2 SOUTH KOHALA YESTERDAY AND TODAY

2.1 GENERAL PHYSICAL SETTING

South Kohala has two distinct physical environments, each with its own kind of natural beauty: the green and lush mountainous region in the north and the rugged, dry landscape in the south.

The mountainous region, which includes the town of Waimea, includes a plateau between the Kohala Mountains and Mauna Kea. The Kohala Mountains provide a backdrop of rolling hills and volcanic *pu'u* covered with pastures and forests kept green by fog, fine mist, and rain.

Green pastures near Waimea Town

Pu'u Hina'i and dry grasslands

The second distinct physical environment is distinguished by pale yellow vegetation, beige to red-brown rock formations along the coast, and barren black lava fields. Amid these rugged and desert like conditions, there are pockets of white sand beaches along the rocky coast. Waikoloa Village, along with the major resort areas, is located in the dry southern region of the district. The Kawaihae area located on the northwest coast of the district is also dry and arid. (County of Hawai'i General Plan, 2005)

Table 2.1 displays the average annual rainfall and temperatures for different regions within the district.

Table 2.1 Average Rainfall, High Temperatures, and Low Temperatures for South Kohala

Location	Avg. Annual Rainfall	Avg. Daily High Temperature Range (Fahrenheit)	Avg. Low Temperature Range (Fahrenheit)
Waimea Area	20-80 inches	75 degrees	60 degrees
Waikoloa Area	10-15 inches	77-85 degrees	65-70 degrees
South Kohala Coast	10 inches	83-87 degrees	70-75 degrees

Source: Waikoloa Highlands EIS; Lālāmilo EIS; County of Hawai'i

2.1.1 LANDFORMS

The major landforms of the South Kohala district and their distinguishing characteristics include:

Kohala Mountains: The Kohala Mountains were created from the eruptions of the Kohala Volcano. The Kohala Volcano last erupted approximately 60,000 years ago. The oldest lava has been dated at 460,000 years old. The volcano is extinct and in the erosional stage of its life cycle. Its eastern windward flank is characterized by great erosional valleys, spectacular waterfalls, and dramatic sea cliffs. The of rubble of a dramatic landslide extends fifty miles out on the ocean floor. The mountain's leeward southwesterly side is within the South Kohala district. This side of the mountain is more gently sloping and smooth. The town of Waimea, pasture lands, and farm lands exist on these gentle slopes. The summit elevation of the Kohala Mountains is 5,480 feet.

The Kohala Mountains

Pu'u: The Kohala Mountain rift zone extends southeastward from its summit into the district in the vicinity of Waimea. The last eruptions were moderately explosive and formed a series of large cinder cones (*pu'u)* that accent the Kohala Mountain and plateau in the surrounding area of Waimea. A number of *pu'u* are also scattered along the Saddle Road and are associated with Mauna Kea.

Coastal beaches dot the otherwise rocky, jagged coastline. Sandy beaches can be found near Anaeho'omalu, Waialea Bay, Puakō, Hapuna State Park, Kauna'oa, Mau'umae, and Ohai'ula (Spencer Beach Park) . There are several man made beaches located at the resort nodes. Much of the coastline is defined by old lava flows that have entered into the ocean.

Mau'umae Beach

Marine seascape: The diverse coral reef communities that occupy the nearshore waters of South Kohala distinguish the district from other districts on the island. These unique marine environments support an extensive reef system populated by a variety of species. Tidal pools, rock formations, and ancient fishponds are also prominent features of South Kohala.

2.1.2 GENERAL DEVELOPMENT PATTERNS IN THE DISTRICT

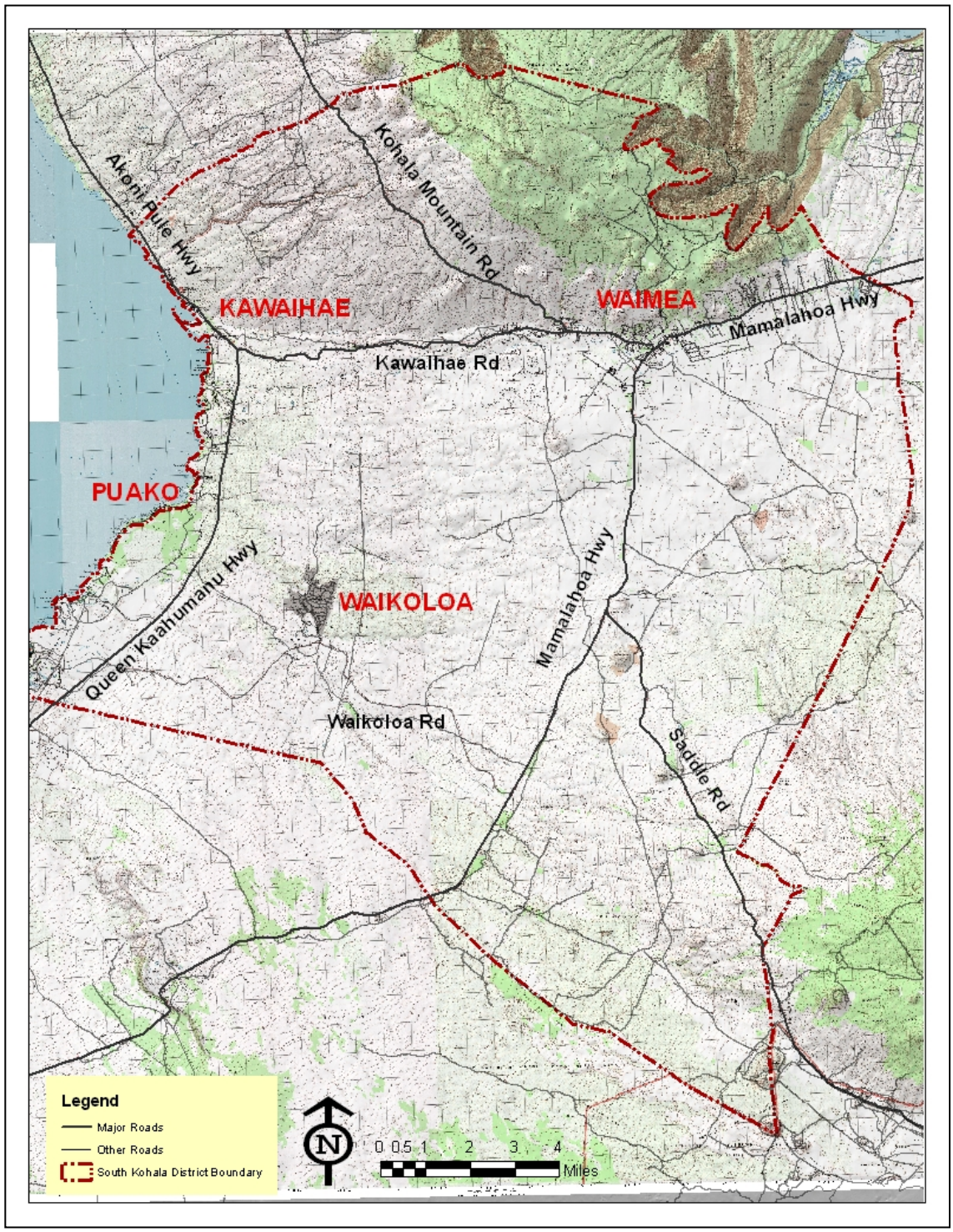
South Kohala's general land development pattern varies greatly between the district's two main population centers: Waimea Town and Waikoloa Village. Waimea Town is a rural community that has a long and proud history. It is situated on a plateau of the Kohala Mountains. Waikoloa Village is a relatively new, more urbanized residential community. Waikoloa Village was originally designed to be a retirement community when it was developed in 1971. However, due in part to the expansion of upscale hotels, restaurants, and shops along the South Kohala coast, and the corresponding housing needs of these employees, Waikoloa Village has evolved into a suburban community for residents of all ages. Community members from Waikoloa Village note that the Village is isolated from other surrounding areas due to its location away from a major highway. There is currently only one access road, Waikoloa Road that connects Waikoloa Village to other areas in the district.

A third key location in the district is the Kawaihae area. Although sparsely populated, the Kawaihae area is home to the only recreational small boat harbor in northwest Hawai'i and the only

commercial harbor in West Hawai'i. The harbor area is a major transportation and activity node, handling both traffic generated from harbor activities and traffic from North Kohala, Waimea, and the resort areas that must all pass through the Kawaihae area at the intersection of the Queen Ka'ahumanu Highway, Akoni Pule Highway, and the Kawaihae Road.

Three large destination resorts are located along the Queen Ka'ahumanu Hwy. The Mauna Kea Resort, Mauna Lani Resort, and the Waikoloa Resort are situated along South Kohala's coastline. Each resort node consists of large-scale, high-end hotels, shops, restaurants, and high-end residential units. Just north of the Mauna Lani Resort is the small residential coastal village of Puakō. Today Puakō mainly consists of single-family homes that have been built along either side of Puakō Beach Drive. A significant number of single family homes are operated as vacation rentals in Puakō. The village is also home to the historic Hokuloa Church, founded more than a century and a half ago by the Reverend Lorenzo Lyons. The Puakō Petroglyph Field is located between the Mauna Lani Resort and the Puakō Beach Lots.

FIGURE 2.1: DISTRICT OVERVIEW MAP



The key planning implications related to South Kohala's physical setting include:

- **South Kohala is a large land area** – Providing adequate public services and infrastructure over such a large area will be challenging.

- **The physical settings and development patterns throughout the district are diverse and distinct** There are several regions in the district that have unique features both physically and in the way that the regions have developed over time. The CDP recognizes the unique qualities in these regions and does not plan for the district in a "one-size fits all" approach.

2.2 SOUTH KOHALA YESTERDAY: AN HISTORICAL OVERVIEW

Anthropologists and archaeologists estimate that the first settlers arrived in the South Kohala region sometime between 750-1000 AD. The warm coast and beaches on the western boundaries of the South Kohala district were used seasonally by early Polynesians who eventually migrated to the cooler plateau. Descendents of these early Polynesian explorers established fishing villages on the leeward coast of the district and along the western extremities of the plains and began cultivating *lo`i kalo* terraces along a series of streams at the southern base of the Kohala Mountains. Construction of the Waimea field system may have involved clearing and burning of the native forest. South Kohala, in particular Kawaihae and Waimea, was an important political region on the Island of Hawai'i. Many high ranking ali'i regularly visited the area and held court here even up to the time of Kamehameha and his son Liholiho. (Clark, 1986) Towards the mid 19th century and on into the 20th century, the district was heavily influenced by the *paniolo* way of life. Toward the latter half of the 20th century, the development of three world class resorts in the district shifted the district's economic base from agriculture to tourism which has influenced land use and development patterns over the last several decades.

2.2.1 BRIEF HISTORY OF WAIMEA

Because of its fertile soils and food productivity, Waimea is known by some as "Edena Nani" (beautiful Eden). The area was a coveted location and was the site of many interisland and intraisland battles between Hawaiian Chiefs. Sometime between the 16th and 17th century, one such interisland battle took place, involving the army of Kamalalawalu, chief of Maui, and the army of Lonoikamakahiki, chief of Hawai'i Island. Kamalalawalu first sent scouts to Kawaihae to spy on the region. The Maui army marched to the plains of Waimea. To their dismay, they were met with a great force of Hawai'i Island warriors. Armies from Waimea, Kohala, Kona, Hāmākua, Hilo, and even as far away as Puna and Ka'u, assembled in Waimea to repel the invading Maui troops. It was said that the host of Hawai'i warriors was so great that they covered the grassy plains of Waimea like "locusts". (Cordy, 2001)

As many areas of Hawai'i were profoundly impacted socially and economically by the rise of large sugar plantations and the in-migration of immigrant labor, South Kohala had no such large scale plantations. During this time period, South Kohala, and in particular Waimea, was greatly influenced economically and socially by the ranching and cattle industries. The origins of the *paniolo* or 'Hawaiian Cowboy' can be traced all the way back to the gift of five cows and one bull that Kamehameha received from Captain George Vancouver of England in 1793. For ten years, a *kapu* on hunting was placed on the small herd. From these six cattle, large herds of cattle eventually developed. In 1838, Kamehameha III asked Spanish-Mexican vaqueros from California to teach Hawaiians how to manage the wild cattle. The vaqueros became known as "*paniolo*."

