

CHAPTER 4:

Kaua'i County Assets

4.0 Introduction to Kaua'i County Assets

The assets identified in this section were selected, mapped, and included in the document based on the features that Kauai County identified as important and essential assets to the county. The emphasis for identification of assets is on those things that ensure sustainable development and livelihoods for Kaua'i. People of Kaua'i categorized these assets in several key areas: 1) Emergency Services Infrastructure, 2) Vulnerable Populations, 3) Critical Infrastructure, 4) Transportation and Ports of Entry, 5) Telecommunications, 6) Land and Solid Waste Protection, 7) Economically Important Assets, 8) Socially, Culturally, and Economically Important Assets, and 9) Other Government Facilities.

The assets in each of these areas have been incorporated in the county's Geographic Information System (GIS) based on information provided at public county meetings, two steering and technical committee meetings, interviews with members of the Disaster Management Committee, four meetings with community members in the geographic districts, interviews with first response personnel in civil defense, fire, and police departments, and interviews with non-governmental organizations and community leaders.

4.1 General Characterizations and Demographics

The natural features of the Island of Kaua'i are as important to protect as the people who live in the island. In this section, information about the characteristics of the island are discussed, including geography, population demographics, employment, economy, and land use.

4.1.1 Geography

In the center of the island of Kaua'i is Kawaikini Peak, rising 5,170 feet and Mount Wai'ale'ale, rising 5,080 feet. Mount Wai'ale'ale is the rainiest spot on earth, averaging 460 inches of rain a year, and contributes to this island's nickname---the Garden Island. Many streams flow from these mountains to the sea through canyons in the volcanic rock. Waimea canyon has colorful rock walls that are 2,857 feet high. Rugged cliffs along the northwestern coast make it impossible to build a road around the whole island. Ni'ihau, nicknamed "The Forbidden Island," is a private island owned by the Robinson family of Kaua'i. The island is semi-arid with a dry climate, although several lakes provide fresh water.

Kaua'i is situated northwest of O'ahu, separated by the Kaua'i Channel. Known as the Garden Isle, Kaua'i is the northernmost and geologically oldest of the major Hawaiian Islands. Kaua'i County includes Ni'ihau Island (73 square miles) and the tiny uninhabited islets of Ka'ula and Lehua. These islands are volcanic in origin, although there are currently no active volcanoes in this county. The circular island of Kaua'i rises three miles from the ocean floor and is roughly 550 square miles.

The highest mountain, Kawaikini Peak, rises to 5,243 feet (1,598 m) above sea level, closely followed by Mt. Wai'ale'ale 5,080 feet (1,548 m) as the second tallest peak. The northeastern slopes of Wai'ale'ale, one of the wettest spots on earth, receive an annual average rainfall of 450 inches (1,143 cm). This high annual rainfall has eroded deep valleys in Kauai's central mountain mass and formed spectacular canyons. Waimea Canyon, the "Grand Canyon of the Pacific" is almost 10 miles (about 16 km) long and more than 0.5 miles (0.8 km) deep.

The steep slopes and topography, combined with a number of natural occurrences, can increase the effects of a natural hazard. High precipitation in steep terrain can cause flooding. High winds increase as it moves up slopes. Weathering and erosion can cause rockslides and landslides, typically along the coastal road. Since most of the development has occurred along the coastline, the area where it is possible to settle, the settlements can impede some natural processes (flow of water, beach movement), and coastal hazards may cause more severe and costly impacts to the population (flooding, coastal erosion).

4.1.2 Population

Kaua'i County has a population of 67,091 (2010 Census) also with an adjusted estimate of 69,512 (Hawaii State Databook, 2013), roughly 5 percent of the population of the State. Eighty-seven percent of the population lives in urban areas (State of Hawaii Data Book 2013). During this period, Kaua'i grew at a faster annual rate than the state as a whole. Between 1990 and 2010, Kaua'i County's resident population increased 19.6 percent (see Table 4-1). The geographic area population statistics were not available at the time of publication, so the figures reflect the latest census levels in the tables below. These localized population statistics are updated in the revision of the Kaua'i County General Plan (currently underway in 2015), which takes development needs in account with local population growth.

Table 4-1: Population Change by Geographic Area in Kaua'i

(Hawaii Databook 2013 -Table 1.12)-- RESIDENT POPULATION OF COUNTIES AND DISTRICTS: 1990, 2000, & 2010

County and district (see maps)	April 1, 1990	April 1, 2000	April 1, 2010	Percent change	
				1990 to 2000	2000 to 2010
State total	1,108,229	1,211,537	1,360,301	9.3	12.3
Kauai County	51,177	58,463	67,091	14.2	14.8
Hanalei	4,631	6,348	7,828	37.1	23.3
Kawaihau	15,627	18,525	20,992	18.5	13.3
Lihue	10,663	12,022	14,683	12.7	22.1
Koloa	11,368	12,845	14,086	13.0	9.7
Waimea	8,888	8,723	9,502	-1.9	8.9

1/ Including Kalawao County.

Source: U.S. Bureau of the Census, *1990 Census of Population and Housing, Population and Housing Unit Counts, Hawaii*, 1990 CPH-2-13 (March 1993), table 8; U.S. Census Bureau, *Census 2000 Redistricting Data (Public Law 94-171) Summary File* (March 19, 2001) and 2010 Census Redistricting Data

(Public Law 94-171) Summary File (February 24, 2011)

<<http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml>> accessed June 3, 2011.

Source: State of Hawaii Data Book, 2013, Population.

Kaua'i's infrastructure and service needs are determined not only by the number of residents, but also by the number of visitors who spend time on the island. On average, there are an additional 19,855 people on Kaua'i who are not residents. In 2013, visitors comprised about 31 percent of Kaua'i's population (State of Hawaii Data Book 2008). Growth scenarios reviewed during the General Plan Update and projections developed by the Planning Department estimate a range of 24,000 to 28,000 visitors per day in 2020, although the economic crisis has resulted in fluctuations in visitor populations, and this will alter the estimates over the long run. The Planning Department uses the higher estimate for public facility planning to ensure access for everyone.

Population projections developed for the Kaua'i General Plan Update estimate 2020 population as follows: annual statewide visitor counts changed from 834,732 (1966) to 8,003,474 visitors staying overnight or longer in 2013, of which 1,084,681 were designed for Kauai; and average daily visitors from 20,900 (19,271 Domestic, 1629 International) in 1966, to 149,213 in 2013, of which 22,318 were destined for Kauai. The change in resident population of Kauai showed 28,176 up to 67,091 in 2010 (State of Hawaii Data Book 2013, Table 1.01). The amounts have fluctuated with recent changes in the economy as people have moved to other states and visitors have declined; the projections, however, have not yet been revised to 2015, because there is a wide degree of unpredictability related to the visitor industry. The County General Plan Update is currently underway.

There are approximately 21,700 households in Kaua'i, with the largest number of these in the Waimea to Barking Sands area on the west side of the island. Of these, approximately half are renter-occupied households. There is a lower percentage of female-headed households with children than on other islands---only about 1,340 households or 6% of households.

In terms of ethnicity and ancestry, the majority of residents on Kauai are characterized as "Asian alone or in combination with one or more other races." Slightly fewer are "White alone or combined with one or more races" and about half of the number of Asians categorize themselves as "Native Hawaiian and other Pacific Islander alone or in combination with other races" (about 17,000).

4.1.3 Economy

Of the total State economy, Kaua'i represented only 3.7% (1310 of 34,952) the labor income and 4% of the total personal income (State of Hawai'i Data Book 2013 Table 13.16). Kaua'i's per capita personal income, \$64,752, remains higher than the 2012 per capita median household income of the State average, \$56,263 (State of Hawai'i Data Book 2013 Table 13.22).

