Clean Environment (115)
Waipiʻo (110)
Economic
LOCAL ECONOMY
Agriculture (247) [also shown above]
Business & Small Business (94)
Food, including Ag (58)

Table 9-2. Talk Story Sessions- Vision

Based on the question: "What do you want to see in Hāmākua in 20Years?"
Overall
Sustainable/Sustainability (128)
Community
COMMUNITY, OHANA, HEALTH, EDUCATION
Education, total (1,163)
Schools 1,014
College/University (99)

Health, total (553)
Clinic/Hospital & General Healthcare (334)
Elderly Care (162)
Housing (278)
Affordable Housing (146)
Increase Housing (47)
Community (146)
Violence, Abuse, & Substance Abuse (94)
Culture (67)
Cultural Center (52)
RECREATION
Parks, total (250)
Parks Playground (96)
Skate Park (94)
Youth Center & Programs (234)
Sports Facilities & Programs (220)
Trails/Hiking/Bike (179)
Recreation, General (127)
Community Center/Gathering Places/ Public Gathering Places (101)
Pools (95)
Hunting (65)
Senior Center (56)
Fishing & Boat Ramp (54)
Festivals & Events/Art Music Culture (45)
Horse Recreation (29)
Beach Recreation & Beach Parks (28)

Environment
‘AINA, NATURAL BEAUTY, NATURAL RESOURCES, ENVIRONMENTAL QUALITY
Land Use (622)
Public Access (489)
Environmental Quality (422)
Waste/Recycling (102)
Invasive Species (93)
Pollution/Noise Pollution (83)
Clean Environment (54)

Environment, general (41)
Natural Beauty (164)
Viewplanes (83)
Open Space (78)
Native Species (55)
Forest (45)
Ocean/Shoreline, Watershed, Rivers & Streams (43)
Waipi'o (120)

Economic
LOCAL ECONOMY
Business, total (1,764)
Jobs (458)
Shopping, total (404)
Shopping Center/Mall (93)
Shopping Grocery/Supermarket (62)
Business, General (202)
Restaurants, including Pubs/Bars (172)
Small Business (111)
Gas/Service Stations (65)
Tourism (50)
Theater (48)
Anti: Business/Big Business/Tourism (43)
Agriculture, total (1,014)
Agriculture, General (234)
Food, misc (108)
Farmer's Markets (93)
Sustainable Ag (88) Organic, Anti GMO, Anti Pesticide/Herbicide (70)
Ag Support, including Marketing & Co-ops (69)
Gardens/Community Gardens (63)
Processing, including Rendering Plant (57)
Family Farms (48)
Local Products (46)
Ranching (44)
Diversified (43)
PUBLIC SERVICES
Transportation, total (957)

Roadways, total (572)
Roads (163)
Multimodal: Walking, Biking, & Horse Transportation (70)
Highway (46)
Alternative Routes (40)
Mass Transit (282)
Bus/shuttles (112)
Protective Services, total (167)
Police (59)
Water (73)
Telecommunications (59)
Public Restrooms (52)
DEVELOPMENT/GROWTH
Stay the same/No change (124)
Limit/Control Development/Smart Growth (115)
Ag Land Preservation (105)
Open Space (78)
Land Use General Planning & Policy (74)
Anti Development, Anti Commercial & Anti Industrial Land Use, & Anti Resort (72)
[Pro Development, Pro Commercial & Industrial Land Use, Pro B&B (13)] Zoning (52)
ENERGY
Alternative, Renewable, & Sustainable Energy (146)
Local Energy/Diversity & Independence (60)
Anti Eucalyptus & Anti Forestry (58) [Eucalyptus, Misc. (6)]
Clean Energy (40)
Anti Biomass/Anti Electric Plant (22) [Pro Biofuel (12)]

There are many similarities in the key words between the responses to "what do you love about Hāmākua" and the responses to "what do you want to see in Hāmākua," probably because what people value are what they would like to preserve into the future. The following "word clouds" combine the vision and values key words, then "scale" the words by the number of responses, and group the key words by the "triple bottom line" of sustainability—community, environment, and economic goals:

Community:

Environment:

Economic:

9.2. Sub-Regional Workshops

Workshop Process

During the months of October and November, 2010, three sub-regional workshops were held to gather information from the Rural South Hilo, North Hilo and Hāmākua communities. ____ individuals signed in as attending the sub-regional workshops.

The purpose of these workshops was to augment the information gathered through the Talk Story values and vision by mapping places the participants considered "treasures" as well as places where they saw problems or challenges. The participants were also asked to review information gathered on maps to correct or add to the mapped information. The workshops were organized in an open house format where topic-oriented stations were available for individuals to review and mark up maps while sharing their knowledge with note takers.