In 1847, the legendary Parker Ranch was founded when John Palmer Parker purchased two acres of land in the Waimea area for $10. Since then, Parker Ranch land holdings have increased

considerably. Today, Parker Ranch is one of the largest privately owned ranches in the world and is a major landowner in South Kohala.

Several legendary *paniolo* contributed to Parker Ranch's growth and expansion. These *paniolo* included the descendants of several notable families in the area including the Lindsey, Purdy, Bell, Stevens, and Spencer families. These families are commonly known as the "Foundation Families" of Parker Ranch. From their initial beginnings in the early 19th century, these families grew to become large in number and had great influence on the shaping of Parker Ranch and Waimea.

Alfred Wellington Carter assumed stewardship of Parker Ranch from the beginning of the 20th century to the 1950s. He is credited with the further building, maintaining, and preservation of Parker Ranch. Carter also devoted Ranch resources to the education of Ranch employees and their children. He also provided interest free home loans to Ranch employees and was instrumental in getting veterinary service for North and South Kohala and improved medical service for the Waimea community. During his tenure as head of the Thelma Parker Trust, Parker Ranch land holdings grew to 327,000 acres including the acquisition of the 95,000 acre *ahu 'ili* of Waikoloa which includes most of the lands in South Kohala. (Bergin, 2004)

During World War II Parker Ranch played an integral part in hosting 50,000 marines, as they prepared for the battles in Iwo Jima and Okinawa. Waimea had a huge tent city at one point which became known as Camp Tarawa. During their stay in Waimea, the military constructed an entertainment center which was renamed Kahilu Hall and an airstrip that was later converted to commercial use. (http://www.kamuela.com/history.asp)

During the early and middle parts of the 20th Century many Japanese farmers settled in Waimea. They were an important part of Waimea's agricultural history and remain an important part of the community today, as many of these families are a major presence at the Lālāmilo farm lots.

Richard Smart, son of Thelma Parker, and last remaining heir to the Parker Dynasty, took over Ranch operations from Hartwell Carter, son of A.W. Carter during the middle of the 20th century. (Bergin, 2004) Through the remaining years of his life, Smart faced significant challenges when running the Ranch, including the decline in Hawai'i's agriculture and cattle industries and the rise of the tourism industry in the State. Parker Ranch, under the direction of Smart, developed the "Parker Ranch 2020 Plan." Written in the 1980's, the plan described the primary issues of the 80's as "Traffic Congestion," "Inadequate Potable Water and Agricultural Water Sources," and "Inadequate Housing." Smart commented in a publication summarizing the Parker 2020 plan: "Let us work together to make Waimea the kind of community we all desire and deserve. May our land continue to be blessed with all the benefits which make it a better place in which to live."

Richard Smart died in 1992. In his will, Smart bequeathed most of Parker Ranch's assets to the Parker Ranch Trust Foundation. The Parker Ranch Trust Foundation's mission is to "Provide perpetual support for designated beneficiaries engaged in healthcare, education, and charitable support through the sound management of Trust assets while remaining mindful of the needs of the Kamuela community and its unique quality of life." Smart designated five beneficiaries: The North Hawai'i Community Hospital, Lucy Henriques Medical Center, Parker School Trust Corporation, Hawai'i Preparatory Academy, and the Richard Smart Fund of the Hawai'i Community Foundation.

Waimea has also been bolstered by the philanthropic energies of Dr. Earl Bakken, creator of the first battery powered pacemaker. Dr. Bakken moved to Hawai'i in 1989. In 1996 he helped to dedicate the North Hawai'i Community Hospital. Dr. Bakken also helped to establish Tutu's House, "a safe place for people of all ages to learn, share and explore health and healing of the mind, body, and spirit" (www.tutushouse.org); and a non-profit organization known as "Five Mountain," all of which have served to enrich and anchor a healthy, engaged community.

2.2.2 BRIEF HISTORY OF WAIKOLOA VILLAGE

Contrary to belief of many, Waikoloa does have a history of its own. Waikoloa is known as the "*kula*" lands and also the "plains". Waikoloa and its neighbors were identified as "*`ili `aina*" (small land divisions" within a larger political land unit) -- the ahupua`a or kalana -- of Waimea, may indeed help explain why Waikoloa (containing c. 95,000 acres), apparently had no direct connection to the ocean.

Waikoloa, known for its uplands, has two ancient major trail systems: one trail extended between the coastal settlements and marine fisheries of Puakō to the Waikoloa-Waimea uplands.
The second trail extended from the Puakō shore to Napu`u, meeting the upland trail between Waimea and Kona, near Ke`amuku-Kuainiho. Both trails remained in use through the nineteenth century. Use of the Puakō-Waimea Trail appears to have been discontinued primarily as a result of shifting population and the development of long-term leases between the Territorial Government and plantation-ranch business interests. The Puakō-Napu`u Trail remained in limited use through the 1960s, as a part of the operations of Pu'uwa'awa'a Ranch and Parker Ranch.

Waikoloa Village is only a few decades old. Established in 1971, the Waikoloa Village Association is an incorporated property owners' association whose purpose is "to provide for the management, maintenance, protection, preservation, architectural control and operation and maintenance of the common property within the development." Waikoloa Village was originally designed to be a retirement community, but today it has grown to be a more family-oriented community.

Boise Cascade, the original developer of Waikoloa Village, agreed to convey approximately 10,000 acres of land and improvements to the Waikoloa Village Association (WVA). The Clubhouse, swimming pool, tennis courts, and approximately 2,000 acres of land were conveyed to the Association in 1975 and an additional 8,000 acres were conveyed in 1987.

The predominant features of the community include single family homes, multi-family condominiums, a golf-course, a neighborhood shopping center, and a public school which opened in 1994. Several residents in the community consider the Waikoloa Elementary and Middle School to be the "heart" of the community.

2.2.3 BRIEF HISTORY OF KAWAIHAE

Literally translated, the name Kawaihae means "water of wrath". People are said to have fought over the water from a spring in this arid area. Historically, because of the region's dry, arid climate, Kawaihae has never sustained a very large population. However, despite its lack of water, Kawaihae was well known as a residence for ali'i and as a place with fertile off shore fisheries. Kawaihae was an important political region on the Island of Hawai'i. Many high ranking ali'i regularly visited the area and held court here The fishing village of Kawaihae was the birthplace of several notable ali'i, including Queen Kamamalu, wife of Liholiho (Kamehameha II). Some believe that Queen Emma, wife of Alexander Liholiho Keawenui 'Iolani (Kamehameha IV), was also born in Kawaihae. (DHHL Kawaihae Master Plan, 1992)

Kawaihae was a very significant area during the lifetime of Kamehameha the Great. Kamehameha frequently held court in Kawaihae throughout his reign and some of his favorite surfing spots were off the coast of Kawaihae. The Pu'ukohola Heiau was constructed by Kamehameha. The heiau is near Kawaihae and is one of the few remaining heiau in all of Hawai'i that is of Po'okanaka class, a heiau where human sacrifice was performed. Two other heiau exist in the Kawaihae area. The Hale o Kapuni Heiau is a submerged shark heiau in Pelekane Bay. The Mailekini Heiau shares the same site as the Pu'ukohola Heiau. (Puakō Historical Society, 2000)

During Kamehameha's conquest of the other islands, two of his closest advisors were Western men, Isaac Davis and John Young. John Young married one of Kamehameha's nieces and Kamehameha granted him land at Kawaihae. In one of his capacities as the king's advisor, Young acted as a purchasing agent, obtaining supplies for the king's court and setting prices. His presence at Kawaihae helped to encourage more westerners to do business at Kawaihae. Young built the first European style house in the area near Pu'ukohola Heiau in 1798. His household complex was named Pahukanilua and it overlooked Kawaihae Bay. (Puakō Historical Society, 2000)

Throughout the 1800s and into the first half of the 20th century, Kawaihae continued to serve as a major port of commerce for the entire region. Large forests of sandalwood were harvested on the slopes of Mauna Kea and transported to ships anchored at Kawaihae during the early 1800s. During the peak years of cattle ranching in Waimea, from the mid 1800s to the early 1900s, thousands of cattle were brought down to Kawaihae Harbor to be shipped out to other places throughout Hawai'i.

In 1957, the Army Corps of Engineers began construction of a deep draft harbor at Kawaihae. The project lasted for about two years and was completed when the main breakwater was built in 1959. The completion of the deep draft harbor allowed larger barges to deliver and export materials directly to and from the region.

Laurance S. Rockefeller constructed the Mauna Kea Beach Hotel in the early 1960s, paving the way for future resorts and hotels to be developed in the region. Many of the current local businesses in the Kawaihae area receive a significant amount of business from tourists who stay at the Mauna Kea Beach Hotel. In 1975, the Queen Ka'ahumanu Highway was completed. The new highway ran from the Keāhole Airport to Kawaihae Harbor. The highway connected the major coastal towns in West Hawai'i and is one of the major infrastructure improvements in the region that helped to generate future development. (Puakō Historical Society, 2000) The Akoni Pule Highway was dedicated in 1973. This highway was named after Akoni Pule, the State Legislator representing North Kohala during the 1960s, who advocated strongly for a second access road into the district of North Kohala. Prior to the completion of the Akoni Pule Highway, the only roadway into North Kohala was the narrow and winding Kohala Mountain Road.

In 1972, the Kawaihae Canoe Club was formed. The club is a nonprofit organization dedicated to promoting and perpetuating Hawaiian outrigger canoe paddling. The club consists of residents from South Kohala as well as other districts on the island. The Kawaihae Canoe Club area lies north of the commercial harbor near the north small boat harbor. (http://www.kamuela.com/kcc/)

2.2.4 BRIEF HISTORY OF PUAKŌ

In legends and historical accounts, the white sandy beaches of South Kohala were used for canoe landings. Arriving from Kauai, Madame Pele beached her canoe at Puakō. The demi-god Maui also used Puakō as a canoe landing as he was visiting the island during his love affair with Pele. (Puakō Historical Society, 2000)

In 1832 at 24 years of age, Lorenzo Lyons and his 18 year-old wife Betsy Lyons arrived in Kawaihae. He is credited with translating many church hymns into Hawaiian and also for composing hymns in Hawaiian as well. He was lovingly known to local folks as Makua Laiana (Father Lyons), the lyric poet of the mountain country (*haku mele o ka'aina mauna*). Many of the historical accounts in the region come from the journal entries of Father Lyons. Father Lyons also established a church in Puakō in 1858. The church, named Hokuloa, means "evening star." (Puakō Historical Society, 2000) The church is still in regular use to this day and it also serves as a meeting place for the Puakō Community Association.