Kaua'i's economy is less diversified than O'ahu, and the primary sector remains tourism, followed by agriculture. The unemployment rate in 2014 was 5.2% (First Hawaiian Bank 2014,

3). Time share properties, where bookings are made well in advance, have continued to sustain the tourism industry. Kauai also benefits from the location of the Pacific Missile Range Facility (PMRF) that offers higher salary jobs for about 1000 people that work there (First Hawaiian Bank, 2014, 5). PMRF is not subject to the same economic vacillations as the tourism sector. The economy has also benefited from unique agriculture-based businesses that are developing brand identities (First Hawaiian Bank 2014, 1). The film industry has further added jobs, and increased visitors who want to see where films such as *Jurassic Park* and *The Descendants* were filmed (First Hawaiian Bank, 2014, 5).

The following table from the State of Hawai'i Data Book (2013) shows the number of visitors in the State of Hawai'i, which grew after the economic downturn in 2009-2010.

Table 4-2. Average Daily Visitor Census, by County and Island: 2012 and 2013

State of Hawai'i Data Book Table 7.07						
AVERAGE DAILY VISITOR CENSUS, BY COUNTY AND ISLAND: 2012 AND 2013						
[Covers visitors staying overnight or longer anywhere in the state, and any overnight or non-overnight interisland trips reported by these visitors. Domestic includes passengers from all flights originating from the mainland United States. International includes passengers from all flights originating from U.S. territories and other countries]						
County or island	Total	2012 Domestic	Inter- national	Total	2013 Domestic	Inter- national
State total	201,267	148,887	52,380	202,876	149,213	53,663
Oahu	97,989	59,760	38,229	96,054	57,079	38,974
Hawaii County	28,559	24,057	4,502	29,255	24,500	4,755
Kauai County	22,318	20,835	1,484	23,334	21,689	1,645
Maui County	52,401	44,235	8,166	54,233	45,944	8,289
Maui	50,976	42,979	7,997	52,798	44,675	8,124
Molokai	707	623	84	725	638	87
Lanai	718	634	84	710	632	78

Source: Hawaii State Department of Business, Economic Development and Tourism, Tourism Research Branch, *Annual Visitor Research Report* (annual) and records. See also <<http://www.hawaii.gov/dbedt>>.

4.1.4 Employment

Historically, employment trends for Kauai County reflect the national recession of the early 1980s, the weak State economy during the 1990s, the damaging effects of two hurricanes, and the impacts of the weakened global economy since 2007, resulted in declines in tourism through 2010, but began picking up. In 2014, Kauai has developed 2,300 additional jobs from the low point in 2010. The economy relies heavily on the visitor industry, but the agricultural sector is close behind. Construction jobs are on the horizon as several single-family housing developments have been started.

4.1.5 Land Use

The State Land Use Commission has classified 14,558 acres in Kaua'i as urban, 198,769 acres as conservation, 139,320 acres as agricultural and 1,253 acres as rural (State of Hawai'i Data Book, 2008).

Table 4-3. Estimated Land Acreage.

State of Hawai'i Data Book Table 6.04-- ESTIMATED ACREAGE OF LAND USE DISTRICTS, BY ISLAND: DECEMBER 31, 2013					
[Total acreage, including inland water, as classified by the Hawaii State Land Use Commission under the provisions of Chapter 205, Hawaii Revised Statutes, as amended. All data are approximate]					
Island	Total area 1/	Classification by State Land Use Commission 2/			
		Urban	Conservation	Agricultural	Rural
State total	4,112,388	200,434	1,973,846	1,926,507	11,602
Hawaii 3/	2,573,400	54,140	1,304,347	1,212,891	2,023
Maui	465,800	24,191	194,836	242,720	4,053
Kahoolawe	28,800	-	28,800	-	-
Lanai	90,500	3,330	38,197	46,566	2,407
Molokai	165,800	2,539	49,768	111,627	1,866
Oahu 3/	386,188	101,661	156,829	127,698	-
Kauai	353,900	14,573	198,769	139,305	1,253
Niihau	45,700	-	-	45,700	-
Kaula and Lehua	400	-	400	-	-
Other islands 4/	1,900	-	1,900	-	-

1/ These totals differ somewhat from the official figures based on measurements by the Geography Division of the U.S. Bureau of the Census, cited in Section 5.
2/ For definitions, see Hawaii Revised Statutes, Section 205-2.
3/ May be revised, pending updates of County records.
4/ The Northwestern Hawaiian Islands, from Nihoa to Kure Atoll, excluding Midway.
Source: Hawaii State Department of Business, Economic Development & Tourism, Land Use Commission, records.

In the 1980s, approximately 54,900 acres of prime agricultural lands were determined as Agricultural Lands of Importance to the State of Hawai'i (ALISH), with an estimated 50,000 acres still available for cultivation. About 30,000 acres of very good to fair agricultural land remain open for cultivation. In 1998, there were twelve aquaculture farms using about 160 acres of land. Irrigation systems serving agricultural lands have decayed and have been poorly maintained. Ownership of the ditches and water sources remains contentious. With the decline in sugar production, the plantations are selling lands; however, the poor irrigation systems will make it difficult for future cultivation and for diversified agriculture plans. Most of the diversified agriculture is coffee production, with additional production of flowers, papaya, and poi. In 2009, Gay & Robinson estates leased land to Dow AgroSciences for propagation of seed corn. The seed production has gained more economically than the conversion of sugar cane lands for use in ethanol production.

Of conservation lands, some of the most precious state parks---Ha'ena State Park, Koke'e State Park, Na Pali Coast State Park, Polihale State Park, Wailua River State Park, Waimea Canyon State Park, and Kilauea Point National Wildlife Refuge---lie in these areas. About 80 percent of the users of these parks come from visitors to Kaua'i. Residents regard their natural resources as important and have developed policies within the Kaua'i General Plan to protect and preserve the quality of these resources.

Although Kaua'i County encompasses four islands (two uninhabited), the island of Ni'ihau is unique. It is privately owned and managed by Gay & Robinson, Inc. and county officials and politics have little, if any, authority on the island. The population figures for this island are gathered by Gay & Robinson, Inc. and the population is controlled by not allowing visitors. The family company makes all land use decisions and is not bound by oversight from Kaua'i County agencies. The land has not been developed and the population is not expected to increase.

Table 4-4. Real Property Tax Valuation.

State of Hawai'i Data Book Table 9.55 -- REAL PROPERTY TAX VALUATION FOR THE STATE, BY COUNTY, 2014				
[In thousands of dollars. For fiscal year ending June 30. Gross valuations exclude nontaxable (government) properties]				
2014, by county	Honolulu	Maui	Hawaii	Kauai
Assessor's gross valuation 1/ 2/	184,338,798	39,779,467	28,913,424	17,868,949
Land	(3/)	17,113,698	12,310,421	(4/)
Improvement	(3/)	22,665,769	16,603,003	(4/)
Exemptions 1/	24,262,310	6,042,161	5,324,395	2,068,710
Assessor's net taxable valuation	160,076,489	33,737,306	23,589,029	15,800,239
Half of valuation on appeal	980,763	325,748	46,752	93,189
Number of appeals	1,514	499	223	216
Valuation for tax rate purposes	159,095,726	33,411,557	23,542,277	15,707,050
Land	(3/)	15,616,451	11,457,651	(4/)
Improvement	(3/)	17,795,106	12,084,626	(4/)
Amount to be raised by taxation	832,248	222,300	216,069	95,020

1/ Beginning in 1993, data exclude nontaxable properties.
 2/ Assessed value for 2011 as of January 28, 2010 for Honolulu; March 25, 2010 for Kauai; April 19, 2010 for Maui; and April 20, 2010 for Hawaii. Assessed value for 2012 as of January 26, 2011 for Honolulu; April 19, 2011 for Maui and Hawaii; and April 21, 2011 for Kauai. Assessed value for 2013 as of January 27, 2012 for Honolulu; April 19, 2012 for Maui and Hawaii; and March 30, 2012 for Kauai. Assessed value for 2014 as of January 29, 2013 for Honolulu; February 22, 2013 for Kauai; April 19, 2013 for Maui; and June 17, 2008 for Hawaii.
 3/ As of the 2004 - 2005 report, Statewide detail no longer available separately as the City and County of Honolulu consolidated 'Land' and 'Improvement' into the single category 'Property'.
 4/ Single rate for each class.