Workshop Results

The comments received from the three subregional workshops are listed below. Many of the comments have been incorporated into the maps in the previous chapters. Following is a detailed summary, by topic, of the comments received and transcribed at the community workshops.

PUBLIC ACCESS

- Destinations
    - Fishing
        - Fishing spots identified (mapped)
        - Desire open access to Haina and Pā'auhau Landings
        - Fishing trails Pepe'ekeo
        - Kapulena Gulch (Old Kapulena Landing or Opala House)- fishing/diving [but access closed now]
        - Abandoned coast guard – there is no access to the ocean, would like open

access

- Hunting
    - Hunting spots identified (mapped)
    - Forest area, access is being closed off, want free access, want to be able to hunt in these forests
    - Access to Mana Rd, Alternative Road to Mountain (mapped)
    - Manowai'ōpae Homestead – residents used to walk up KS lands on trails but now gated/cattle – could it be open for trails?
    - 660 acres of county land below Honoka'a Golf Course sold to a private mainland owner – land manager is local and met with hunters after a year of private ownership. Owner continues to allow access, hunters just have to call
    - There are actively hunted lands in Kapulena. The state needs to maintain access when ag park is formed.
- Surfing
    - Surfing spots identified by community at workshops (mapped)
    - Small state owned parcel N. of Pukihae rivermouth – could be made into a small beach park. Good surfing (mapped).
    - Improve trail access to "Scenics" surf spot (currently State-owned land). 2 trails half way to monument shop and at right side of scenics. (mapped)
    - Pāpa'ikou Beach – owners have been generous in allowing access. They maintain area – only ask visitors to follow minimal rules, current furor is a waste of energy and resources. (mapped)
- Other Destinations
    - Natural pool – was used by plantation families – Olympic swimmer Yoshi Oyakawa (1952 Olympics) trained at Paki Pond. (mapped)
    - Onomea waterfall privately owned; recent diving competition held there. (mapped)
    - Old Boy Scout camp (not gated) swinging bridge
    - Gate blocks access to gathering area at the shoreline (mapped)
    - Waipi'o Valley— tours ok; problem w/ 4-wheel rentals driven by inexperienced off-road drivers; guide books invite the inexperienced
    - Kukuihaele Lighthouse – should restore access
    - Old Road to Laupāhoehoe Point – trail closed. Should be reopened.
      Road closed since 1975.
      County says this old road is too dangerous to open to the public, but Hwy 19 is also very dangerous but the County hasn't closed that road.
      County estimated $4Mil to build trail & $20M for an access road.
      2002 trail opened – closed after earthquake '06
      2007 or 2008 – another boulder fell on the trail; trail is currently usable and not impassable (mapped)
    - Old road to Laupāhoehoe Point. (multiple comments about the importance of maintaining two accesses) Important for emergencies, should be open as a walking trail. People should be able to use it as a walking trail and not hold the County liable should they get hurt.

- Suggestion to access/develop cane roads for recreation (bike or walking trails)
- Hiker access on future HELCO road that is currently used for water pump access at Āhualoa
- Road used to be between Kapuna Road, it is a gravel road owned by the county, can't make a traffic route – when the water isn't running it would make a good equestrian/hiking trail.
- White Road Trail, trail goes up along old irrigation canal, closed from earthquake, is this closed? Can it be opened? Want to make sure it remains open
- Old Sugar Rd. ʻOʻōkala to Waipiʻo Valley; open up for emergencies and fishing so don't have to go through other private properties
- Mana Rd; private owners restrict access

- Access Restrictions
  - Gates
    - Access to Pāpaiʻkou Beach. Should be "public" not gated – not vulnerable to private owners restrictions (mapped)
    - Many roads in limbo gated
  - Land Management
    - Public access signs to hunting area keep getting taken down (end of Kaiwiki Rd) (mapped)
    - Hāmākua Energy Partners were once open to access, but now restrict; they should be involved/required to find solutions
    - Access to public-owned lands— need to ensure and provide
    - Keep our roads in limbo and paper roads public. Do not sell these valuable accesses.
    - Another good land manager who was building trust was Bob Marr. He was community oriented and understood the culture. He helped to clean up the forest, had programs for kids, cleaned roads
    - New construction blocks trails – Pepeʻekeo to Waipiʻo
  - Other Access Comments
    - As new home construction goes up fishing accesses are getting closed.
    - Need funding to research title or conduct surveys for questionable access
    - Good resource people for access: Linda Gallano (hunting), Mike Crossan
    - Organizations related to access: OLAPA— trying to be umbrella for various access groups; Mauka-Makai Access Committee
    - Fencing on both sides should be done to enable more roads to be opened
    - Keep island country!
    - Laupāhoehoe BP: make a wading pool for young children
    - Identify state-owned coastal lands for future public access, parks, etc.
    - Cane haul roads should be used for emergency access. It also enables fishing access. Bridge repairs need to be kept up. The expense/investment in infrastructure should be maintained. Tree hauling possible on cane haul road (ʻOʻōkala to Waipiʻo). Waipunalei-mauka cane haul road also goes