In 1853, there was a major outbreak of small pox that spread from Waimea to Kawaihae and down towards Puakō. Famine and food shortages in the area also contributed to a decline in the population. Also, more promising economic opportunities on O'ahu and in other larger towns across the islands led many of the native people in the region who did survive the outbreaks to migrate out of the region. (Clark, 1986) In 1859, Mauna Loa erupted and lava from the eruption flowed 25 miles into the ocean along the Kona coast. Although the lava did not flow through South Kohala, the Mauna Loa eruption had a negative effect on the coastal resources of all villages along the Kona coast because of the rise in ocean temperatures that the lava flow caused. From Puakō, Father Lyons commented on the effect the lava flow had on the tiny coastal village: "The heat of the volcanic stream that entered the sea near this place from [Mauna Loa] have killed or frightened away all their fish." (Puakō Historical Society, 2000)

In 1895, the Puakō Sugar Plantation was established by Robert and John Hind. The plantation included 1,500-1,800 acres of land located east of the present Puakō Beach Drive where the present kiawe forest is located. Investment in the plantation included construction of a sugar mill, a wharf, and even a small one-mile railroad track running from the mill to the wharf. However, due to a combination of many factors, including a flood in 1901, and several instances of severe high coastal winds which blew down crops and scattered salt into the soils, the life of the sugar plantation was short-lived. The Puakō Sugar Plantation closed after being in operation for only about a decade and a half. Just seven families remained in the area after the plantation's closure. (Puakō Historical Society, 2000)

During the early 1930s Francis Hyde I'i Brown acquired land just south of Puakō from the Parker family. The area is known as Kalahuipua'a "the family of pigs." Brown was of Hawaiian ancestry and he cared deeply about the land. He made several notable improvements to the area including planting several hundred coconut palms and did some restoration work on the fishponds in the area. Brown was also remembered for his many "Hollywood" like parties that lasted for days and sometimes even weeks. Everyone was invited to his parties, local community members and even visiting Hollywood celebrities. Brown eventually sold the property to Mauna Lani Resort in 1972. (Puakō Historical Society, 2000)

In 1946, coastal communities in South Kohala were witness to a devastating tsunami. At Kawaihae, the tsunami was measured at 12 feet in height. In Puakō, coconut palms were reported to have watermarks on their trunks eight feet high. A long time Puakō resident, Ichiro Goto gave an account of the tsunami in his journal:

> "Puakō Bay was empty for just a minute or two before another wave comes in like some unearthly monster. Roaring like a group of heavy bombers the wave comes in like some wild thing. Pushing rocks, fish, debris, everything and filling every space, and after the spaces are filled looks like some giant hand is pushing the wave up and above to a greater height." (Puakō Historical Society, 2000)

In 1964, Shunichi Kimura, the County's first elected mayor, oversaw the completion of a paved road that connected Kawaihae and Puakō. A decade later in 1975 the Queen Ka'ahumanu Highway. was completed. The new highway ran from the Keāhole Airport to Kawaihae Harbor. Prior to the highway's completion, all vehicular traffic between Kailua and Kawaihae had to pass through Waimea.

In 1987, a large brush fire occurred in the district near Puakō. The fire was accidentally caused by campers at Waialea Bay. Strong winds had blown their camp fire onto dry fountaingrass nearby. The fire spread rapidly toward houses around the bay because of the strong winds. The main blaze lasted for two days, totally destroying seven houses and causing millions of dollars in property damages. (Puakō Historical Society, 2000) Exactly 20 years later in October of 2007, another large brushfire threatened the residents of Puakō. Unlike the previous fires, this fire was thought to have

been purposely set by arsonists. The fire consumed approximately 1,000 acres near Puakō and seriously threatened the Puakō forest. Residents of Puakō were evacuated, but luckily no lives were lost and there was no significant damage to properties.

2.3 LAND USE

State land use districts, **County of Hawai'i Land Use Pattern Allocation Guide (LUPAG)** and the **County of Hawai'i Zoning Code** set forth policies and standards to guide the location, type, and intensity of different land uses in particular areas and regions. The following tables and figures illustrate State and County Zoning land use policies in South Kohala. Please see **Appendix C** for descriptions of County Zoning and LUPAG Acronyms.

FIGURE 2.2: STATE LAND USE DISTRICT (SLUD) DESIGNATIONS IN SOUTH KOHALA

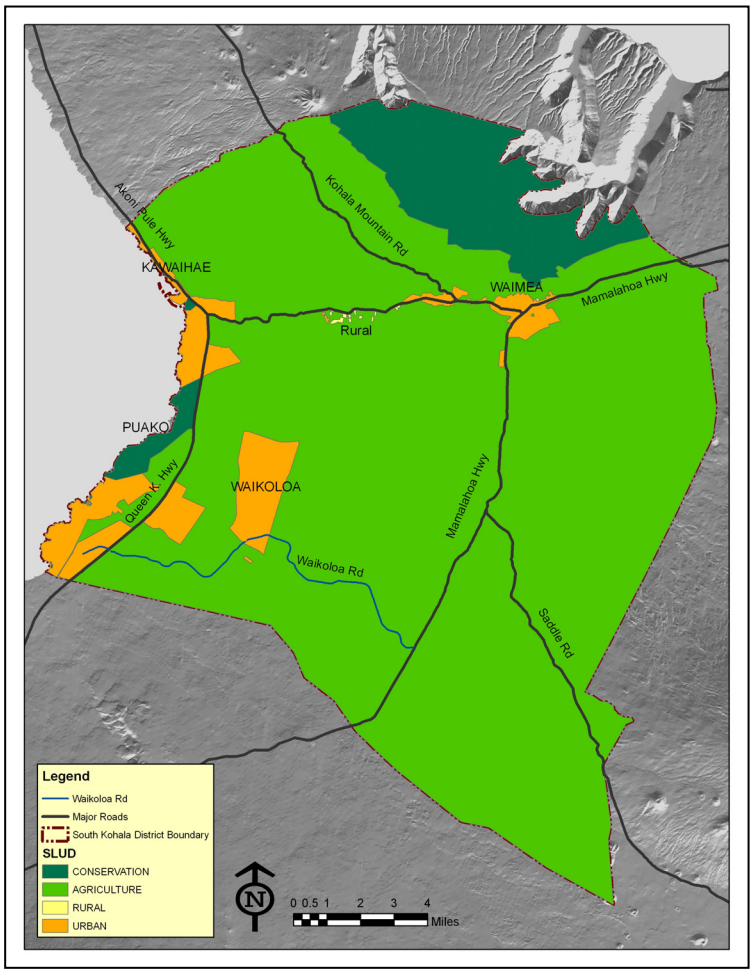


Table 2.2 State Land Use Districts Acreage by County Districts in 2000

Districts	Agricultural	Conservation	Rural	Urban	Total
Puna	175,104	138,563	146	6,329	320,142
South Hilo	70,695	169,493	0	12,814	253,002
North Hilo	53,587	120,110	71	608	174,376
Hāmākua	162,729	235,805	13	1,041	399,588
North Kohala	64,713	13,187	16	2,434	80,350
South Kohala	**150,426**	**15,356**	**53**	**10,608**	**176,443**
North Kona	158,853	188,331	477	17,787	365,448
South Kona	110,749	35,051	31	845	146,676
Ka'u	237,743	422,239	0	1,801	661,783
Total	1,184,599	1,338,135	807	54,267	2,577,808

Source: DBEDT, Office of Planning GIS data

FIGURE 2.3: DISTRICT OVERVIEW OF GENERAL PLAN LUPAG DESIGNATIONS

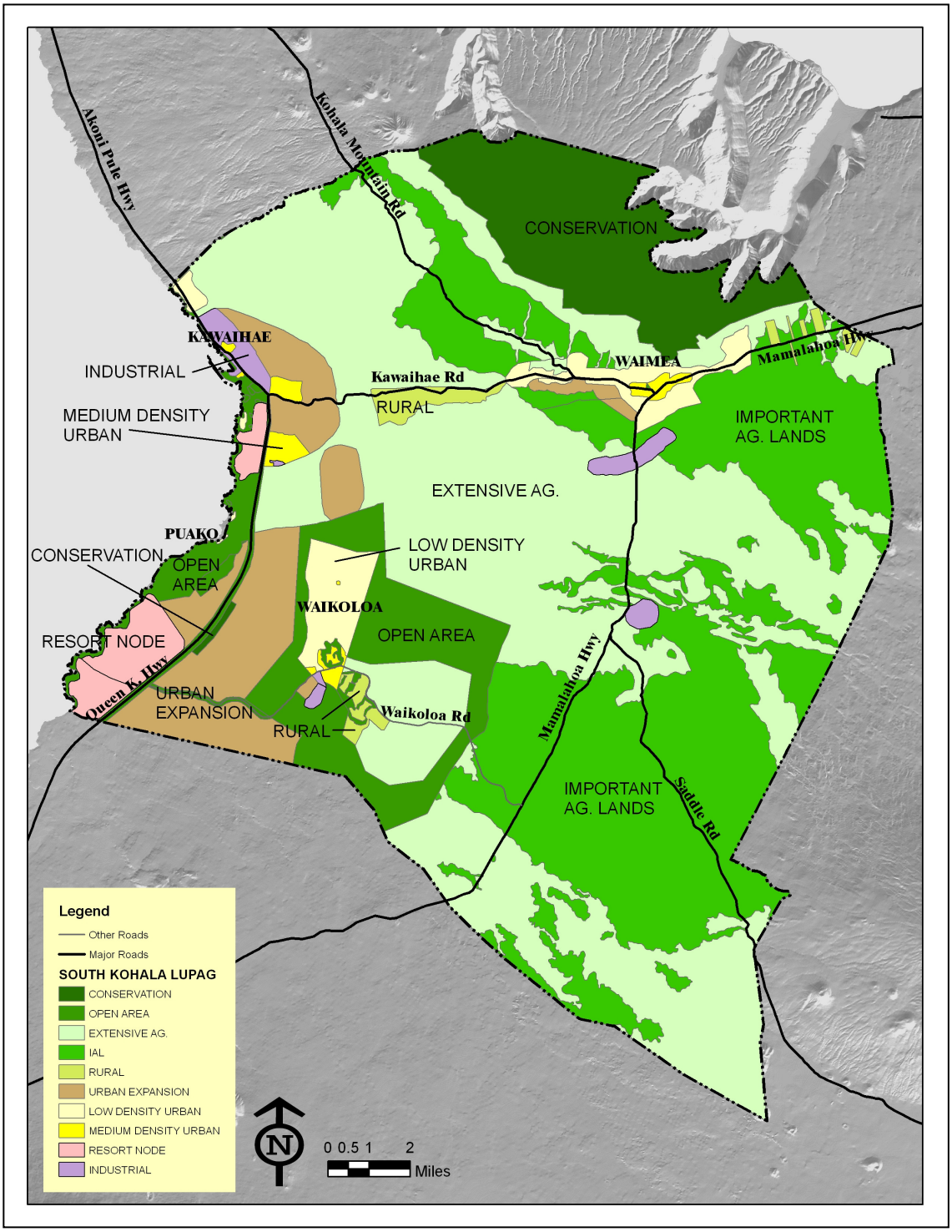


Table 2.3 LUPAG Designation by County Districts

LUPAG Map Designation	Puna	South Hilo	North Hilo	Hamakua	North Kohala	**South Kohala**	North Kona	South Kona	Ka'u	Total
High Density Urban	0	847	0	0	0	**0**	458	0	0	1,305
Medium Density Urban	478	1,481	69	292	176	**1,282**	1,456	292	421	5,947
Low Density Urban	8,013	10,073	617	2,293	2,668	**5,084**	6,287	1,070	1,148	37,253
Industrial	669	4,264	29	132	51	**1,869**	3,889	0	74	10,977
Important Agricultural Land	49,770	37,237	21,632	78,023	41,314	**51,500**	26,703	32,804	47,300	386,283
Extensive Agriculture	88,573	26,078	31,755	82,924	21,885	**71,299**	105,074	66,368	167,426	661,382
Rural	29,251	2,542	71	0	102	**1,908**	1,001	31	13,090	47,996
Resort / Resort Node	0	84	0	0	47	**3,212**	2,289	15	29	5,676
Open Area	2,335	1,798	434	1,266	2,119	**14,074**	6,233	2,699	4,738	35,696
Conservation	137,210	167,779	119,710	235,212	11,217	**13,957**	199,585	43,395	426,956	1,355,021
Urban Expansion Area	3,844	122	62	0	258	**12,264**	11,995	0	597	29,142
University Use	0	664	0	0	0	**0**	461	0	0	1,125

Source: County of Hawai'i General Plan 2005

The **Land Use Pattern Allocation Guide (LUPAG)** of the County is a graphic expression of the General Plan, particularly those elements of the General Plan relating to land use. However, the LUPAG is not the entire General Plan. It is not a zoning map; rather the LUPAG estimates the future acreage allocation for a particular land use and is meant to serve as a land use guide for the County. Generally, future developments must be consistent with the LUPAG map.