Source: City and County of Honolulu, Department of Budget & Fiscal Services, Real Property Assessment Division, *Real Property Tax Valuations, Tax Rates, & Exemptions, 2013-2014 Tax Year, State of Hawaii* (August 2014) and <<https://www.realpropertyhonolulu.com/portal/rpadcms/Reports?parent=REPORTS>> accessed August 29, 2013 and earlier reports, and reports as the Department of Finance.
Source: http://dbedt.hawaii.gov/economic/databook/2013-individual/_09/.

Within the 2000 General Plan and in the Mayor’s vision for Kauai, Kaua'i residents have documented the importance of maintaining the rural character of the island. Several characteristics that are important include: keeping towns and communities compact with a distinct identity rather than sprawling; maintaining open lands; keeping building heights low and relatively small scale; and, maintaining natural vegetation along roads. By highlighting the importance of protecting local assets, Kaua'i values the health and sustainability of its communities.

4.2 Emergency Services Infrastructure

Emergency Services Infrastructure refers to critical facilities required during a disaster and first response units to any type of disaster. The location of the emergency services infrastructure has been recorded in the GIS database. These include: the emergency operations center; police stations; fire stations; hospitals, clinics, and dispensaries; civil defense sirens; tsunami signs and warnings as part of the 2014 implementation of the revised evacuation maps; and, community shelters.



Figure 4.1: Evacuation Signs. New signs have been installed to mark the evacuation routes around the island in support of the tsunami warning

4.2.1 Emergency Operations Center

The new Emergency Operations Center opened in Lihue in 2002. The center houses Kaua'i Civil Defense Agency, the Kaua'i Police Department, and the Prosecuting Attorney’s office with facilities for operating a first response center and shelter for personnel during disasters. Built with some funding from the Hazard Mitigation Grant Program, the facility was designed to the highest standards. It has the capability of maintaining communications access during crises, and FEMA ensured that trunk lines can be inserted into the facility easily to operate their emergency mobile response vans. The facility has been operational for 13 years and provided quick and appropriate responses for several disasters. The co-location of police and attorneys with emergency managers has enabled improved coordination in response to disasters. The facility was designed with a large meeting room to support training and drills, and to be ready during operations.

4.2.2 Police and Fire Stations

The Kaua'i County Police Department has three stations, with the main station and administrative headquarters in Lihue at the new Emergency Operations Center facility. The smaller stations in Waimea and Hanalei (Princeville) are co-located with fire stations.

The Fire/Rescue/HazMat/Medical Response Operations program provides fire protection and suppression, rescue (ocean and land), hazmat and emergency medical services (basic life

support.) It conducts commercial, hotel, and industrial pre-fire planning. Pre-fire planning consists of building inspections to determine the building's construction material, contents (people as well as material that determine "fuel load",) entrances and availability of fire protection equipment on property. Seven fire stations are located in Waimea, Hanapēpē, Kalāheo, Kōloa, Kapa'a, and Hanalei (Princeville). The mission of the Kaua'i Fire Department is to protect life, preserve property and enhance the environment of the County of Kaua'i from all hazards. Station units provide 24-hour protection. There are seven engine companies and one rescue/hazardous materials company. The fire fighting force consists of 122 uniformed personnel and four civilians, organized into three bureaus--Administration and Operations, Training and Research, and Prevention (Government of Kauai 2015, Kaua'i Fire Department, <http://www.kauai.gov/Government/Departments/FireDepartment/tabid/107/Default.aspx>; Department of Defense, Civil Defense Division. 2005. State of Hawai'i Drought and Wildland Fire Mitigation Plan). In addition, the Fire Department trains the Community Emergency Response Teams (CERT) with a goal of training teams in every neighborhood (<http://www.kauai.gov/Government/Departments/FireDepartment/CommunityEmergencyResponseTeam/tabid/325/Default.aspx>).

4.2.3 Shelters

Hawai'i State Civil Defense and Kaua'i Civil Defense Agency surveyed shelter spaces in Kaua'i. The final list identified approved sites by hazard. It also included a list of retrofits and hardening activities that were needed in order to designate sites as suitable for sheltering during disasters. There are approximately 20,744 ready general shelter spaces for 69,512 residents--lacking 48,768 spaces. The previous assessment did not take into account special needs of the population, specifically in communities, and sheltering for pets, although Kauai County was the first to have a designated pet shelter and facility at the Humane Society for people to shelter with their pets. The population has since risen to 69,512 (State of Hawai'i Data Book, 2013). No additional formal study has been undertaken. However, several sites have been developed with areas specifically designed to serve as shelters. The visitor population, estimated 15,000 to 20,000 per day, also does not have secured shelter spaces, unless hotels have provided safe locations. Available shelter spaces also do not correlate well with the population around the island, and is somewhat uneven in distribution.

Communities such as the North Shore of Kauai have severe storms that may be isolated. There are potentially thousands of visitors on a daily basis who would need to be sheltered should they be cut off. Given the lack of sheltering for the local population, it is important to identify ways to get visitors to shelters near the airport, where they may be evacuated quickly and not add to the burden of the local communities during the disaster.

The Department of Defense Army National Guard armories have become shelters in the past, even though they are not adequate for this service. During an emergency, however, the army has been reluctant to turn people away who become stranded. The facilities require some shutters and hardening to meet requirements for hurricanes. These facilities also need hardening because they store the supplies used in post-disaster recovery operations. Currently,

available funding for shelters cannot be used to harden the facilities because the armories are under federal jurisdiction.

Kaua'i County was the first place in Hawai'i to develop a partnership with the Kaua'i Humane Society. The new facility was built to high wind specifications and will provide shelter to pets. Space in the basement has also been developed to increase the number of shelter spaces in the county.

Table 4-5. Official Shelters for Kaua'i

Shelter Site	Number of Occupants Permissible	Disaster Type
Ele'ele School	652	Tsunami Flooding Hurricane
Kalāheo School	964	Tsunami Flooding Hurricane
Kapa'a Elementary School	1,209	Tsunami Flooding Hurricane
Kapa'a High School	3,569	Tsunami Flooding Hurricane
Kaua'i Community College	1,059	
Kaua'i High & Intermediate School		Tsunami Flooding Hurricane
Kaumakani Neighborhood Board Center	341	
Kekaha School	894	Tsunami Flooding Hurricane
King Kaumuali'i Elementary School	2,245	Tsunami Flooding Hurricane
Kōloa School	884	Tsunami Flooding Hurricane
Waimea Canyon School	2,288	Flooding Hurricane
Waimea High School	3,142	Tsunami Flooding Hurricane
Wilcox Elementary School	268	Tsunami Flooding Hurricane
Kaua'i Veteran's Hospital	209	
Mahelona Memorial hospital	14	
Veteran's Center	144	
Kaua'i County Humane Society		Tsunami Flooding Hurricane

Source: Hawaii State Civil Defense and Kauai County Civil Defense Agency. 1997, reviewed 2013. Shelter Survey.