to Hilo
- No State or County land can be sold without assessment of traditional use for hunting and fishing – if so – hunting and fishing rights are more important to current and future generations than short term profit to the County or State
- Problems with Laupāhoehoe Experimental Forest – USDA study plots are marked, leaving dangerous "markers" (including rebar and spikes) in the forest as a part of "research." The markers are dangerous for other forest users, i.e., hunters who have been hunting in that area for generations. Hunters should ask the Laupāhoehoe Community Association to help with that.

NATURAL RESOURCES

- Streams
    - Natural resource protections are not adequate. Too many streams are polluted.
    - ALL streams are important – should not classify one as being more outstanding than any of the others.
    - Healthy streams mean a healthy watershed and adequate flows from mauka areas.
    - The rivers here were once drinkable. Now the life is gone.
    - Who owns old Boy Scout Camp off Kamaee Rd. (swinging bridge site)? The stream at this location has strong recreational and aquatic resources and should be available to the public for use.
    - Suggestion or question about whether or not mountain ʻopae can be propagated
    - Flooding issues between Malanaehae and Kawaikalia Gulch – owners/managers grubbing and/or pushing debris into gulches which impede flows (mapped)
    - Malanaehae Stream has become badly degraded
    - Kapehu Stream – not perennially flowing anymore
    - Pāpaʻaloa Stream not always flowing
- Coastal
    - Hakalau Beach (treasure)
    - DLNR Division of Aquatic Resources proposing to impose fishing restrictions from Waipiʻo to Laupāhoehoe? [editors note: follow up with DAR indicates that none is proposed at this time]
    - Suggestion to make a park or parks makai of Highway for community recreation purposes
    - Swimming at Laupāhoehoe in boat ramp is dangerous, water quality (?) with boat oils, etc.
- Forest
    - Kālōpa Park, want that to remain a reserve
    - Eucalyptus – should be replanted with higher value resources

- Eucalyptus monoculture is a fire hazard
- Forest area, Kinimaka rd, currently mixed forest in private ownership, feels that it may be under threat, want it to become a reserve
- Buffers between any forestry plantings and roads, powerlines and other infrastructure
- Pigs and turkeys are a value for hunting
- Protect ʻOhia forests – no development of tree plantations by wiping out ʻOhia forests
- Un-natural resources = eucalyptus. What is to become of this resource?
- Koa – can grow with very little maintenance if starts are protected from grazing
- Hope that access to the mountains is preserved
- maintain forest resources to benefit Hawaiian birds
- OG Forest proposal in mid-1990's was unwelcome
- Plant higher value trees
- Forest reserve, want to keep it that way
- Preserving the limited forest that we have

- Invasive Species
  - Coqui Frogs – encroaching mauka 1 mile up streams, also in Nīnole, Pihakahuku Stream, mauka
  - Chickens at Kālōpa State Park – Chickens are invading the park and nearby Forest Reserve, creating a maintenance problem and damaging flora. A neighbor to the park has begun breeding chickens, but lets them run wild. Are there any requirements to confine your foul?
  - Pigs: Are there any trappers available to help property owners? Could the County maintain a list of trappers/hunters? A hot line?
  - Waiʻwi - develop industries to utilize this plentiful and useful tree.
  - Waiʻwi is taking over mauka forests and management actions need to be taken ʻOhia can't regenerate when it is so thick.
  - Need a plan to manage selective harvest and use funds to control waiʻwi
- Natural Resource Management Examples
  - Landowner in Pāʻauilo mauka using CREP to restore forest (Ahu Lani) [Conservation Resource and Enhancement Program (CREP)— technical assistance, grants from NRCS and Farm Services Agency (FSA)] (mapped)
  - Landowner on Chin Chuck Road. Has 12 acres of fruit orchard and also growing native (ʻOhia) as well as "complimentary" (native trees of the same region as his fruit trees). Native birds are beginning to re-appear. Could this be an eventual tourist attraction (native Hawaiian birds)? Could this help Hawaiian Bat's recovery? (mapped)
- Other Natural Resource Comments
  - Improve management of State Lands for:
    - Watershed protection
    - Conservation
    - Habitat improvement
  - Recognize the difference between conservation and preservation – keep

certain State lands open for people when doing conservation work. Challenges when preservation consists only of fencing without restoration and management – invasive understory can take over