Approximately two-thirds of the land in the district is designated as Important Agricultural Land (IAL) or Extensive Agricultural land by the LUPAG. The General Plan defines Important Agricultural Lands as those lands with better potential for sustained high agricultural yields because of soil type, climate, topography, or other factors. IAL was determined by including lands identified as "Intensive Agriculture" on the 1989 General Plan LUPAG map, lands identified by the Agricultural Lands of Importance to the State of Hawai'i Study as "Prime" or "Unique," lands identified by the Land Study Bureau's Soil Survey Report as Class B "Good" soils and lands classified as "fair" for two or more crops, on an irrigated basis by the USDA NRCS study of suitability for various crops. The General Plan defines Extensive Agriculture lands as lands that are not capable of producing sustained, high agricultural yields without the intensive application of modern farming methods and technologies due to certain physical constraints such as soil composition, slope, machine tillability and climate. Other agricultural uses such as grazing and pasture may be included in the Extensive Agricultural category.

South Kohala also has the highest acreage allocation for open area lands with 14,074, the highest acreage for Urban Expansion with 12,264, and the second highest allocation of IAL with 51,000 acres. The Hāmākua District has the highest allocation of IAL with 78,023 acres.

The LUPAG has12,264 acres for urban expansion in South Kohala. The majority of the lands slated for future urban expansion is located near the resort areas, Waikoloa Village, and the Kawaihae area. A smaller acreage of land is designated for urban expansion in the Waimea area. Of the total 29,142 acres designated by the County for urban expansion across the Big Island, 42% of those acres are in South Kohala.

FIGURE 2.4: DISTRICT OVERVIEW OF COUNTY ZONING

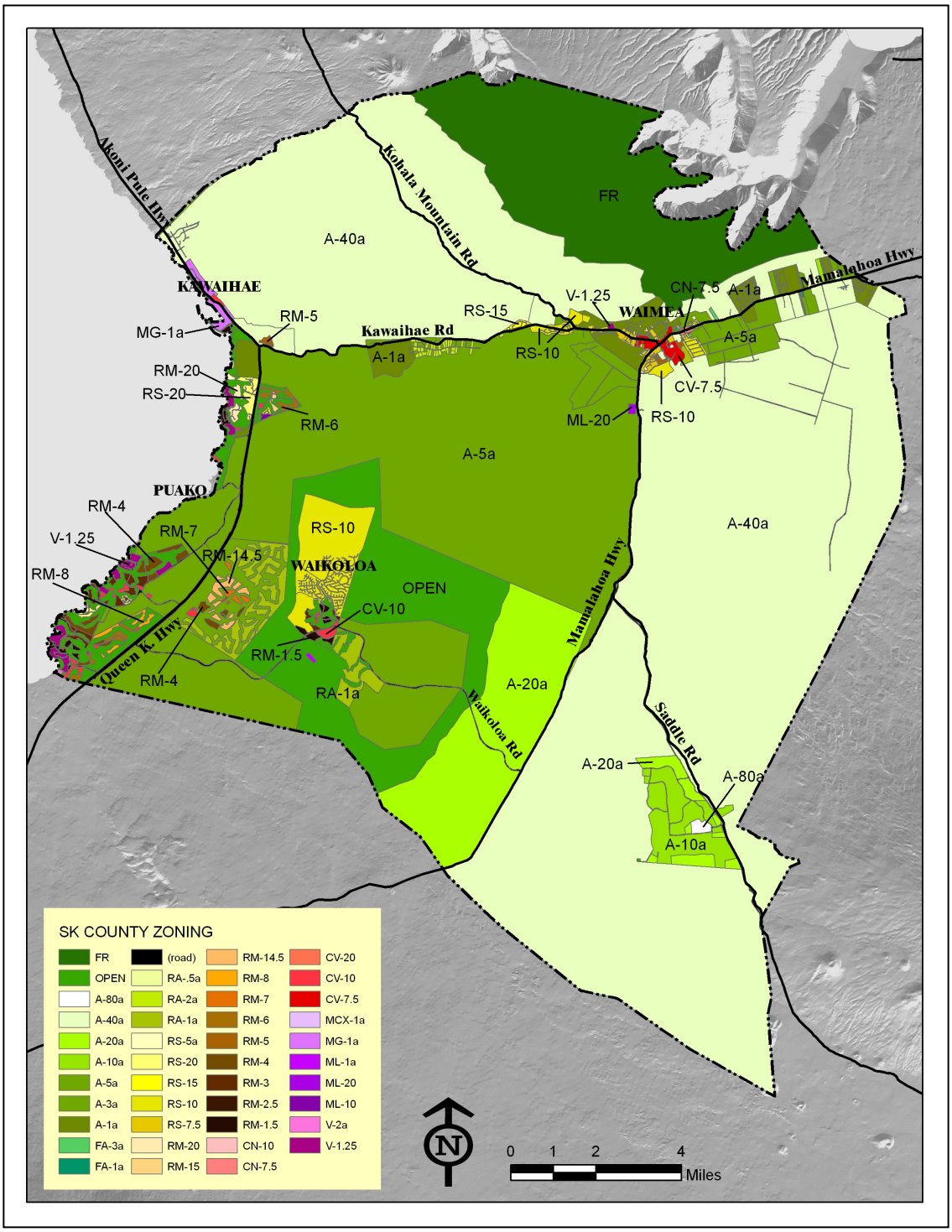


Table 2.4 County Zoning Acreage by County Districts in 2000

Zoning	Puna	South Hilo	North Hilo	Hama-kua	North Kohala	**South Kohala**	North Kona	South Kona	Ka'u	Total
Single Family	2,677	8,374	391	631	652	**3,382**	2,887	414	781	20,189
Multi-Family	4	380	0	4	43	**1,507**	1,026	0	101	3,065
Resort	1	136	0	42	14	**360**	740	15	45	1,353
Commercial	74	1,088	10	38	39	**426**	1,015	108	61	2,859
Industrial	490	2,185	38	15	59	**291**	2,909	0	52	6,039
Industrial-Commercial Mixed	23	4	0	0	0	**0**	0	0	0	27
Family Agriculture	22	26	0	0	0	**6**	39	7	0	100
Residential Agriculture	625	185	55	0	22	**585**	489	144	0	2,105
Agriculture	198,747	73,750	61,954	165,223	67,977	**119,813**	167,415	112,051	252,843	1,219,7 73
Open	5,029	2,065	38	963	27	**11,951**	173,821	7,628	115,740	317,262
Project District	0	0	0	0	0	**0**	1,748	0	0	1,748
Agricultural Project District	0	0	0	0	0	**0**	0	23	0	23

Source: County of Hawai'i Planning Department

As can be seen by the tables, the great majority of lands in South Kohala are designated as agriculture by both the State and County.

Important planning implications related to South Kohala's land use include:

- **The majority of the district is designated as agriculture by State and County**

The majority of the land in the district is designated as agriculture. However, the majority of these agricultural lands are designated as "extensive agriculture" by the County rather than IAL. Future development pressures will inevitably impact these "extensive agricultural" lands to be developed for other uses besides agriculture. These "extensive agriculture" lands, although not important for agricultural production, may still be important for other reasons such as open space preservation, environmental and scenic values, and therefore preservation of these lands should be considered.

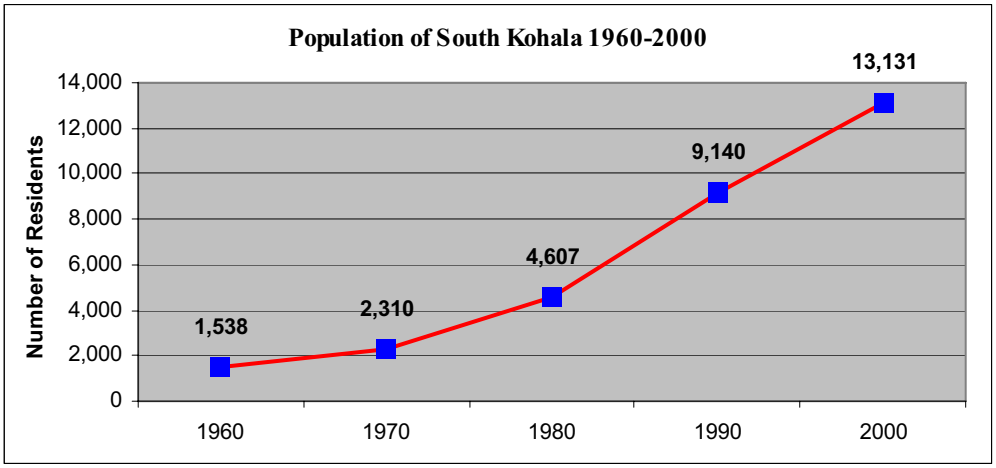
- **South Kohala has the highest amount of lands designated as "Urban Expansion" by the County LUPAG when compared with other County districts.**

It appears that the County is anticipating that significant urban growth and development will occur in South Kohala in the future. The urban expansion areas in South Kohala are primarily located around the Waikoloa area and Kawaihae area. This large Urban Expansion acreage should be re-evaluated during the next County General Plan update.

2.4 DEMOGRAPHICS, LOCAL ECONOMY, AND POPULATION CHARACTERISTICS

According to the 2000 Census, South Kohala was the fourth most populated district in the County. However, it was the fastest growing district from 1980 to 1990 and the second fastest growing district from 1990 to 2000. Figure 2.1 below shows the population trends for South Kohala over the past four decades and Table 2.5 shows the rate of population growth for both South Kohala and the County since 1980.

Figure 2.5 Population



Source: Census 2000, 1990, 1980, 1970, 1960

Table 2.5 shows how South Kohala's population compares to the other districts in the County of Hawai'i.

Table 2.5 Hawai'i County Population

District	1-Apr-80	1-Apr-90	1-Apr-00	% of Total Population (Rounded to the nearest %) 1980	2000	Change
Hawai'i County	**92,053**	**120,317**	**148,677**	**100%**	**100%**	**---**
Puna	11,751	20,781	31,335	13%	21%	8%
South Hilo	42,278	44,639	47,386	46%	32%	-14%
North Hilo	1,679	1,541	1,720	2%	1%	-1%
Hāmākua	5,128	5,545	6,108	6%	4%	-2%
North Kohala	3,249	4,291	6,038	4%	4%	0%
South Kohala	**4,607**	**9,140**	**13,131**	**5%**	**9%**	**4%**
North Kona	13,748	22,284	28,543	15%	19%	4%
South Kona	5,914	7,658	8,589	6%	6%	0%
Ka'u	3,699	4,438	5,827	4%	4%	0%

Source: County of Hawai'i Data Book

Table 2.6 shows future population projections for the entire district of South Kohala with Projection A being the most conservative estimate and projection C being the least conservative estimate.

Table 2.6 Population Projections

Area	2000 Population	2020 Projection A	2020 Projection B	2020 Projection C
South Kohala	13,131	23,947	24,426	26,625
Co. of Hawai'i	148,677	213,452	217,718	237,323

Source: County of Hawai'i Planning Department

2.4.1 ECONOMIC CHARACTERISTICS

Mauna Kea Resort, Mauna Lani Resort, and the Waikoloa Beach Resort, the three resort complexes in the district, account for 40 percent of all hotel rooms within the County. Between 1980 and 1998, ten properties within these resorts were developed totaling 3,400 visitor units. South Kohala hotels are some of the County's largest employers, employing residents from all over the County. There are several new projects being planned these resorts. The Mauna Kea Resort is tentatively planning to develop recreational amenities such as a golf course and 135 large acreage residential lots with associated infrastructure and commercial use on its "Ouli 2" property. Stanford Carr is planning to develop 516 hotel units, three golf holes and related support facilities within the Mauna Lani Resort.

Eco-tourism, nature-tourism, and ag-tourism are growing sectors in the tourism market. Encouragement of these tourism markets would be consistent with the community vision and values. Establishing hiking, biking, and equestrian trails will promote economic activities consistent with these values.

Table 2.7 Hawai'i County's 10 Largest Employers in 2004

Rank	Employer	Employees
1	State of Hawai'i	7,608
2	County of Hawai'i	2,291
3	United States Government	1,221
4	***Hilton Waikoloa Village***	***1,100***
5	KTA Superstores	785
6	***Fairmont Orchid Hawai'i***	***600***
7	***Mauna Lani Bay Hotel & Bungalows***	***580***
8	Four Seasons Resort Hualalai	557
9	***Mauna Kea Beach Hotel***	***556***
10	***Hapuna Beach Prince Hotel***	***542***

Source: County of Hawai'i Data Book

Although tourism is currently the leading economic industry in the district, the area is also well known for cattle ranching, vegetable production, and other forms of agriculture. Waimea is one of the most productive areas for vegetable crops on the Big Island. Cabbages, tomatoes celery, lettuce, daikon (radish), peppers, broccoli and carrots are just some of the vegetables grown. Experiments are being conducted on different crops as well as on the improvement of those presently grown. The highly varied climatic conditions on the wet east side of Waimea and the dry west side of the town allow for a variety of crops to be grown.