4.3 People and Communities

Even though the Līhu'e and Kapa'a areas of Kaua'i are considered more as urban lands, population density is not greatest in these locations as in other urban centers. Kaua'i retains a rural character and the lack of high-rise buildings and urban sprawl help to protect the population from disasters. As Table 4-1 indicates, the population is spread almost evenly around the island. Vulnerability does not result from high density in hazard areas, but rather from isolation of communities in disasters that prevent access to evacuation routes and medical services. Although much improved since 2003, there are places where telecommunications dead zones exist and people cannot access proper assistance during crises because of debris cutting off roadways.

In many areas, the only developed land lies near the coastline. Floods or other disasters could cut off the people who live in these areas, as happened in the flood disaster event in March 2012 (see Chapter 3). Landslides have also caused road closures. Bridge failures may prevent movement along the coastal road by emergency vehicles and impede access to residents who need assistance. In the GIS database, the following have been included: day care facilities, nursing homes, social service agencies, and a dialysis center.

4.3.1 People in Poverty

Disasters exacerbate and stress social conditions, such that the poor are most impacted. The percentage of the Kaua'i population in poverty, according to the following table, is consistent with other counties in the State of Hawaii; however, the real numbers are low. Even with recent growth and development, the rural characteristics of Kaua'i may provide some cushion from impacts, where communities may still support extended families and neighbors which increases coping capacity of residents.

The Center for the Progress of America hosts a website that compiles research on poverty statistics in Hawaii. In most of these areas, Hawaii is near the top, or really among the worst, of the states for poverty. The disaggregated data for counties and communities is not available, but it is clear that areas of equality, poverty reduction, affordable housing, food security, and assets and saving are areas that could be targeted to increase the resilience of communities in the State, and more specifically in Kauai County. Poverty reduction will help to reduce the vulnerability of the community to the impacts of disaster, and the more resilient the community, the better able it is to cope with and recover from disasters.

TalkPoverty.Org – Hawaii Indicators of Poverty

Poverty Rate in Hawaii: 10.9% of people in the state had incomes below the poverty line (\$23,834 for a family of four) in 2013, which ranks 5th in the USA. (Source: U.S. Census Bureau, American Community Survey, 2013, Table B17001; TalkPoverty.org).

Child Poverty Rate: 12.7% of children under 18 in related families in the state who had incomes below the poverty line in 2013, which ranks 4th in the USA. (Source: U.S. Census Bureau, American Community Survey, 2013, Table B17006; TalkPoverty.org).

Poverty Rate for Working-Age Women: 12.4% of working-age women (ages 18-64) who had incomes below the poverty line in 2013, which ranks 8th in the USA. (Source: U.S. Census Bureau, American Community Survey).

Income Inequality Ratio: 13.5 is the ratio of the share of income going to the top 20 percent of households and the share of income going to the bottom 20 percent of households in 2013, which ranks 12th in the USA. (Source: Analysis of data from the U.S. Census Bureau, ACS.)

Unemployment: 4.8% of all workers in the state who were unemployed in 2013. (Source: Bureau of Labor Statistics, Local Area Unemployment Statistics, 2013).

Hunger and Food Insecurity: 12.9% of households in the state who were food insecure on average from 2011 to 2013, meaning that at some point during the year, they experienced difficulty providing enough food due to a lack of money or resources. (Source: U.S. Department of Agriculture, Household Food Security in the United States in 2013).

Affordable Housing: 40 units is the number of apartments or other units in the state that were affordable and available for every 100 renter households with very low incomes in 2013. Very low-income households are those with incomes at or below half of median income in the metropolitan or other area where they live. (Sources: Analysis of data from the U.S. Census Bureau, American Community Survey, 2012; National Low Income Housing Center, Housing Spotlight 4 (1) (2014)). Rank 47th in the USA.

Assets and Savings: 16.5% of households in the state that were “asset poor” in 2011. This is the share of households whose total assets, including any home equity—minus their total liabilities—are less than three times the monthly federal poverty threshold. Ranked 1st in the USA. (Source: Corporation for Enterprise Development, Assets & Opportunity Scorecard; Analysis of data from the U.S. Census Bureau, Survey of Income and Program Participation, 2011).

Wage Gap: 83¢ is women’s median earnings for every dollar of men’s median earnings among full-time, year-round workers in the state in 2013, ranking 7th in the USA. (Sources: Analysis of data from the U.S. Census Bureau, American Community Survey, Table S0201).

Unemployment Insurance: 36.7% of unemployed workers in the state who were helped by unemployment insurance in 2013, ranked 6th rank in the USA. (Source: U.S. Department of Labor, Unemployment Insurance Chartbook).

The best information on household income and poverty is developed by the State of Hawai'i. The data in Table 4-6 suggests that children under five have increased risk of poverty, which may be related to the greater poverty status of female-headed households with children under five. There will be less access to income, resources (such as food, medicine), and opportunities in families of greater poverty. Risk reduction activities that strengthen the resilience of the most impoverished will enable these families, and ultimately the communities in which they live, to be more resilient to the impacts of disasters.

Table 4-6. Poverty Status.

Table 13.27-- POVERTY STATUS, FOR THE STATE AND BY COUNTY: 2008- 2012					
[Based on nationwide poverty thresholds. Hawaii thresholds are approximately 15 percent higher than those in effect on the Mainland; these data accordingly understate the numbers of persons and families below the poverty level in Hawaii. Economic characteristics not available from the Census 2010. Average of 2008- 2012. Data in percent below poverty level]					
Subject	State total	City & County of Honolulu	Hawaii County	Kauai County	Maui County
All families	7.6	6.7	12.2	7.7	7.5
With related children under 18 years	11.8	10.2	20.2	11.1	12.2
With related children under 5 years only	13.0	10.6	22.3	19.0	15.1
Married couple families	4.3	3.8	6.8	5.4	4.1
With related children under 18 years	5.5	4.7	9.8	7.5	5.7
With related children under 5 years only	5.9	4.6	9.7	10.7	9.8
Families with female householder, no husband present	20.4	19.0	29.1	18.6	18.2
With related children under 18 years	30.0	29.2	40.1	23.0	24.3
With related children under 5 years only	33.6	31.7	43.7	40.1	28.5
All people	10.8	9.6	17.0	11.0	10.3
Under 18 years	14.6	12.7	24.9	14.0	14.5
Related children under 18 years	14.2	12.3	24.3	13.3	13.8
Related children under 5 years	15.5	13.3	26.4	16.7	15.8
Related children 5 to 17 years	13.7	11.9	23.5	11.9	13.0
18 years and over	9.7	8.7	14.7	10.1	9.0
18 to 64 years	10.2	9.1	16.0	10.5	9.9
65 years and over	7.2	7.2	9.1	8.3	4.7
People in families	8.0	7.0	13.6	7.8	7.6
Unrelated individuals 15 years and over	24.2	22.8	31.2	26.2	22.2

1/ Either there were no sample observations or too few sample observations were available to compute an estimate. Source: U.S. Census Bureau, 2008-2012 American Community Survey 5-Year Estimates, Selected Economic Characteristics: 2008-2012 Hawaii, counties, and places as extracted by Hawaii State Department of Business, Economic Development & Tourism, Hawaii State Data Center, American Community Survey 2012 Hawaii Geographic Area Profiles (5-Year Estimates) "DP03: Selected Economic Characteristics" <<http://census.hawaii.gov/acs/american-community-survey-2012/2780-2/>> accessed January 7, 2014.