- Consider existing plans:
  o Hawaiian Civic club (Honokaʻa?) developed a plan for a cultural gathering place (mauka)
  o Look at DLNR stream inventories
  o Look at Hāmākua ag plan
- Help create best management practices for homeowner/landowner stream/drainageway management
- Conservation plans— although NRCS reviews and approves conservation plans for farmers, it seems some farmers or those on short-term leases either do not care or are not aware of the conservation plan requirement; for short-term leases, perhaps hold landowners accountable. As an example, sweet potato farmers may be planting in a way that exacerbates runoff.

HERITAGE RESOURCES

- Historic
  - During the 1965 earth quake all gulches were affected and this should be considered when highway improvements were made. Especially during construction, do not make motorists sit in traffic in the gulches where they are trapped in the event of a natural disaster.
  - Laupāhoehoe School was the first territorial school. (mapped)
  - you can see the concrete remnants of the old train tunnel on the Hilo side of Maulua Gulch. The train used to cross the gulch and continue in the Hilo direction. (mapped)
  - Old Laupāhoehoe hospital building is still intact and should be preserved (mapped)
  - Pāʻauilo Store – near or part of the Post office/Industrial Relations building. Re-open store (mapped)
  - Kukuihaele Plantation Manager's house (1911)
  - John Ross School site (mapped)
  - Haina and Pāʻauhau Landings
  - Need a more robust way to designate Historic and Cultural sites. 50 years old and an understanding of why it is significant
  - Like Estate Oceanside waterfall and swimming pool, very rare and beautiful resource which deserves to be better known and protected.
  - Continuing loss of Old Māmalahoa Hwy destroying a valuable economic resource with cultural implications
  - Section 106 Consultation – N. Hawaiian Rights
  - Pihanakalani Ranch (treasure)
  - historical place; whole Honokaʻa coast
- Cultural
  - two additional heiau locations and a graveyard near Laupāhoehoe (mapped)
  - Preservation and conservation of cultural and sacred sites (Waipiʻo Valley, Waimanu

Valley, etc…)

- Area of Waipi'o valley – Honoka'a stream (whole area) Conserve and Preserve this area. It has cultural and sacred value.
- Laupāhoehoe Point is our piko – must have access from both roads. In the past, the road that now has geotechnical problems was always open (not impacted by slides).
- A community member was glad she grew up in the time she did because it was a time of values. Children were seen but not heard and showed respect to their elders. She also said that there is too much concern about lawsuits and that's why access is restricted. When she grew up you were free to move and go places without fear. If you fall down, well, that's not the property owner's fault.
- Possible remnants of an ancient Hawaiian trail were demolished for Mud Lane (disagreement among archaeologists about if trail was at this location)
- Hongwanji(s) – many beautiful ones; population is growing older – sustainable? Preserveable?
- Native mauka forests and stream gulches are historic and cultural resources (in addition to being habitat)
- Akaka (falls) & Honoli'i – access and cultural heritage rights
- Pāpa'ikou Mill – Hawaiian Village Cultural Site
- Koholālele Landing— very historic area; can get into water; heiau connected to King Umi somewhere in Koholālele, although not sure if any remains of heiau
- Waipi'o needs to be carefully preserved

- Scenic

  - Maulua waterfall
  - Nahaka point
  - Open Space along the coast – Scenic view to keep open
  - Onomea Arch (treasure)
  - Onomea Bay preserved as a natural reserve & scenic wonder w/out obstruction of house lots and gentrified estates
  - Highway view plane to the ocean and mountain. Treasure seeing ocean and mountain at same time from same place – currently unobstructed and should stay this way.
  - Waipi'o Lookout (treasure)
  - the eucalyptus trees obstruct the view to the ocean – used to be able to look at the ocean to see if it was a good day to fish, can't do that anymore.
  - View is gone, can't see the whales anymore, eucalyptus trees blocking the view

- Heritage Resource People

  - Ku'ulei Badua
  - Ka'ai Batalona
  - Gladys Toko
  - Jayson Mock Chew
  - Kelly Loo Sr.
  - Tsue Kawashima
  - Taka Domingo
  - Yoshito Takamine