Further expansion of the agricultural industry, including more truck farms, faces many challenges. This industry, faced with competition for resources from tourism and other urban forces, needs governmental assistance. (County of Hawai'i General Plan, 2005) There has been a continuing trend of small farmers going out of business because of two primary factors: 1) the market price of land has risen dramatically in the last decade encouraging farmers to sell their land; and 2) a lack of younger generations wanting to take over their family's farm.

The cattle ranching industry utilizes most of the land area within the district with pastures situated on the higher slopes of the mountains and extending down to the sea. Parker Ranch, one of the largest privately owned ranches in the world, has its headquarters in Waimea. The Ranch has approximately 230,000 acres of grazing land that supports 45,000 to 50,000 head of cattle. (Waikoloa Highlands EIS, 2006) Feedlots once allowed ranchers to raise cattle from birth to full maturity. The closing of all feedlots within the County has resulted in the export of 90 per cent of all cattle to mainland feedlots.

The Canada-France Hawai'i Telescope on Mauna Kea has its base facility in Waimea. The base has a staff of 51 and an annual operating budget of $6,200,000. As several planned telescopes are built on Mauna Kea, additional base facilities may choose to locate in Waimea. Waimea is also home to the headquarters of the W.M. Keck Observatory on Mauna Kea, the largest optical and infrared telescope in the world. The headquarters employs about 80 people and has an annual operating budget of $10,000,000. (County of Hawai'i General Plan, 2005)

The educational sector includes Hawai'i Preparatory Academy (HPA) with a current total enrollment of 600 students in grades K through 12, which includes 175 boarders from grades 6 through 12. In addition, Parker School is a day school with an enrollment of 300 students. Waimea Elementary School had an enrollment of 650 and Waimea Middle Public Conversion Charter School had an enrollment of 400 students in 2008. Kanu O Ka 'Āina Public Charter School in Waimea has an enrollment of approximately 150 students. Waimea has three performing arts venues: Kahilu Theatre, Gates Performing Arts Center at HPA, and Parker School Auditorium. In Waikoloa Village, Waikoloa Elementary and Middle School is the largest employer with an enrollment of 625 students in 2008 and 75 employees.

The North Hawai'i Community Hospital is the 14th largest single employer in the County with 269 employees. (County of Hawai'i Data Book) The hospital opened in May 1996 and serves approximately 30,000 residents and visitors of the northern region of the Big Island which includes the districts of South Kohala, North Kohala and parts of Hāmākua and North Kona. The hospital is a non-profit entity that is community owned. (www.northHawai'icommunityhospital.org) In addition to the North Hawai'i Community Hospital's efforts to become a "total body wellness center", there are numerous holistic and alternative health practitioners in this District. Likewise, the resort hotels market wellness and therapeutic vacation packages.

Housing

During the period 2002-2005, Hawai'i's housing market was red hot. However, from 2007, the housing market began to slow across the State, due in part to the nation-wide "sub-prime loans" problems. While more recent data was not available during the writing of the CDP that is South Kohala specific, it is important to note that the housing market nationally has slowed considerably. Hawai'i's housing market has also shown signs of slowing down. By mid 2007, home prices in most areas of the State were flat or slightly lower than their 2006 highs. While home prices have not risen as rapidly as earlier in the decade, many residents still consider the price of homes to be high.

Table 2.8 West Hawai'i Median Value Home Sale Price* 2001 – 2006 by District

District	2001	2005	2006	Percent Change 2001-2006
South Kohala	$225,000	$480,000	$549,950	144%
North Kohala	---	$675,000	$695,000	---
North Kona	$267,000	$579,030	$654,900	145%
South Kona	---	$395,000	$735,000	---

*Prices for single-family homes only

Source: (West Hawai'i Today, 2006

The key planning implications related to South Kohala's demographics and economy include:

- **The population of the district has increased significantly over the last two decades. The County General Plan projects that the current population of the district will almost double by 2020 if current trends continue**

Given past and future population trends in the district, the underlying planning question that these trends raise is "where will all these new people live and how will the district support this housing expansion with sufficient infrastructure and public services?" If the population of South Kohala increases per the County's General Plan, more public services and facilities will be needed to accommodate this future growth. Services such as schools, fire, police, medical, and various social services as well as more infrastructure, including roads, sewer, water, and electricity will need to be provided.

There may need to be an overarching policy in regards to moderating future population growth for South Kohala.

- **The resort areas in South Kohala are not only major employers in the district, but these resorts are some of the biggest employers in the entire County.**

Both residents of South Kohala and residents who live outside of the district work at the resorts. These large employment and visitor centers need adequate infrastructure to accommodate the large number of guests and employees. Workforce housing near these resorts would reduce daily commute time for hotel employees and also reduce traffic along the major highways.

- **Agricultural related industries are still a major part of the district's economy**

While tourism is South Kohala's largest economic engine, the district still has a viable agriculture industry in the Waimea area. However, for agricultural businesses to remain viable in the future, steps need to be taken to help these businesses deal with the pressures of urbanization, rising land prices, and a labor pool that is in decline.

- **Cost of housing has risen significantly**

There is a great need to provide affordable housing throughout the district.

2.5 CULTURAL AND NATURAL RESOURCES

2.5.1 CULTURAL AND HISTORICRESOURCES

WAIMEA CULTURAL RESOURCES

Waimea has many historic and cultural resources. Table 2.9 below lists some of the historical sites of Waimea. Note: this list was derived from available source material, and is not intended to be comprehensive or definitive.

Table 2.9 Historical and Cultural Sites in Waimea

NATIVE HAWAIIAN CULTURAL SITES			
No.	**Site**	**Structure**	**Description**
1	Haleino "Women's Heiau"	Heiau	Historical accounts attribute the founding of the heiau to high chiefess Hoapiliahae. It is said that young virgins performed ceremonies at the heiau and earned about the science and practices of healing
2	Heiau built by Makuakua	Heiau	The akua Makuakua observed a rainbow and found the goddess Wao. The two lived at Hokuʻula. Wao returned to the Waimea hillsides to bear children. Thus the hillsides were sacred. A kapu was proclaimed in her honor on the hillsides. The boundary of the kapu area was delineated by rolling stones down the hill. The place where the stones stopped delineated the boundary of the area.
3	Lālāmilo Field System	---	Identified in 1976 as a veritable treasure of 400+ acres of pastoral lands, house sites, hearths and stone enclosures. The field system was developed by Native Hawaiians prior to contact with western civilization.
4	Various Agricultural, Habitation, Religious, and Burial sites	---	Several of these sites are known to exist in the vicinity of various streams, pasture lands, and hillsides of Waimea. Although most have not been surveyed, they have been identified especially in areas that have not been altered by farming or urban development.

Table 2.9 Historical and Cultural Sites in Waimea

PANIOLO SITES			
No.	**Site**	**Structures**	**Description**
5	Parker Ranch Race Track	Track built in (1901) Horse Barn (1915); Attendant House and Stallion Barn (1930).	**---**
6	Additional Parker Ranch Structures	Mana Complex (1847); Spencer Home (1875); Manager's House (1885); Kahilu Hall (1918).	**---**
7	Parker Ranch Slaughter House	**---**	Stone wall enclosure that formed Minuke Ole pen. Built in the early 1940's.

No.	Site	Structure	Description
8	Pukalani Complex	This complex of buildings consists of: *Pu'u Hihale Complex, Breaking Pen Stables, Carriage Barn (Surgery Barn), Black Smith Stable, Pukalani Stables*	These buildings were essential to Parker Ranch's ranching operations. Possibility of incorporating this complex into a heritage community with a heritage center / museum. Built in the late 1800's.
9	Breaking Pen	---	Coffee shack and stone wall enclosure. Built in 1905.
10	Pu'u Hihale Complex	Viewing lanai (1900); Cowboy Gang Stables (1930, remodeled 1985); Bucking and Grooming Chute (1944).	Stone wall corral with walls 8' high by 6'wide. Cattle branding viewing lanai. Chute built for the Marine Rodeo. Referred to as the "Paniolo Heiau" and is considered the most significant Paniolo historic site in Waimea. Built in the late 1800's.
11	Waimea Stables	Stone wall that preexisted the stables by 50-100years.	Converted to a working corral in 1985. Originally constructed in 1960.
12	Kemole Corral	---	Rebuilt often. Originally built in 1930.
13	Pu'u Kikoni Corral	---	Rebuilt often. Originally built in 1930
14	Pu'u Kikoni Dairy Site	---	Called New Dairy. Built in 1920.
15	Anna Ranch	---	Anna Lindsey Perry-Fiske, the last of five generations of Lindseys to run the ranch, died at age 95 in 1995 and left the ranch as her legacy to the people of Waimea
16	Pali Ho'oukapapa Dairy Site	Creamery (late 1800's); Corn Silo (1914); Corral (1920+).	Later became a working corral. Originally built in the late 1800's.
17	Mana House Complex	---	Covered in Naughton's work.
18	Makahalau Complex	Corn Crib and Silo (1914); Cowboy Camp House (1920); Makahalau Stables and Corral (1920); Purebred Bull Barns (1935).	Was once a village like Mana.
19	Hanaipoe Line Cabin	---	Became the home for section chief Seichi Morifuji and was kept as a recreational cabin for ranch employees. Built in the 1930's.
20	Waiki'i Complex	Corn Silos (1914); Cooking ovens (1915); Large Barn, Corn Crib and Cowboy Stable Barn (1920); Attendant Corral, Homes and Quonset Huts (various dates).	Ovens of both Russian and Portuguese origin.

CHURCHES

No.	Site	Structures	Significance
21	Imiola Church	---	Listed on National Register of Historic Places. Use of Koa wood both structurally and for decoration. Built by Reverand Lorenzo Lyons in 1857.
22	Ke Ola Mau Loa	---	Built in 1931.

HOMES			
No.	**Site**	**Structures**	**Significance**
23	Frank Spencer House	---	Combined styles and the use of Koa wood. Home of Judge Bickerton and served as an early court house and hotel. Associated with several of Waimea's prominent families. Built in 1850.
24	Antony Smart House	---	Original location in Waiemi. Built during the 1830's.
25	Purdy House	---	Built by Harry W.W. Purdy who was one of Waimea's earliest foreign adventurers and a contemporary of John Palmer Parker. Built in 1840.
26	Old Lindsey House	---	
27	Hale Kea (Jacaranda Inn)		Home of A.W. Carter. The oldest part of Hale Kea was built around 1885 and was first used as an Episcopal Church.
STORES			
No.	**Site**	**Structures**	**Significance**
28	Kamuela Liquor		Formerly this location was the Wakayama Theater, a gathering place for early Japanese settlers in Waimea.
29	Chock In	---	One of the last surviving stores that was built near the turn of the century. Built in 1908.

Table 2.10 Historic and Cultural Sites in Kawaihae

No.	Site	Structures	Significance
1	Pu'ukohola Heiau	---	The heiau was dedicated by Kamehameha the Great to his war god Kukailimoku. Thousands of laborers participated in the construction of the heiau; even chiefs participated. It is at the heiau that Kamehameha became the ruler of the entire Island of Hawai'i when Kamehameha's soldiers slew his cousin Keoua. Built around 1791.
2	Mailekini Heiau	---	Located immediately makai of Pu'ukohola heiau, Mailekini Heiau was converted into a fort by Kamehameha.
3	Hale o Kapuni Heiau	---	Hale-o-kupuni is an off-shore underwater heiau located somewhere in Pelekane Bay. It is believed to be a shark heiau where sacrifices were offered to sharks.
4	Remains of John Young's House	---	John Young was one of Kamehameha's closest advisors. Remains of his house are believed to be near the Makahuna Gulch. The house was originally constructed in the early 1800's
5	Kawaihae Lighthouse	---	
6	Salt making areas	---	Kawaihae was known for salt-making during pre-contact times. The area also provided salt for the cattle and beef industry during the 19th century and early 20th century.
7	The "original" Kawaihae Well	---	The location of the original Kawaihae well where people supposedly fought over the water is located under the anchor at the intersection of Kawaihae Road and Akoni Pule Highway.
8	King's Residence	---	Located mauka of Pelekane Bay, this area was where many ali'i held court including Kamehameha I and Kamehameha II. It is also believed by some that Queen Emma was born here.
9	Keolahou	Church	The church was rededicated in 1859 at a cost of $800. A hundred years later in 1959, the church was razed. Only ruins of the church remain.