4.3.2 Elderly Population

Kaua'i has a significant and increasing number of elderly residents. In 2000, the elderly population (age 60 and older) rose to 17.9 percent from 15.7 percent in 1980 (2000 Census). The elderly resident population has increased faster than total population growth in the county. Nearly 13 percent of the elderly population is categorized as low-income (Kauai General Plan 2000, 8-5). Districts with a significant elderly population---about one in five over 60 years---include Līhu'e, Kōloa-Poipu-Kalaheo, and the West Side (Kauai General Plan 2000, 8-5).

Growth in the elderly population in Kaua'i is expected to increase over the next several decades. This indicates a need to plan for rising demand for geriatric services, including long-term and home care, alternative living accommodations, and access to health care, social services, and public transportation. With significant members of the elderly community classified as low-income and likely spending more for increased services, housing also becomes difficult to afford (Kauai General Plan 2000, 8-5).

The elderly population poses some difficulties to emergency management, especially in situation of a disaster. Access to medical facilities may be impeded during a natural hazard. Evacuation from areas of the island, such as Po'ipū and Kōloa may be difficult since there are few access roads, and the elderly populations living in these areas may need additional assistance. Emergency response plans must consider special needs and requirements for the elderly population.

To ensure that the elderly population is protected, the County of Kaua'i Agency on Elderly Affairs participates in the Disaster Mitigation Committee. County of Kaua'i Agency on Elderly Affairs, with the Mayor as Chief Executive, is the local Area Agency on Aging. Its purpose is to plan, support, and advocate for programs to promote the well-being of Kauai's older adults and to address and respond to the priority needs of all seniors. Priority is given to seniors 60+ years old who are in the greatest financial and social need. Seniors and their families have the opportunity to make a contribution towards the services they receive, thus helping to maintain and expand services within each program. These services are provided with funding by County, State and Federal governments. Services include: Information and Referral, Case Management, Senior Transportation, Adult Day Care, Homemaker Services, Personal Care, Respite, Elderly Nutrition Services, Volunteer Program, Friendly Visiting Program, Telephone Reassurance, Senior Companion Program, Home Service Registry, Legal Assistance Services and Caregiver Counseling. They have developed information and procedures to help the elderly populations of Kaua'i prepare for disaster.

4.3.3 Communities

The geography of the Island of Kaua'i lends itself to the geo-cultural divisions from the mountains (mauka) to the sea (makai), or ahupua'a. The rural character of the island combined with the divisions in ahupua'a has resulted in resource use planning that takes place within communities. Examples of this type of organization include the Hanalei Watershed Hui, which has been able to work together with community members to address local environmental issues and needs. Although the communities are not all focused on hazard mitigation, many of their environmental activities become flood mitigation projects. In addition, the ability of these communities to work together in many activities, often with non-governmental organizations has helped to improve health, education, livelihoods, and well-being in communities that makes them more likely to recover quickly from disaster impacts.

The North Shore community often gets cut off during high rain events and flooding. They also recognize vulnerability from high waves, tsunamis, and storms. Because the community has

done extensive planning over the last several decades and identified the importance of maintaining the rural character of community, the community has developed the Hanalei to Ha'ena Resiliency Plan that identifies specific disaster threats, convenes community leaders to consider options for training and drilled evacuations (at the school). The community has also recognized that there are extensive numbers of visitors to the North Shore on a daily basis who do not have the knowledge or resources to cope with disasters without extensive dependence on few residents. The plan begins to look at options. This resiliency plan is being discussed in other communities, and there are several that would like to pursue similar plans.

4.3.4 Public Housing and Building Stock

Housing has changed over the last century as people moved away from plantation houses to agricultural homesteads and house-lots. As the highway around the island developed, new areas became available for development. Former plantations converted to residential subdivisions. In addition, the transient and visitor population changed, increasing markets for condominiums and timeshare rental units. During the 1990s, an influx of mainland buyers again increased resort development and demand in high-end residential real estate.

Following Hurricane Iniki, the housing market suffered from a downturn in the visitor industry. Housing stock generally changed and improved following Iniki, with fewer single-wall construction facilities.

Table 4-7. Housing Values, 2013.

State of Hawai'i Data Book Table 21.03-- ACCEPTED VALUE PER HOUSING UNIT, BY COUNTY: 2013					
[Not comparable to <i>Data Books</i> prior to 2006. In dollars. Excludes building permits for additions, alterations and repair. "Accepted value" is the cost of construction for which building permits are issued]					
Type of structure	State total	City and County of Honolulu	Hawaii County	Kauai County	Maui County
One-family	342,196	318,639	339,884	540,590	323,709
Two-family	284,413	300,142	141,394	(NA)	164,340
Multi-family	202,667	203,022	(X)	(NA)	172,875
X Not applicable					
NA Not available.					
Source: County building departments and U.S. Census Bureau, building permits; < http://censtats.census.gov/bldg/bldgprmt.shtml > accessed May 29, 2015.					

The cost of housing, including owner-occupied and rental units, continues to be one of the biggest economic obstacles facing most Kaua'i residents. Throughout the state, Kauai County has the highest cost of housing by a significant margin compared to other counties. This pressure often means that one-family houses are often occupied by extended family members in order to meet living costs. Of the total number of owner-occupied housing in 2013, only 5.7% of the houses are located in Kaua'i (State of Hawai'i Data Book 2013). In 1997, Kaua'i had the third highest median household income of Hawai'i's four counties. The median household income of \$34,890 was about 14 percent lower than the statewide median figure. A common indicator of housing cost burden is the monthly shelter-to-income ratio. The optimum shelter-

to-income ratio should not exceed 30 percent. A greater proportion of rental households, about 50 percent of them, have shelter-to-income ratios exceeding 30 percent and have difficulty transitioning to homeownership since they cannot save enough for a down payment (Kaua'i General Plan 2000, 8-3). The housing characteristics have not been reassessed since the last census.

Kauai County has the least amount of housing, and also the fewest residents. Approximately 60% of the housing units are owner-occupied (State of Hawai'i Data Book 2013). The following table shows the residential characteristics of the State, with information for Kaua'i County highlighted.

Table 4-8. Estimated Land Acreage.

State of Hawaii Data Book Table 21.16-- SELECTED HOUSING CHARACTERISTICS, BY COUNTY: 2010					
[Data include some condominium units used or intended for use by transients]					
Subject	State total	City and County of Honolulu	Hawaii County	Kauai County	Maui County 1/
All housing units	519,508	336,899	82,324	29,793	70,492
Occupied housing units	455,338	311,047	67,096	23,240	53,955
Owner-occupied housing units	262,682	174,387	44,271	13,968	30,056
Renter-occupied housing units	192,656	136,660	22,825	9,272	23,899
Average household size					
Owner-occupied housing units	3.02	3.11	2.69	2.96	3.02
Renter-occupied housing units	2.72	2.75	2.73	2.64	2.57
Vacant housing units	64,170	25,852	15,228	6,553	16,537
For rent	16,441	8,633	2,995	1,312	3,501
Rented, not occupied	954	625	101	61	167
For sale only	4,277	1,941	1,338	251	747
Sold, not occupied	1,151	645	289	51	166
For seasonal, recreational, or occasional use 2/	30,079	8,799	7,135	4,172	9,973
All other vacant	11,268	5,209	3,370	706	1,983
Homeowner vacancy rate (percent)	1.6	1.1	2.9	1.8	2.41
Rental vacancy rate (percent)	7.8	5.9	11.6	12.30	12.70
Owner-occupied:	262,682	174,387	44,271	13,968	30,056
Family households	198,891	134,249	31,369	10,754	22,519
Married-couple family	155,722	104,825	24,627	8,443	17,827
Other family	43,169	29,424	6,742	2,311	4,692
Nonfamily households	63,791	40,138	12,902	3,214	7,537
Renter-occupied:	192,656	136,660	22,825	9,272	23,899
Family households	115,016	83,593	13,038	5,393	12,992
Married-couple family	74,354	56,347	7,207	3,211	7,589
Other family	40,662	27,246	5,831	2,182	5,403

Nonfamily household	77,640	53,067	9,787	3,879	10,907
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1/ Maui County includes Kalawao County. Kalawao County had 113 housing units, 1 owner-occupied housing unit and 68 renter-occupied housing units.