- Tisha Maikai
- Keala Swain ("Donna Leong") Taught Hawaiian Studies at Laupāhoehoe HS
- Pi'i Laeha – for more cultural/historic info
- John Martines

- Other
  - Pā'auilo Mauka Comm Assn has done oral history of old timers; prevailing comment has been the reduced trees and streamflow (less recharge)
  - Eco-tourism to benefit community too (not for individuals who do not extend generosity to maintain road, resources, etc)
  - Hawaiian culture as a host not recognized

AGRICULTURAL & ECONOMIC

- Agriculture
  - Hāmākua should grow to be a "bread basket"
  - Open space and pasture (cattle industry) (treasure)
  - Comments from farmers at Hāmākua Alive to support ag:
    1. more training
    2. venues to exchange excess produce
    3. demonstration cooking of local produce
    4. research/demo of alternative crops (e.g., high-protein maringa)
    5. Ditch water allocation
    6. Pest control coordination— hard to control if neighbors not cooperating; watch for new crops being brought in – brings in pests that are problem for existing farms (e.g., ants)
    7. Farmers markets limit acceptance to control competition; new farmers have difficulty selling
    8. need compost to restore depleted sugar soils
    9. hemp potential— biofuel, clothing, nutritious food source, bldg material (dave@hoolea.com)
  - "Green" zones (modeled after California)— conservation or ag easements with tax incentives (with rollback tax penalties if taken out of the easement)
  - Right to farm— need some sensitivity to plan land uses to minimize conflicts, but the weight should favor the farmer emphasizing the right to farm law
  - Ag property tax— how to restrict to bona fide ag?
  - Procurement of local food— Schools and Government should pursue local purchasing of food.
  - Ag theft!!
  - No herbicides in Hāmākua
  - Want to preserve the agricultural lands, make sure they are taken care of, improve the farmers ability to farm
  - Co-op to aggregate what we grow/ build /develop community from that

- Increase or support agriculture – sustainable agriculture
- Access to water for agriculture >> Honomū
- Like to see zoning changes to allow small farms (5 to 10 acres); land that people can afford.
- Honomū-Pauuilo has less rain; south of Honomū has more rain-- vegetables have to be grown in shade houses
- Needs to be a market before crop goes in the ground – need mainland distributor for greater capacity, production contract! – neighbor firms producing in partnership – one stop shop for community farmers – small distributor fails to live up to deal, then farmer suffers
- Surplus crop can go towards value added
- Rerview tax laws-- how they can incentivize small farms?
- Map concentration of Ag. Zoning 1,2,3 etc. ensure Ag 20s are actually farming
- Co-op partnership with west side. Software to connect farmers –sellers, distributors, restaurants and buyers

- Towns
  - Preserve Honomū town center
  - Town preservation at Honokaʻa; business incentives; senior housing
  - Pāʻauhau is an active community
  - Honokaʻa town; Blane's example of new development that does not fit plantation character
- Visitor Attractions & Accommodations
  - Jim Reddekopp (vanilla farm owner) contracted by State to assist other farmers to comply with requirements for ag tourism; coordinates tours through Earthbound Tours; County bill 148 re: ag tourism
  - Tour helicopters— landing at zip lines is causing a nuisance
- Energy
  - Bioenergy fed-funded project 1st mtg 10/27/10 at Honokaʻa HS cafeteria
  - Old mill sites— potential sites for alternative energy development
  - Micro-hydro future— to facilitate micro-hydro development, need to first identify which streams are sensitive vs. which streams ok to tap
  - Hydropower— help make permitting process easier for residents to do their own power
- General Economic Development
  - need jobs
  - No market (few opportunities); competition with mainland market
  - Algae to diesel makes sense
  - Honomū – support for access to water. Longer term lease from DHHL so can secure financing.
  - Land use should be mixed use and compatible. Commercial land should not be allowed in agriculture suitable areas.