Table 2.11 Historic and Cultural Resources in Puakō

No.	Site	Structures	Significance
1	Hokuloa	Church	The church was established by Father Lorenzo Lyons in 1858. The church, named Hokuloa, means "evening star." Weekly services are still held at the church. The church also serves as a meeting place for the community.
2	Puakō Petroglyph Field	---	The petroglyph field is the largest petroglyph field in the State. Approximately 3,000 symbols were carved in the lava fields here. Access to the petroglyph field is through the Mauna Lani Resort.

2.5.2 COASTAL RESOURCES

Land-based sources of pollutants, such as sediment and nutrients, are among multiple factors threatening the quality of coastal waters and coral reef ecosystems in Hawai'i. These pollutants make their way into the ocean via surface water runoff and seepage from ground water.

The Pelekane Bay Watershed has been classified by the State DOH as a "Category I watershed," a watershed in need of restoration. The marine environment and coral reefs of Pelekane Bay have been severely stressed because of worsening water quality. The Pelekane Bay watershed has been significantly altered with the construction of the Kawaihae Harbor in the 1950's and 1960's. In 2004, Pelekane Bay was listed as an impaired body of water under the federal Clean Water Act because of high turbidity and excess sediment. The State DOH listed the Pelekane Bay Watershed as a priority watershed, in most urgent need of restoration in 2004. In 2003, DOH recorded turbidity in the bay to be close to 18 times the allowable water quality standard. (Pelekane Bay Watershed Sediment Runoff Analysis, 2007)

Waters off of Hapuna Beach Park and Spencer Beach Park are also on the list of DOH impaired water bodies. However, these two sites are not nearly as heavily polluted as Pelekane Bay.

The health and condition of South Kohala's coral reefs has been affected by both natural and man made events. Natural disasters such as tsunami, storms, and lava flows have all had a significant negative impact on coastal reefs over time. Man made events have also impacted the health of coral reefs in a negative way such as the dredging of reefs to clear waterways for boats or development and through the introduction of feral ungulates such as goats. The feral ungulates over graze and remove the vegetative cover on land. During rain events, the lack of vegetative cover causes soil to run off into the ocean and smother the reefs.

2.5.3 NATURAL DISASTERS AND HAZARDS

Wildfires

Dry invasive grasses, especially fountain grass, cover much of the inland and coastal areas in the southern portion of the district. The dry, dense, biomass of grass is an easily combustible fuel that carries fire quickly over large areas. Also located in these areas are small groves of kiawe trees, which are scattered throughout the landscape. Wildfire is a major threat to the health and safety of most South Kohala residents and is the most frequently occurring natural hazard in the region. Wildfires can be defined as any non-structural fire in a

October 2007 wildfire near a Mauna Lani Resort Golf Course

wild area. The district's gusty winds, naturally dry and hot climate in the southern and coastal regions, and the large amounts of fountain grass that grow in these areas not only increases the likelihood of wildfire occurrence, but also contributes to the rapid spread of fire. In July 2007, a brush fire burned over 9,300 acres near the Waikoloa Rd. and Māmalahoa Hwy. junction. Also, in October 2007, nine fires were started by arsonists, including a wildfire that spread over 1,000 acres near the Puakō community.

The dryland forests that once thrived in the region are lost, primarily due to wildfire. Hawai'i Island's dryland forests are one of the most endangered habitats in the world. These native habitats support many Hawaiian cultural activities. As wildfires wipe out more native habitat, invasive grasses invade these areas and the wildfire cycle continues. Remnants of the old dryland forests exist near Waikoloa Village. An intact, but seriously threatened, dryland forest containing rare native Wiliwili trees and native and endangered Uhiuhi trees exists just south of the village. The trees range in age from 5 to 600 years. A significant portion of the forest is cared for by the Waikoloa Village Outdoor Circle's Waikoloa Dry Forest Recovery Project. The project area is about 250 acres.

South Kohala has all the required elements for a wildfire disaster. It is possible that during extreme fire conditions with dry fuels and high winds, fire fighters, equipment, and water supplies can become depleted as numerous homes ignite and burn. Fire crews cannot simultaneously evacuate residents and effectively take suppression action in a subdivision of homes that are igniting within a few minutes of each other. A map of wildfire hazard areas can be found in **Appendix F**.

Suppressing wildfires in unoccupied range or open lands or forests is expensive. These costs increase significantly when firefighters must concentrate resources to save property and lives in developed areas. For instance, the expenses for suppressing the 2005 Waikoloa fire were more than $250,000. These costs are ultimately born by taxpayers.

A helicopter helps to contain a wildfire near Puakō
October, 2007

The County Department of Public Works (DPW) has maintained a list of heavy equipment needed for fighting wildfires and updates this list on a weekly basis so that the equipment can be mobilized when needed. DPW strategically pre-positions the fire fighting equipment to prepare for wildfires according to the time of year or around special occasions such as long weekends. The Hawai'i Wildfire Management Organization (WHWMO), a 501(c)(3) nonprofit, has been working cooperatively with the Big Island Wildfire Coordinating Group and other agencies to increase community awareness about wildfire mitigation hazards. Several communities have begun to implement wildfire management strategies including Waikoloa, Puakō, and Waialea Bay. The HWMO has received wild land urban interface and other grants to build an island wide inventory of wild fire resources, create fire history maps, install dip tanks, conduct hazard assessments and research on mitigation, and to develop community fuelbreaks. Primary government agencies involved in these efforts with HWMO include the County of Hawai'i Fire Department and the State Department of Land and Natural Resources Division of Forestry and Wildlife. (County of Hawai'i Drought Mitigation Strategies, 2004)

There are no County regulations that require residential subdivisions to participate in wildfire mitigation programs. County regulations for new subdivisions to reduce wildfire hazards, such as requiring adequate fire truck access, hydrant placement, and water system sizing are in place.

While building codes have been recently revised, the design of subdivisions and new developments can be improved to prevent wildfire disasters and costs to the public, e.g strategic use of green spaces and landscaping, placement of dip tanks, etc. Also, the management of fuels, primarily grasses, on the landscape needs to be addressed to reduce risks to neighboring communities and costs to the taxpayers.

Earthquakes

Hawai'i Island experiences thousands of earthquakes each year; the majority of the earthquakes are so small that they can only be detected by sensitive instruments. The most recent major earthquake on the Big Island occurred on October 15, 2006 when a 6.7 magnitude earthquake and magnitude 6.0 aftershock struck the Big Island. The earthquake caused significant damage to infrastructure in South Kohala. The earthquake damaged Piers 1 and 2a at Kawaihae Harbor, severely limiting the amount of cargo and marine traffic that the harbor can accommodate.

The earthquake also caused significant damage to the Mauna Kea Beach Hotel. The hotel has been closed due to earthquake related damage and does not plan to reopen until November of 2008. Many of the hotel guests patronized the small shops and businesses in the Kawaihae area. The hotel's closure has caused the loss of jobs and has significantly reduced the number of people who have patronized local businesses in the last year.

One of the reservoirs that services the Waimea Water Delivery System

In Waimea Town, there is a concern that future earthquakes may catastrophically damage the County reservoirs that are located above the town. With the recent Kaloko Dam tragedy on the island of Kauai, which resulted in the loss of lives, and the recent earthquake that occurred on the Big Island, it would be prudent for the County to consider establishing an early warning system for the reservoirs above Waimea Town. Currently there is an emergency *action plan* that is in place in case of flooding caused by reservoir water overflow from heavy rains, but there is no early warning signal or siren in place, should there be significant damage caused to the reservoir by earthquake or other events. Damage to the County reservoirs above Waimea Town is discussed in more detail in section 2.5.5.

General Community Readiness

To date, a small number of South Kohala residents have undergone CERT training. The Community Emergency Response Team (CERT) Program educates people about disaster preparedness for hazards that may impact their area and trains them in basic disaster response skills, such as fire safety, light search and rescue, team organization, and disaster medical operations.

During times of emergency, children who are attending school could be cut off from access to either their parents/legal guardians or their homes. This was the case during recent fires near Waikoloa Village and Puakō. Students and parents in these areas were cut off from each other. There is a need to provide for safe transport and / or housing for students should natural disasters occur when schools are in session.

Unexploded Military Ordnance (UXO)

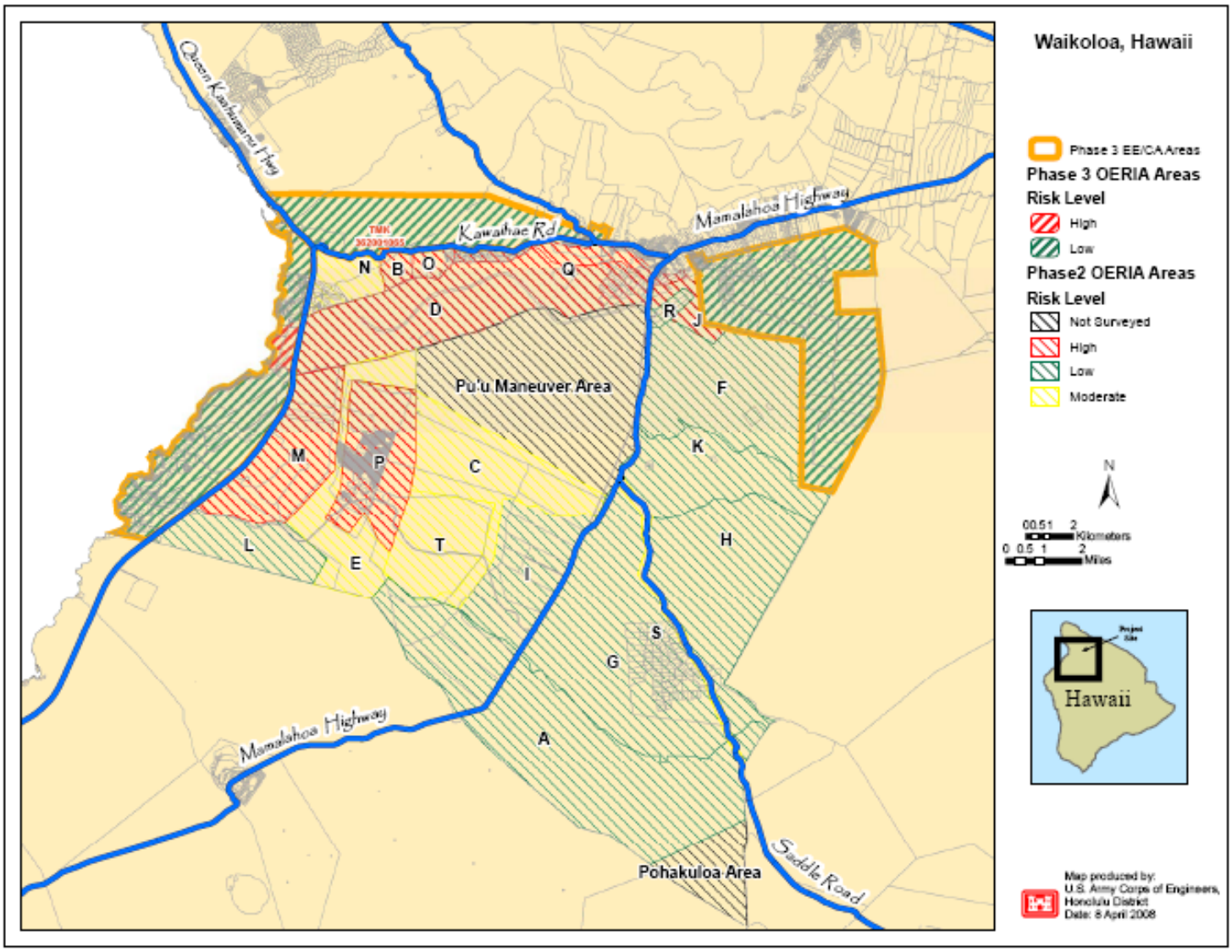
From 1943 to 1953, the U.S. military utilized 130,000 acres of land with at least 40 percent of the area being used for training with live military munitions. Following the deactivation of Camp Tarawa and Waikoloa Maneuver Area, the Department of Defense performed cleanup activities in

accordance with the "Explosive Ordnance Details for Disposal", a series of safety and health standards from the 1940s to 1950s, the time in which this cleanup was done. In 1954, two Parker Ranch employees were traversing the former training area and were fatally injured as they encountered UXO. Within the last decade, UXO has been found at Waimea Middle School and near homes in Waikoloa Village.