2/ Used or intended for use only in certain seasons or for weekends or other occasional use throughout the year. Seasonal units include those used for summer or winter sports or recreation, such as beach cottages and hunting cabins. Seasonal units also may include quarters for such workers as herders and loggers. Interval ownership units, sometimes called shared-ownership or time-sharing condominiums, also are included here

Source: U.S. Census Bureau, 2010 Census "DP-1 - Hawaii Profile of General 2010 Demographic Profile Data" (May 19, 2011)
<http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml> accessed May 19, 2011 and 2010 Census Summary File 1 (June 16, 2011)
<http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml> accessed July 11, 2011.

The analysis of housing affordability indicates that about half the homeowners and renters are economically vulnerable to impacts of any crisis. Inability to work for even short periods of time could prevent people from paying mortgages or rent, and could cause a severe sheltering crisis for Kaua'i County, in addition to any damage sustained to houses and buildings during a disaster.

One of the measures for housing vulnerability used in other studies has been the age of the structure, with the assumption that the older the facility, the weaker it may be due to aging. This assumption does not necessarily apply to Kaua'i. Although the maintenance levels since Hurricane Iniki will have a large impact on the ability of the newer houses to withstand disasters, the assumption is that those things that withstood the previous hurricanes are built pretty well.

Kaua'i County has been at the forefront of planning in the state for improved building standards for housing. In addition to strengthening buildings, Kaua'i has promoted safe room construction in new homes. The ordinance for safe room construction appears in the Chapter Six appendix. The County Planning Department recommended additional setbacks for rim lot development, because houses located on ridges and cliffs experienced an upsweep of wind. After the earthquakes affecting Hawai'i Island in 2006, the State researched and developed a stronger building code, and gave the counties time to train and adjust to the revisions. Kauai County adopted the 2006 International Building Code in 2010, and is working to improve these codes to the 2012 IBC, with amendments for wind risk.

4.3.5 Visitors

The County of Kaua'i provides basic services to the visitor industry, such as water supply, roads, fire and police protection, and operation of public parks. With the additional average 23,334 visitors to Kaua'i per day, the County must also provide protection during natural hazards (State of Hawai'i Data Book 2013). Not only do visitors present a problem for sheltering, they do not typically have water and food reserves, and will tax very limited resources available for the county following a disaster. Further problems come from people who need to leave and cannot get off the island. Interisland travel becomes limited, people miss flights, and it may be days before they can get out of Kaua'i. This experience during Hurricane Iniki damaged the tourism

industry and resulted in fewer visitors to Kauai for years following the hurricane. With the high economic dependency on tourism, it is important for Kauai's economy to value and plan for visitors in the case of disaster, not only to protect this population but to also protect the local economy.

Visitors may not have additional cash resources to cover their extended stays and financial institutions may not have reserves for the population. Depending on the impact of the disaster to O'ahu, it may be difficult for Kaua'i to receive cash and goods since financial and shipping services rely on transfers through Honolulu. There may not be enough goods to purchase on-island. The visitor population is vulnerable to disasters, and exacerbates resources available to the county. Therefore, any hazard mitigation plan should make plans to protect and provide resources to the visitor population, while maintaining the same level of protection and safety for residents.

4.4 Critical Infrastructure

Critical infrastructure covers a wide range of activities and lifelines that support the daily activities of Kaua'i County and are essential in any emergency situation. These lifelines include water infrastructure, energy, transportation and ports of entry, telecommunications and solid waste.

4.4.1 Water

The Kaua'i County Water Department has mapped, and maintains the maps of, their resources using Geographic Information Systems. Some of the data is available on their website, although much of the specific information needs to remain secure as part of homeland security.

Personal customer information has not been included and privacy has been maintained. The GIS system includes the following: county water storage tanks; water distribution lines for the public system; wells; private water systems; reservoirs for wildfire fighting; irrigation and ditch systems; wastewater systems; dams and reservoirs; and, storm drainage systems.

4.4.2 Water Supply

The Kaua'i County Department of Water (DOW) is a semi-autonomous agency for the management, control, and operation of the island's municipal water system. DOW supplies water to thirteen geographic service areas, each of which is served by a single system or linked subsystems. Service areas include: 1) West Side – Hanapēpē to Ele'ele and Waimea to Kekaha; 2) Kalāheo to Po'ipū-Kōloa – Kalāheo, Kōloa- Po'ipū, and Lawai-Omao; 3) Līhu'e – Puhi-Līhu'e to Hanamā'ulu; 4) Kawaihau – Anahola, Moloa'a, and Kapa'a-Wailua; and, 5) North Shore – 'Anini, Hanalei, Kīlauea-Waipake-Kalihiwai, and Wainiha-Hā'ena. In addition, there are several private potable water systems, including Princeville. DOW contracts with Princeville to supply 'Anini with water (Kauai General Plan 2000, 7-10,11; reviewed 2015).

DOW maintains 52 separate groundwater sources comprised of wells, shafts, and tunnels. Storage tank capacity contains approximately 18.5 million gallons. DOW has 16 booster pump stations. Average daily demand for municipal water is approximately 10.6 million gallons per day, with maximum demand reaching 15.9 million gallons per day. In general, the municipal

water system has adequate source and storage capacity to support existing demands; however, additional growth would require expansion to the water system (Kauai General Plan 2000, 7-10,11).

The Kaua'i Department of Water and members of the Water Board have completed a 20-year plan known as "Water Plan 2020." This is a comprehensive, long range planning effort, to ensure that the county continues to provide safe, affordable and sufficient drinking water in the 21st century for the Kaua'i community. The plan reviews existing facilities, and service standards and provides an outline for new and replacement facilities, a capital improvement program for the next 5-7 years, a financial plan, and a rate study.

Kaua'i's Department of Water operates 13 separate, unconnected water systems spread out along our island from Kekāha to Hā'ena. Pumping water from 48 underground wells and tunnels and storing it in 43 tanks, DOW delivers water to nearly 18,000 accounts through 400 miles of pipeline. Many of the water systems date back to the plantation era, and some pipelines are 80-100 years old.

Water Plan 2020 is focused on potable water used for drinking and fire protection. It addresses the sources, infrastructure, and funding needed to deliver potable water. The plan will not cover issues involving water for agriculture, stream standards, and watershed management. These issues are the focus of other state and local planning and regulatory processes.

Water supply in Līhu'e is constrained by a lack of new groundwater sources because of the geology of the area, and therefore, new development is also constrained in this area. Throughout the North Shore, water supply is also limited. Long-range plans have been developed to monitor and expand the water system over the next 20 years. Even though Kauai is known for receiving a great deal of precipitation, it must still monitor its water resources, which may be burdened during periods of drought associated with climate variability and change. Areas on Kaua'i are subject to wildland fires, as previously discussed, and will require additional water resources to combat fires, especially during dry periods. These issues have been addressed in the county drought mitigation plans (Kauai County. 2004. County Drought Mitigation Plan <http://state.hi.us/dlnr/drought/preparedness/KauaiDroughtMitigationStrategies.pdf>). [Note: this is the latest version of the plan and best available data.]