- Puunoi Ranch
- Encourage small farms, diversified agriculture
- Environmentally friendly economic development
- Community gardens for learning center – build from Hilo + Kohala efforts and expand in Hāmākua
- NO 7/11, healthy food that nourishes us, instead of diabetes
- Jobs with no growth
- Like to see the rural atmosphere stay
- Keep intense businesses in Hilo / Honoka'a
- Business opportunities – small farming ranching island wide. Family owned or operated
- South of Kalalau – Kamehameha Schools: DHHL land /not included in their planning
- Educational programs at ranch: HI boy scouts, FFA curriculum – promoting traditional Ahupua'a – plantation history – we show different ways of farming to small farming – Kalalau Ranch, Victory Gardens
- How do we get our stuff to Oahu for cheap BI= state's bread basket.
- Agriculture comes first. If it prospers everything else will.
- Keep it agriculture; grow crops
- Vegetables can be grown here.
- Possibility of farmer's market
- Restored Makahiki trails & Old Malamahoa highway reconnected for tourists and commuters; economic opportunity/cultural significance/historical preservation
- Wood > Gasification > 10c/Kwhr
- Onomea ahupua'a between Kawinui and Hanaui >>all agriculture expect some gentrified state (along old onomea road). There is speculation of land and fear of suburbanization
- County wide economic development plan. Where does everything fit into county plan
- Taxing people building houses vs. agriculture workers
- Farm as an educational institution > healthy food – want to teach
- Issues about power plant > electricity> made of cheapest materials. Economically trees transport 50 miles not sustainable
- We can be the bread basket for food.
- Agriculture is the most important thing for the community. 2 generations have gone – they don't know where the food comes from.
- Educate community >> involve them more
- Wainaku-Kaiwki area: Waterfall bring visitors- need to maintain view of our waterfalls and make others more available market South Hilo as the "waterfall coast" to attract visitors and help them support local business stability
- Pauka'a: We need to generate power using our rivers – most stable and economical way to create electrical energy
- Pauka'a: We should encourage mix uses on agriculturally zoned land. Keep bulk of land useable for agriculture in agriculture, but allow some sort of commercial such as lodges, visitor shops, and recreational uses on marginal portions of the land including gulches or steep graded areas.

- Pepe'eko: Need to inventory the kinds of business that currently operate in Hāmākua – Formal and informal. Existing industrial properties don't currently serve many existing business. Rural business decentralized /backyard but, for the most part it is illegal under state law with special permit.
- Suggest HCDP acknowledge the decentralized nature of rural jobs/businesses and support this rather than presume businesses establish in industrially zoned land only.

LAND USE, INFRASTRUCTURE & PUBLIC FACILITIES/SERVICES

- Land Use
    - Construct new subdivisions near existing infrastructure – do not entertain underserved "agricultural subdivisions" like those proposed by Peter Savio in the mid-1990's. Contact for more info: Thomas Bearden
    - Waipi'o Valley. Preserve this. Support the taro growing, there is a need to restrict traffic into valley and regulate the number of people
    - Prevent landslides through proper zoning
    - I am against development on open, agricultural land as proposed in Pāpa'ikou. County should buy land and make it a park.
    - There shouldn't be any more subdivisions built until the existing subdivisions/housing are occupied.
    - Many residences w/o permits create problems for housing stock and inadequate housing being rented
    - Existing industrial areas— Existing LUPAG Industrial or Industrial zoning not being used or under-used. Special Permits or unenforced illegal non-Ag uses allow de facto decentralized commercial/industrial development pattern
    - Former mill sites— Preserve Pāpa'ikou and Pepe'ekeo mill sites (editor's note: conflicts with comment above re: existing industrial areas)
    - Industrial areas— former mill sites and Haina mac nut factory are good areas
    - Honoka'a expansion— acceptable growth patterns would be towards Pā'auhau, and towards Kukuihaele near the cemetery in the vicinity of the transfer station
    - Proposed Shropshire proj. – opposed
    - Gentrification trend (influx of wealthier class that displaces the lower income)- encroachment of gentlemen estates is causing a "quiet conversion" of ag lands; need critical mass of bona fide ag activity for a viable industry
    - No development of Waipi'o
    - Stream water quality— development pollutes rivers; streams used to have 'ōpae, hīhīwai; water was clean enough to drink
    - Helicopter noise in Kaiwiki— not against legitimate non-tour flights; up to 5x/day of noise
    - Suburbanization of Ag lots
    - SMA areas – with narrow areas in close proximity to Māmalahoa HWY
        - 1 Acre lots with large house in view from roads
        - High visual and scenic impact -detract from rural/scenic quality
        - Not Ag use
    - Parcel by Hakalau Sugar Warehouse