"FUDS," the Formerly Used Defense Sites program, addresses potential risks on lands formerly owned or controlled by the Department of Defense prior to 1986. The FUDS program is administered and implemented nationally by the U.S. Army Corps of Engineers and within the Pacific Islands by the Honolulu District. The Waikoloa FUDS area covers 137,000 acres with approximately 50,000 acres considered "high risk." Most of the "high risk" land is near Waimea, in the vicinity of the old Camp Tarawa. To date the Army Corps has cleared about 8,000 acres of land and removed approximately 1,800 pieces of live munitions. It's estimated that to clean up the entire 137,000-acre Waikoloa FUDS area will cost $680 million over the span of 50 years or more. Teaming with experts from the Army Corps' Huntsville Military Munitions Center of Expertise and its contractors, innovative "packages" of sensing technologies have been developed in order to efficiently scan beneath the surface throughout the Waikoloa Maneuver Area FUDS.

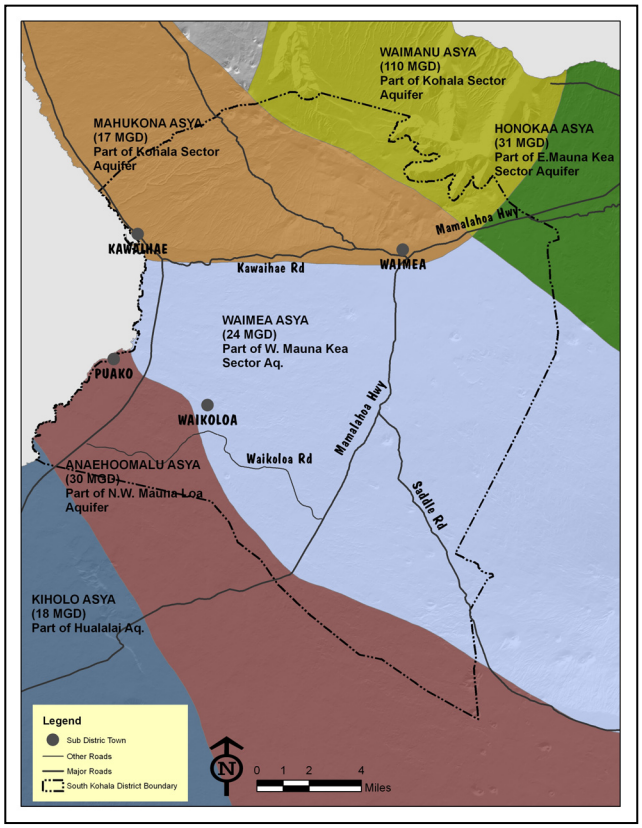
Figure 2.5 illustrates the FUDS areas that are at "High," "Moderate," or "Low" risk of having UXO. The area on the map indicated as the "Pu'u Maneuver Area" has not yet been surveyed for UXO. With the continuing development of the Waimea and Waikoloa areas, the Corps' FUDS team has taken on an aggressive approach to reaching current and future homeowners and developers. Private land owners who have property in "High" or "Moderate" risk areas (which have not yet been cleared by the Army Corps) and who intend to develop their lands are advised to contact the Army Corps of Engineers prior to the start of construction. The Army Corps can provide private land owners with UXO support which may include survey of lands for UXO and removal of UXO if UXO are found.

FIGURE 2.5: FORMERLY USED DEFENSE SITES (FUDS) IN SOUTH KOHALA



2.5.4 WATER RESOURCES

Figure 2.6: SOUTH KOHALA AQUIFER SYSTEM AREAS (ASYA)



The primary source of data for the following section on water resources is from the *DRAFT Hawai'i County Water Use and Development Plan Update: Hawai'i Water Plan* completed in December 2006. Another information source was a report prepared by Waimea Water Services Inc. for the County Department of Water Supply entitled "Hydrolgeologic study of the Waimea High Level Ground Water," dated February 2001.

The Kohala Aquifer Sector Area (ASEA) has two Aquifer System Areas that cover portions of South Kohala, the Waimanu ASYA and the Mahukona Aquifer System Area (ASYA). The West Mauna Kea ASEA only has one ASYA, the Waimea ASYA and the North West Mauna Loa ASEA only has one ASYA, the Anaeho'omalu ASYA. Table 2.12 below lists the **sustainable yield**, **current water usage,** and **potential future water use projection**s based upon full build out of the **General Plan LUPAG, County Zoning, and 2025 Population Projections.**

An aquifer's '**Sustainable Yield**' refers to the *estimated* maximum amount of water that the aquifer can safely produce. Extracting amounts of water greater than the sustainable yield may irreparably damage the aquifer. It should be emphasized that sustainable yield numbers are only *estimates*. These estimates should not be considered as the exact amount of groundwater that can be safely utilized. In many regions with high sustainable yield numbers, groundwater cannot be utilized because it would not be economically feasible to install water systems to deliver water to users.

Current water usage in Table 2.12 includes water use from County Department of Water Supply (DWS) systems, private water systems, agricultural use, and irrigation use, including use of reclaimed waste water and water use from domestic rain catchments. Table 2.12 distinguishes between current water use that includes agricultural water use and current water use that does not include agricultural water use. As can be seen in the table, agricultural water use accounts for a significant percentage of current water use in most ASYA. It is also important to note that current use for the ASYA's of Waimanu, Mahukona, and Anaeho'omalu, includes users from outside the district of South Kohala as well. The Waimea ASYA is the only ASYA that exclusively serves South Kohala.

Table 2.12 South Kohala Aquifer System Areas (all numbers in MGD)

ASYA	Developmental Stage	Sustainable Yield (SY)	DWS Water System Use	Private System Water Use	Total Water Use w/Agriculture	Total Water Use w/o Agriculture
Waimanu	Potential Use	**110**	0.08	0.00	0.34	0.10
Mahukona	Currently Used	**17**	0.95	0.68	3.94	1.69
Waimea	Currently Used	**24**	2.17	4.56	11.05	7.71
Anaehoʻomalu	Currently Used	**30**	2.14	0.00	8.15	7.97

Source: Hawai'i County Water Use and Development Plan Update, 2006; Note this plan is on the web at: http://www.hawaiidws.org/wudp.html

As can be seen in Table 2.12, current water use in each of the ASYA areas is less than the sustainable yield of the ASYA's.

Table 2.13 South Kohala Future Projected Water Demand

ASYA	Sustainable Yield (SY)	County Zoning Full Build Out w/Agriculture	County Zoning Full Build Out w/o Agriculture	2025 Population Projection C w/Agriculture	2025 Population Projection C w/o Agriculture
Waimanu	**110**	9.3	0.1	0.6	0.2
Mahukona	**17**	97.4	7.7	7.6	3.3
Waimea	**24**	150.6	13.8	14.7	12.9
Anaehoʻomalu	**30**	18.1	11	15.6	15.2

Source: Hawai'i County Water Use and Development Plan Update, 2006

There are four future water demand estimates in **Table 2.13 South Kohala Future Projected Future Water Demand**. Water demand estimates are based upon current **County Zoning** and **County Population Projection C for the year 2025** (please reference section 2.4.1 of the CDP in regards to population projection C). Estimates for the County Zoning and population projections take into account future water demand that includes and does not include agricultural water use.

There is a tremendous difference in water projections if agricultural lands are not taken into account when looking at the County Zoning designations. The future estimates of water use that include agricultural use in the County zoning assume irrigation of all lands zoned as agriculture by the County. This includes lands that are currently zoned as agriculture by the County but are not in active agricultural production, including the areas in the district that are very dry, rocky, and have topography that would make viable agriculture extremely difficult without substantial investments in improving the land such as extending irrigation systems, removing rocks, and massive grading.

The estimates that include agricultural use assume that all of these lands will be watered at a rate of 3,400 gallons of water per acre per day, hence the significantly higher estimates. The estimate that takes into account no agricultural use makes the assumption that those lands that are currently designated as agriculture by County zoning and are not being currently used will remain OPEN, unused, and un-watered. Future realistic estimates for water use in the district is somewhere between the high number that includes agricultural use and the low number that does not include agricultural use. Neither of the estimates that include or do not include agriculture use, when taken by themselves, paints a complete picture of projected future water demand in the district, hence, both numbers are given. A more complete and detailed explanation of future water use projections can be found in the 2006 Hawai'i County Water Use and Development Plan Update. <http://www.Hawai'idws.org/wudp.html>

Future projected water demand based upon current County zoning designations exceeds ASYA sustainable yields in the Mahukona ASYA and Waimea ASYA if agricultural demand is taken into account. If future agricultural water demand is not taken into account, future projections for water demand do not exceed the sustainable yields of any of the four ASYA.

Future projected water demand based upon population projections for the year 2025 does not exceed the sustainable yields of the ASYA's.

The Waimanu ASYA can safely accommodate water demand in all of the future water demand projection scenarios. However, the Waimanu ASYA is not being currently used. Furthermore, considering the Waimanu ASYA as a viable and economically feasible source to meet future demand may not be practical. Waimanu ASYA incorporates lands that are not readily accessible by vehicles and thus it would be a difficult area to develop groundwater sources. Also, there is the environmental and cultural concern of diverting water from this conservation watershed area to another watershed area. Lastly, consideration must also be given to the current and future water demands of North Kohala as much of the Waimanu ASYA encompasses lands in the district of North Kohala.