4.4.3 Wastewater Treatment

Wastewater treatment varies across the island. The county provides service to some communities and some private systems supply needs to some communities. Other areas rely on Individual Wastewater Systems (IWS), such as cesspools and septic tanks. Wastewater disposal is adequate and does not pose significant health or environmental threats. There are several projects that improve drainage to ensure that storm water does not adversely impact drainage systems. The plan for improving the system in Wailua was finalized in September 2008. The County is implementing the plans as funds become available.

Kaua'i County Department of Public Works Division of Wastewater Management operates four wastewater systems serving Waimea, Hanapēpē to Ele'ele, Līhu'e to Hanamā'ulu, and the Kūhio

Highway corridor. Currently, there are no facility plans to expand treatment plants. Information had been recorded in paper surveys and reports for a number of years, and digital information was limited. Some of the information was digitized for the plans, but federal requirements will require digital data storage for reporting in the future.

The greatest vulnerability to wastewater treatment systems during storms could be overtaxed systems and leaks or breaks in pipes that would threaten environmental and public health. Some of these pipes follow bridges, which may be vulnerable to collapse during floods, storms, and seismic events. The Division of Wastewater Management participated in the development of the geographic information system and plans to improve digital records in the future. This will make it easier to identify weaknesses in the system and areas for response.

4.4.4 Energy

Kaua'i Island Utilities Cooperative (KIUC) serves approximately 36,714 customers, providing four levels of service: residential, commercial, large power, and street lighting (State of Hawaii Databook, 2013, Section 17). Major load centers are Kapa'a-Wailua, Līhu'e, and Kōloa-Po'ipū. The total firm electrical generating capacity on Kaua'i is 110 megawatts. KIUC generates its own power from a 96-megawatt, diesel-fired power plant located at Port Allen and purchases 14 megawatts of firm capacity from Līhu'e Plantation. The utility also purchases non-firm power from Island Coffee and Gay & Robinson sugar mill. This nominal amount is acquired under "surplus power" contracts with the companies and cannot be relied upon to meet peak demand. These non-firm sources generate a total of approximately 4.1 megawatts of power. About 20 percent of KIUC's power output is generated from renewable resources, including bagasse, a sugar-cane by-product, and hydropower.

The County has the ability to guide the location, siting and design of electrical generation and transmission facilities through a combination of land use policies, zoning regulations, and design guidelines. Current service, divided into the main regions of the island, is as follows:

- **West Side** – The main transmission line for the West Side extends from Port Allen to Mana along Kaunualii Highway, including double circuits between Port Allen and Kekaha. Switchyards are located at Port Allen and Kekaha, with substations in Mana and Kaumakani.
- **Kalaheo to Poipu-Koloa** – Four transmission circuits serve this region---one extending east from Port Allen and another extending south from Kaunualii Highway. There is a switchyard in Koloa and a substation in Lawai.
- **Lihue** – Four transmission circuits serve this area. Although Lihue Plantation provides power to the system, the primary source of electricity is the Port Allen Generating Station.
- **Kawaihau** – This region is served via a tap off of the mauka transmission line that connects the Wainiha Hydroelectric Plant with Port Allen. This tap provides power via the Kapaa Switchyard to Kapaa Town and other developed coastal areas, as well as to residential communities in Kapaa and Wailua homestead areas. Kapaa Switchyard is also linked to the Lydgate Substation and the Lihue Switchyard.
- **North Shore** – This area is served by electrical power provided by the transmission lines along the Power Line Trail supplemented by power from the Wainiha Hydroelectric Plant.

KIUC participated in the planning process and understand the importance of mitigating the impact of natural hazards on Kauai's energy system. Following Hurricane Iniki in 1992, there was an island-wide electrical blackout and telecommunications and commercial water services were almost entirely curtailed. Sewage treatment plants were forced to discontinue operations thus threatening pollution of surrounding waters. The loss of electricity closed gas stations and refrigerated food spoiled in homes, stores, and warehouses. Credit cards could not be verified and cash was not available from automatic teller machines (US Department of Energy and Office of Emergency Management for the State of Hawaii, 1996, Hawaiian Islands Hazard Mitigation Report, 1). During the recovery from Iniki, KIUC undertook a program to upgrade the transmission system by installing steel poles and adding many storm guys and push braces. Because Kauai Electric was part of Citizens Utilities Company (CUC), they were able to acquire funds expeditiously to make repairs.

The Citizens Utilities had three programs to improve resiliency of its transmission lines and distribution systems. Kauai Electric had to obtain easements for the additional guying and put quite an effort into the installations. Kauai Electric already planned to install steel poles prior to Iniki, and the effort continued during disaster recovery in order to harden the overall system. KE and CUC spent approximately \$20 million to replace wood poles with steel, and about \$300,000 per year to install guy wires on wood poles not being replaced (US Department of Energy and Office of Emergency Management for the State of Hawaii, 1996, Hawaiian Islands Hazard Mitigation Report, 27-28). Since then, there has been a maintenance schedule that coincides with the KIUC strategic plan.

KIUC no longer installs class 3 poles. Since Hurricane Iniki, KIUC has only installed class 2 and class 1 poles. Presently, KIUC will only install class 1 poles. The Public Utility Commission (PUC) is looking at adopting the National Energy Securities Code (NESC) and eliminating General Order No. 6 (GO6) rules for overhead electric line construction and structural loading requirements. Once this happens, the wind loading would increase substantially. Thus, KIUC would need to install bigger poles or even use steel poles.

The use of an ocean outfall by the Citizens Utilities on Kauai for power plant cooling systems has been found to reduce vulnerability of the power plant to hurricane and gale force winds (US Department of Energy and Office of Emergency Management for the State of Hawaii, 1996, Hawaiian Islands Hazard Mitigation Report, 34-35). Since Homeland Security has become important in planning for the security of utilities, it is important to that KIUC is installing an automatic gate in Ele'ele, a Security System at the Lihu'e Building and is working on cyber security systems for the network.

Most of the utility data has not been classified for inclusion in the geographic information system. Some of the transmission lines and pole locations are not included. The following positions and information have been recorded in the GIS database and included in attached maps: power plants; booster stations; fuel storage and supply; propane tanks, and above ground fuel pipelines.

The Board of Directors of Kaua'i Island Utility Cooperative (KIUC) voted on Aug. 27, 2013 to approve the final version of the cooperative's 2013-2025 Strategic Plan.

Goals in the plan include:

- Reducing the average residential energy bill by at least 10 percent over the next 10 years even as petroleum fuel prices are forecast to rise 35 percent. The amount of the reduction could be greater or less depending on the actual price of oil and assumes that KIUC completes its switch to at least 50 percent renewable power generation.
- Reducing greenhouse gas emissions from KIUC operations to 1990 levels by 2023. That would eliminate about 52,000 tons of carbon dioxide emissions annually.
- Holding operations budgets at or below the inflation rate, something KIUC has done since 2010, while maintaining system reliability.

The 2013-2025 Strategic Plan updates the document that was adopted by the board at the end of 2009. The plan will be regularly evaluated by the board to ensure that KIUC is responding to the rapid technological, financial and regulatory changes that are affecting all utilities. In addition, it plans for the development of energy infrastructure to coincide with development on the island (KIUC 2013, <http://website.kiuc.coop/content/strategic-plan>).

4.5 Transportation and Ports of Entry

Transportation data is important for emergency operations during any type of disaster and for providing relief and recovery. Failure of these lifelines could be a great impediment to dealing with the impacts of a hazard. The information recorded in the GIS database and in attached maps includes: roads and bridges; airports, landing strips and helicopter pads; ports; vehicle and heavy equipment base yards, and car rental agencies.