    - Edge area Min. 40-50' setback width along pali should remain in public domain
    - Views – accessible unique view
    - fishing trail access
    - parcel is part of historical heritage – i.e. Sugar/Plantation Story
- No consideration Probate of Naukana 463 = All Mahele Land – See ceded land case – OHA vs. State of HI
- Public Facilities & Services
    - Laupāhoehoe Point Facilities – the gym needs upgrades. The park needs some lights even though the people above complain of the light at night. Pavilions need to be upgraded and larger. Need larger and improved comfort station. Need to have both roads open or a new road so that the people who live there have a way out in an emergency. The boat ramp needs renovation so that emergency services/rescue can launch from there safely.
    - Learning centers— consider learn to farm centers for schools and adults (e.g., Boys & Girls Club garden, community gardens, school gardens)
    - Recreation— increase and improve sports/rec facilities in the district; gone backwards since plantations shut down
    - No bathrooms at Kolekole Beach Park
    - Need senior housing (town houses within same community)
- Infrastructure
    - Would like to have someone check into Honoka'a sewer system – map sewer lines, outfall, understand treatment (primary only?), relationship for fishing area/outfall, relationship to lava tubes, are the storm drains connected to it?
    - Traffic Safety – Pāpa'ikou
    - Who has rights to Hāmākua ditch water?
    - No more Ag water
    - Water (potable) management issues.
      o How many lines/houses can come off of one service?
      o New well at Kapulena?
      o What are the DOW rules and ability to enforce?
    - Transfer stations – need to be more frequently open.
      o In some ways, trips are scheduled around "going to the dump" and transfer station days/hours of operations.
      o More regular hours may prevent illegal dumping in gulches and elsewhere.
    - Solid Waster Transfer Station run-off goes straight into Kapue Stream, an important cultural resource
    - Old Māmalahoa Hwy between Pepe'ekeo and Honomū— not maintained; provides 1) bypass, and 2) scenic access to Akaka Falls/Honomū (mapped)
    - Water Systems— lack of capacity for the small water systems in the Planning Area forces a development pattern of large high-density projects to recover upfront capital costs for water system improvements, or scattered small projects permitted through water variances or consolidation/resub-

division of preexisting lots
    - Hu Honua power plant— no need for this in the region. Clear-cutting forests will pollute ocean for decades. Transportation of logs for furnace will degrade roads. Burning wet wood inefficient recovery of energy.
    - Water rights— privately controlled; inhibits access and use for micro-hydro
    - State DOT CIP project— pedestrian safety project near Pinky's
    - no place to cross the Highway to access the bus
    - Road name signs along Belt Road— not all roads have signs; however, need to balance the design of signs to not intrude on rural character
    - Truck passing lanes— in anticipation of eucalyptus harvesting, should think about truck passing lanes or off-highway truck routes now
    - Electric car charging stations— consider placement of these stations at park/ride or centralized village parking areas to incentivize future owners of electric cars to drive to these places, and either transfer to transit for longer trips or to walk within town
    - Belt Highway— need more passing lanes
    - Roads in limbo— EMS access an issue (e.g., Nīnole mauka): locked gates, impassable road conditions, unnamed or unrecorded road name in street address database (e.g., Wailele Road)
    - Road standards— dedicable standards are overkill for rural areas; private road standards are an option, but should consider alternate rural standards for public roads
    - Rural bridges (e.g., Nīnole)— lower bridge out of commission for a few years (near Waikamalo Park)
    - Traffic by Pinky's, especially w/new development is a general issue for the planning area
- Other
    - Pā'auilo – Queen L. Stolen property – get better title search

OTHER MISC. COMMENTS

- Squatting – Waimanu – talk to Darren @ Waipi'o Valley
- Young people participating in CDP process at Laupāhoehoe School – they want to fish and hunt – there needs to be a process to encourage this (passing on of traditions)
- Issues with non-payment of taxes
- Rubbish burning,
- Mud Lane trash disposal

9.3. Using the Values and Visions to Guide the Plan Development Phase

The following table synthesize the values, visions, and insights gained through the Talk Story, data gathering community workshops, and the research presented in the previous chapters of this Profile. From this synthesis, proposed guidelines have been derived. These guidelines are intended to help formulate a vision statement and to develop plan strategies.

TOPIC	MAJOR THEMES	Source	Guidelines
Public Access	Access to resource sites (fishing/hunting/surfing/scenic sites) is a fundamental part of the lifestyle for subsistence, recreation, cultural purposes, and also important to pass on values and skills to the next generation.	Talk Story; Workshops	1, 9, 11
	Many fishing spots are dangerous cliffs, but oldtimers know how to handle the risks.	Profile (chapter 6- Heritage Resources)	2
	Many of the desired access require access through private property where rights of access need to be voluntarily granted.	Profile (chapter 6- Heritage Resources)	1, 2, 3
Natural Resources	The Planning Area is geologically young in a wet windward environment characterized by narrow valleys and a high density of relatively pristine streams that is unique in the State.	Workshops; Profile (chapter 2- Physical Environment)	6
	The lush natural beauty and waterfalls are scenic and eco-tourism assets.	Talk Story; Workshops	8
	The mauka native forests are important as critical habitats, recharge areas for groundwater and streamflow, flood management, carbon sequestration, and floodflow management, and most the areas are protected as reserves.	Profile (chapter 2- Physical Environment)	5
	Sea cliff erosion is caused by chronic exposure to waves and episodic seismic activity.	Profile (chapter 3- Natural Hazards)	11
Heritage Resources	Protect cultural places, particularly Waipi'o	Talk Story; Workshops	7
	Preserve Old Māmalahoa Highway and associated historic development	Talk Story; Workshops	8
	Place names can reveal the history, besides historic sites.	Profile (chapter 6- Heritage Resources)	8
	Remnants of the several mills and associated landings remain, which are potential sites for commercial/industrial development.	Workshops	9