Also in 2001, the County DWS conducted hydrogeological studies of high-level ground water in Waimea. The purpose of the studies was to evaluate the potential of the high-level aquifer system to supply Waimea Town and South Kohala's coastal communities. The study involved an area of 122,023 acres from the summit of the Kohala Mountain to the 5,000 foot elevation of the northern slope of Mauna Kea. The study concluded that there are ample ground water resources of good quality within the study area that could be used to supply water to Waimea and the other coastal communities in the district. However, utilizing these high-level ground water resources will require the DWS to construct more water delivery infrastructure such as new wells, storage facilities, and transmission lines. (Hydrogeologic Study of the Waimea High-Level Ground Water, 2001)

2.5.5 WATER DELIVERY SYSTEMS

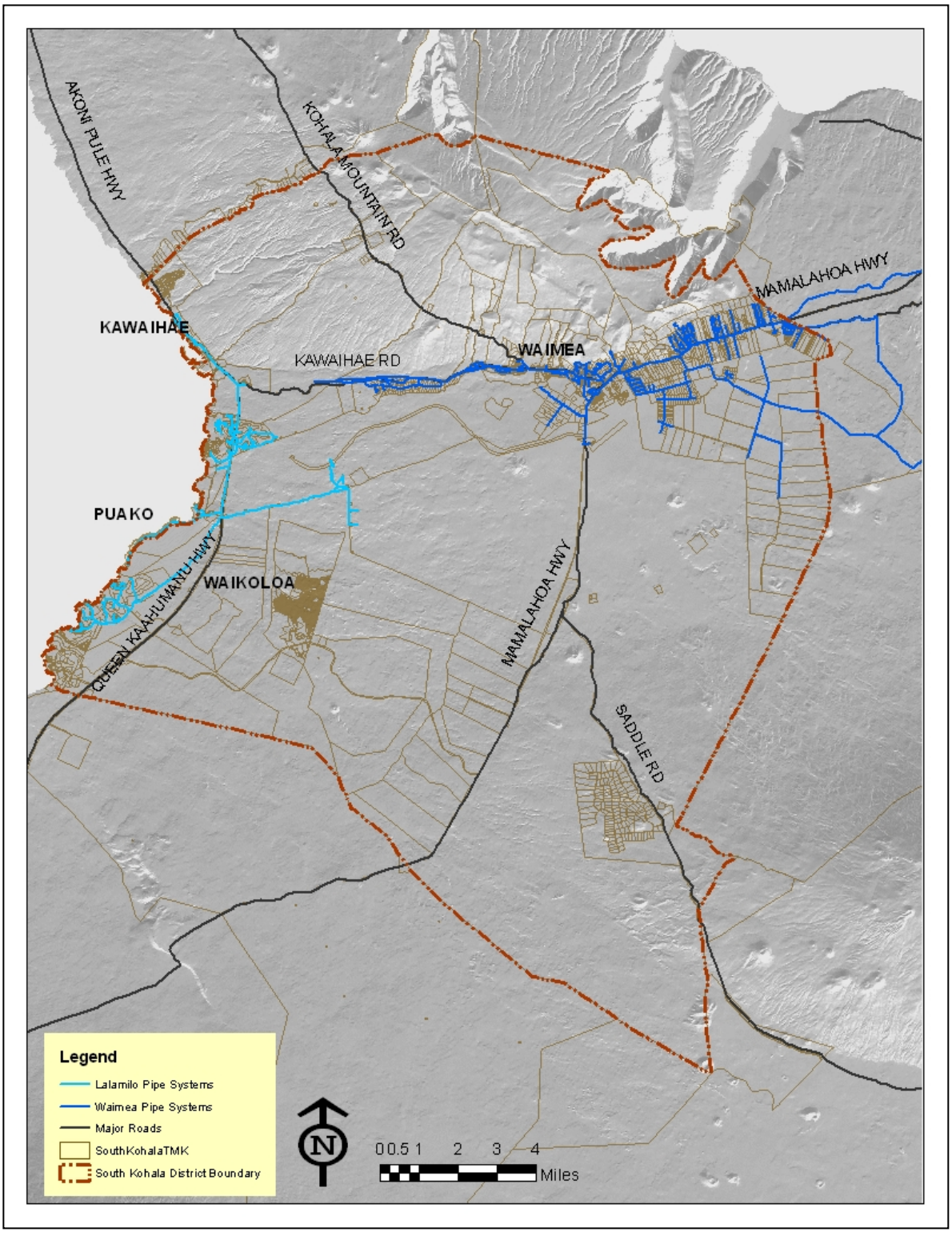
The Waimea Water System primarily services the Waimea and Pu'ukapu area. From Waimea Town, the system extends along Māmalahoa Highway westward and runs down Kawaihae Road for about eight miles. From Waimea Town, the system extends eastward to the two connections at the Haina Water System at the South Kohala district boundary near Mud Lane. The water system spans three aquifer sector areas; but the majority of the service area is within the Kohala ASEA, including the majority of Waimea Town, and the areas north of Māmalahoa Highway from Kawaihae to the Kamuela Highlands subdivision. Improvements to the system have increased reservoir capacity and enlarged the distribution pipelines. The primary water sources for the Waimea Water System are from the Waikoloa Stream and Kohakohau Stream diversions. (Hawai'i County Water Use and Development Plan Update, 2006)

Because of the variations in stream flow, the Waimea Water System has four large reservoirs (Waikoloa Reservoirs) that can store a total of 158.5 million gallons of untreated water, (Hawai'i County Water Use and Development Plan Update, 2006) However, during the October 2006 earthquake two of the four reservoirs were damaged. One reservoir had to be completely drained and the other damaged reservoir can only be filled to half of its normal capacity. The County is awaiting FEMA funding to help with reservoir repairs. Until then, the reservoirs can only store about 79.25 million gallons of water, or about half of their full capacity. During dry climatic periods, water use restrictions have been put in place for longer periods of time because of the reduced reservoir storage capacity. The Waimea Treatment Plant currently provides 2MGD to Waimea residents via the Waimea Water System.

Originally, the Lālāmilo Water System was designed to service Kawaihae, but has since expanded to service other coastal areas including Puakō and the Mauna Kea and Mauna Lani Resorts. The system includes two booster pump stations and nine storage tanks. Water is transported via a six inch pipeline from the Waimea Water System down to Kawaihae and more or less follows Kawaihae Road. As the Lālāmilo Water System expanded to accommodate the new coastal developments south of Kawaihae, high level exploratory deep wells were drilled along Kawaihae Road in order to supplement the limited supply of water from Waimea. The water was of marginal quality and had high chloride content. Water from these wells was blended with fresh mountain water to supply the coastal developments. In 1977, the State drilled exploratory wells on its Lālāmilo lands. These wells and subsequent additional wells were drilled with financing from the developer of Mauna Lani Resort. The water in these wells was of good quality and was also included as part of the system. Two Parker Ranch wells replaced the two Kawaihae wells that serviced the Lālāmilo Water System during the latter 1990s. (Hawai'i County Water Use and Development Plan Update, 2006)

The Waikoloa Water System is a private system. The system services Waikoloa Resort as well as Waikoloa Village. The average daily use for the water system is 4.5 MGD. Five wells located within the West Mauna Kea ASEA provide potable water for all of the developments in the resort area and in Waikoloa Village. (Hawai'i County Water Use and Development Plan Update, 2006) Currently, there are two wells in Waikoloa that are being repaired due to the current drought situation. If dry weather conditions continue to persist, there may be a need to transfer water from the County DWS Lālāmilo Water System.

FIGURE 2.7: COUNTY WATER DELIVERY SYSTEMS IN SOUTH KOHALA



WAIMEA IRRIGATION SYSTEM

The Waimea Irrigation System is managed by the State Department of Agriculture and has been operational since the early 1970s. The system's water sources are the summit watersheds of Kohala Mountain starting with Kawainui and followed by Kawaiki, Alakahi, and Koiawe Streams. Currently the irrigation system has 117 users who draw 0.906 MGD of water to irrigate 587 acres of land. (Agricultural Water Use and Development Plan, 2003) The irrigation system consists of a diversion from these streams via the Upper Hāmākua Ditch directing the flow of water into the 60 MG Waimea Reservoir. An additional reservoir, the 100 MG Pu'u Pulehu Reservoir, provides overflow storage for the Waimea Reservoir and also for diverted upstream flow. Water is transmitted in the system over two miles via 24-inch and 18-inch diameter pipelines. (Hawai'i County Water Use and Development Plan Update, 2006)

There is sufficient storage in these reservoirs to maintain an average service flow in the system for approximately 100 irrigation days. However, the major problem of the Waimea Irrigation System is an insufficient agricultural water supply during excessive periods of drought caused by inadequate collection, storage and distribution facilities. Excessive seepage losses occurring along the existing transmission ditches cause deterioration of the linings, tunnels and flumes. The system's existing storage capacity is inadequate for meeting irrigation water demand during frequent dry periods and for effective application of water to diversified crops. Furthermore, the region served by the Waimea Irrigation System is the heart of the cattle industry, but the system lacks a supplemental livestock water system for low or drought periods. (Agricultural Water Use and Development Plan, 2003)

Additional water sources for the Waimea Irrigation System include the high level aquifer which has been tapped for agricultural emergencies at the State Department of Agriculture's Pu'ukapu well, and there is a private well at the Waimea Country Club. (County of Hawai'i General Plan, 2005)

The key planning implications related to South Kohala's cultural and natural resources include:

- **The numerous cultural and historic resources within the district should be identified with appropriate signage if signage for these resources does not currently exist.**

Examples of possible signage include: signage identifying cultural sites, signage identifying different types of winds and rain and the corresponding Hawaiian names of each or signs that identify the wide variety of flora and fauna within the district. More importantly, signs should educate readers about the respectful protocol and appropriate stewardship of these cultural and natural resources.

- **Watershed management programs for the watersheds of South Kohala should be developed for those watersheds in which a stewardship program does not currently exist**

Watershed management programs could establish pollutant load limits on each *land use* in the watershed in order to safeguard the marine water quality of the South Kohala coast. The watershed management program could also establish pollutant load limits for each watershed. The program could also outline specific actions for consistent monitoring of marine water quality.

- **Future coastal developments should take into consideration global sea level rise and plan accordingly**

While the issue of sea level rise is not at the forefront of many people's minds, it is still a factor that should be taken into consideration when planning for future coastal developments in the long term.

- **Brush fires are a huge potential natural hazard in the district.**

The district's predominantly dry climate combined with the large amounts of fountain grass increases the risks that brush fires may occur.

- **There are specific areas in which South Kohala has the potential to improve community readiness in the event of natural disaster,**

Specific areas for increasing community preparedness include: providing more CERT training opportunities for residents, installing a reservoir warning system above the Waimea Town, or establishing a program to ensure safe transport and shelter of students during and after natural disaster events.

- **Currently there are enough water resources to accommodate existing water demands in the district. However, the Waimea water delivery system infrastructure is presently stressed due to the 2006 earthquake damages and during drought conditions. Accommodating future water demands will likely require major capital improvements to expand the capacity of existing water systems.** There will be enough water resources to accommodate the General Plan's projected population growth to the year 2025 and beyond. However, future projected water demand based upon full build out of current County zoning designations exceeds for the Mahukona and Waimea ASYAs in the South Kohala District for the projections that include and agricultural water use.

Future growth may require the Waimanu ASYA to be developed. It is the largest ASYA in the district in terms of sustainable yield. But currently, the Waimanu ASYA is only being used minimally. A feasibility analysis should be undertaken first to determine whether it is economically feasible to pump water from the Waimanu aquifer. Depending upon the capital improvement expenses and environmental impacts it may not be economically feasible to access water from the Waimanu ASYA.

2.6 INFRASTRUCTURE AND PUBLIC FACILITIES

Within most areas of South Kohala, the level of infrastructure and public facilities has not kept pace with population growth over the years. Congested roadways occur in several areas of the district. Also, several areas in the district such as in Waikoloa Village and Puakō need new roads for emergency access. There are no truck runaway lanes on Kawaihae Road and Waikoloa Road. This is a serious safety issue as many semi-trucks travel along these roadways. In the case of Kawaihae road, a seven mile road at a grade exceeding 10% without truck runaway lanes is dangerous. Conditions along Waikoloa Road can be just as dangerous, with sharp turns, steep grades in some areas, and little or no paved shoulders.

Wastewater disposal, particularly in coastal communities such as Puakō has also become a concern. The need for more parks and community recreation areas is a district wide concern. South Kohala is home to some of the best white sand beaches on the island. On weekends and even during some week days, beach parks are highly frequented. Provision of adequate infrastructure and facilities is needed to accommodate the large numbers of beach park goers. Also, in the Kawaihae area, the expansion of a reliable potable water delivery system is needed in order to provide for more commercial, residential, and recreational uses around the harbor area. There is also a concern that utility lines block scenic view planes. Lastly, as the population of the district continues to grow, South Kohala will need a new middle school and a new high school.

Implications for Planning:

- **In general, given the current level of population, already approved developments, and future population estimates, significant upgrades of infrastructure and public facilities will need to be provided, including:**
    - New wastewater treatment and disposal facilities
    - Increasing roadway connectivity in Waikoloa and Puakō
    - Reducing traffic congestion in Waimea
    - Truck Runaway lanes along Kawaihae Road and Waikoloa Road
    - Assessing the adequacy of water available, especially in light of the CDP's emphasis on promoting agriculture, in addition to providing adequate water transmission and storage facilities
    - Increasing the amount of potable water for Kawaihae
    - Consider under grounding future utility lines to preserve scenic view planes
    - Providing adequate recreational facilities and parks;
    - Providing adequate infrastructure and facilities for beach parks and other coastal recreational facilities
    - A new South Kohala High School and one or more elementary and middle schools will be needed to accommodate a growing population

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