TOPIC	MAJOR THEMES	Source	Guide-lines
Economic Develop-ment- Agri-culture	Market expansion ideas: more farmer's markets; more value-added products; cooperative planting to ensure contracted supply and stabilized prices; local food promotion in restaurants and school gardens; niche products.	Talk Story; Workshops	10
	Reduced input costs: alternative energy to reduce utility and fuel costs; local sources of feed and fertilizer; afford-able land.	Talk Story; Workshops	10
	Infrastructure support: cooperative development and maintenance of irrigation systems; centralized washing, storage, treatment, and distribution facilities.	Talk Story; Workshops	10
	Training, research, workforce: farmer certification pro-grams; school gardens to stimulate interest; research into alternative crops and market opportunities	Talk Story; Workshops	10
	Income supplement: appropriate ag tourism.	Workshops	10
Economic Develop-ment- Other	Better education, better jobs; more jobs so next genera-tion has choice to stay.	Talk Story	12
	Revitalize towns to support small business opportunities.	Workshops	8
Land Use/ Public Services & Infrastructure	Large estate homes on ag land (gentrification trend) threatens critical mass supply for viable ag industry.	Talk Story; Workshops	10
	Passing lanes on Highway 19 meet standards; however opportunities may exist for cost-effective pullouts	Profile (chapter 5- Infra-structure)	12
	Direct growth to existing towns with infrastructure; ca-pacity of County water systems influences the buildout pattern of existing towns.	Workshops	8
	Adequate active recreation facilities, but maintenance and additional programs are concerns	Profile (chapter 5- Infra-structure); Workshops; Talk Story	12
	The Planning Area has the most roads in limbo; many are gated; need a maintenance strategy.	Workshops; Profile (chap-ter 5- Infrastructure)	12

Guidelines:

1. Recognize that activities such as hunting and fishing are a significant part of the Planning Area's subsistence and rural lifestyle and requires a resolve from landowners, community, and government to find mutually acceptable solutions to ensure continued access.

2. Distinguish "general" public access from "community" public access recognizing that not all areas should be open to the general public for safety and resource management reasons.

3. Recognize that public access, whether as an established public right or a voluntarily-granted right, is a privilege that comes with responsibility—responsibility to respect property rights, to not trash the area, to respect any rules of conduct specific to the site, to accept liability for risks associated with using the site, and to manage taking to ensure a sustainable resource supply.

4. The few coastal areas that are easily accessible to the ocean (i.e., not cliffs) are priority candidates for public access, or if existing (e.g., Laupāhoehoe Point), should be priorities for enhancement.

5. Support existing management systems of the mauka natural areas and encourage restoration of native forests.

6. Recognizing streams as an important natural feature of the Planning Area, consider riparian buffers and identify suitable conditions to compatibly accommodate micro-hydro energy development and irrigation diversions.

7. Waipi'o Valley has significant cultural, recreational, agricultural, and tourism values that often conflict, and warrants special attention.

8. Consider appropriate upgrades of segments of Old Māmalahoa Highway to provide a rustic link among several historic towns (which would also function as emergency bypasses for Highway 19 closures) to possibly catalyze the revitalization of these historic towns for enhanced small business opportunities that would provide services to residents and ecotourism visitors. Ecotourism should be a personalized rural experience.

9. Consider restoration of feasible segments of the makai Cane Road for emergency bypass, linking former mill sites as commercial/industrial centers, providing public access to shoreline areas, and/or developing a pedestrian/bike corridor for residents and ecotourism visitors.

10. Consider a systematic approach to developing agricultural strategies that addresses all components of the value chain and clearly identifies the role of the CDP and government.

11. Recognize the special risks of sea cliff erosion and whether there is a need for building setbacks and how lateral shoreline access can be fairly accommodated.

12. Consider community financing options for under-funded facilities (e.g., parks, roads in limbo, schools) or to create opportunities (e.g., cane road improvements).

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