4.5.1 Airports

The State Department of Transportation, Airports Division, operates two facilities on Kaua'i--- the Lihue Airport and the Port Allen Airport. The Lihue Airport serves as the primary gateway for arriving and departing passengers. Overseas passenger service, interisland commuter service, and cargo service use Lihue Airport. It encompasses 834 acres of land. The State of Hawai'i owns and operates the airport as part of the statewide airport system (Kauai General Plan 2000, 4-33; State of Hawai'i Data Book 2013). Based on visitor projections and forecast aviation demand projections, the State's 2020 Master Plan proposed improvements to extend the Runway 17-35 from 6,500 feet to 8,500 feet, although these projections may have declined and the State's budget constraints may not allow the extension to happen. Additional security requirements at airports, decreased travel overseas because of war, terrorism, and SARS, H1N1, pandemic flu, or other health epidemics, fewer daily interisland flights, and localized airline changes that make interisland travel less commuter-friendly may alter the original projections. The Lihue Airport has the highest elevation of any airport in the State of Hawai'i, and may

prove critical for the State in the event that the Honolulu International Airport could not be used for delivering supplies and personnel.

Port Allen Airport has a single runway, general aviation airport with minimal facilities. The State of Hawaii owns the facility. It has been used minimally since the Līhu'e Airport replaced it. This airport provides emergency helicopter operations, helicopter tour flights, and general aviation needs. This airport does not have the physical buildings or facilities to adequately accommodate the needs of the helicopter operators.

4.5.2 Harbors

Nāwiliwili Harbor serves as the primary commercial harbor for Kaua'i. Facilities include three piers for handling overseas and interisland general and containerized cargo. Charter boat fishing, recreational boating and passenger cruise ships use the harbor. In the Department of Transportation's 2010 Master Plan, expansion of the harbor has been planned based on increased projections in visitors, growth of the county, and increased operations of cruise ships. Following September 11, 2001, cruise ship operations declined, and it is not clear whether the need to increase port services is critical at this juncture. However, previous projections showed the highest rate of return in investments at Nāwiliwili Harbor among all the proposed harbor improvements statewide.

Maintaining operations at Nāwiliwili Harbor is critical during emergencies, as Kaua'i experienced during Hurricane Iniki. All of the major relief supplies and equipment would need to be transported through this harbor by Young Brothers cargo transporters. Agreements have been made among the Matson Corporation, State Civil Defense, the Honolulu Electric Company (HECO), and Young Brothers to maintain port operations during emergencies in Honolulu, where most of the imports to Hawai'i, including fuel and equipment, arrive, and to make sure that SCD can control the manifest for deliveries of relief assistance and necessities to the neighbor islands.

The second commercial harbor at Port Allen Harbor has a single pier. Current operations from this harbor include: commercial fisheries, US Naval vessels supporting the Pacific Missile Range Facility, petroleum shipments, general cargo, and small recreational tour operators. The harbor does not currently provide adequate facilities for tour operators displaced from Hanalei River. Capital improvements are needed to support expected future growth.

The State Department of Land and Natural Resources Division of Boating and Ocean Recreation (DOBOR) owns four small boat harbors on Kaua'i---Nāwiliwili, Port Allen, Kīkīaola and Kukui'ula. The Wailua Marina is privately owned. DOBOR manages boat-launching ramps. Local fishers and residents use most of these small boat harbors. Charter boats and tour operators have migrated to Nāwiliwili and Port Allen because of conflicts about types of harbor use, and have not been allowed to operate out of small boat harbors in communities.

4.5.3 Roadways and Bridges

The regional roadway system on Kaua'i consists of two-lane roads connecting major developed areas on the island. The quality of the highways varies from a narrow, winding highway north of Hanalei to excellent arterial highways. A short four-lane segment of undivided highway exists in Līhu'e town, and a three-lane section goes from Hanamā'ulu to Waipo'uli.

The existing roadways serving various regions are described below:

- **West Side** – Kaumualii Highway, a two-lane State arterial road, is the primary highway connecting the West Side to Kalaheo, Lihue, and points eastward. Kaumualii Highway extends west from Eleele/Port Allen to Mana. Kokee Road is the main route providing access mauka to Waimea Canyon and Kokee State Park.
- **Kalaheo to Poipu-Koloa** – Kaumualii Highway is the primary highway connecting the Kalaheo-Poipu-Koloa Planning District to Lihue on the east and to Port Allen/Eleele on the west. Other major roads are county-owned. They include Maluhia Road, Poipu Road, the Poipu Bypass, and Koloa Road.
- **Lihue** – This region is the hub which connects the two belt highways, Kaumualii Highway (serving west Kauai) and Kuhio Highway (serving east Kauai). Kapule Highway has been constructed to bypass Lihue Town, connecting the airport, harbor, and industrial areas with Wailua-Kapaa and other points on the east side.
- **Kawaihau** – Kuhio Highway is the primary roadway serving the Kawaihau Planning District. It is a three-lane State arterial highway between its junction with Kapule Highway and Kamoā Road in Waipouli. Two lanes are northbound, and one lane is southbound. Using contra-flow traffic measures, the land usage is reversed during the morning peak ours in order to accommodate Lihue-bound commuters. Between Kamoā Road and Waikaea Canal at the edge of Kapaa Town, the third lane is used for left turns in both directions. In Kapaa Town, Kuhio Highway becomes two lanes with on-street parking through the town center. From the north edge of Kapaa Town to Moloaa, Kuhio Highway is a two-lane arterial highway.

In 1995, a temporary Kapa'a by-pass route was opened to traffic during daylight hours. The route runs mauka of Kūhio Highway, utilizing private cane haul roads. It has provided some relief for Kūhio Highway traffic through Waipouli and most of Kapaa Town. Major two-lane collector roads include Kuamo'o Road (State) and Olohena Road (County), which provide access to the Wailua Homesteads area from Kuhio Highway in Wailua and Kapaa. Kawaihau Road is a county-owned two-lane collector road connecting Kapaa Homesteads with Kuhio Highway.

- **North Shore** – Kūhio Highway is the only arterial road connecting the North Shore with the rest of Kauai. Throughout the North Shore, Kuhio Highway is a two-lane road. The highway has been improved from Moloaa to Princeville. From Princeville to Haena, the road has narrow pavement widths, hazardous curves, and minimal shoulders. The narrow pavement and the ten one-lane bridges between Princeville and Haena give the roadway a unique character. Only the Lumahai Bridge is a modern two-lane bridge. The one-lane bridges preclude large tour buses from entering Hanalei Town, as well as precluding the entry of heavy trucks and construction equipment.
(**Source:** Kauai General Plan 2000, 7-2,3).

Existing traffic conditions are poor in the central part of the island. Traffic into and out of Līhu'e through Kapa'a is extremely congested during morning and late afternoon peak hours. Collector roads, such as Kuamo'o Road in Wailua, also suffer congestion during peak hours.

Traffic congestion makes residents and visitors extremely vulnerable to the impacts of disasters. Heavy rains make the roads slick.

Congested and few arterial roads may make it difficult to evacuate risky areas. Large segments of the roadway run along the coastline, and many of these roadways could be engulfed in a tsunami. Cars sitting on the road trying to evacuate and the slow movement of traffic could result in high numbers of death and injury. The single lane bridges may also prevent evacuation during emergencies, and leave low-lying areas, such as Hanalei vulnerable to tsunami.

Some planning for additional access and traffic alleviation has occurred. The Kaua'i Civil Defense Agency has worked with private landowners and other agencies to secure access to private roads for evacuation purposes. Planning for the Kapa'a Bypass Road has begun, but will require multi-agency collaboration and planning, and large amounts of funding to become a reality.

Figure 4-2. State Roadways on Kaua'i.



1. Route 50, Kaumualii Highway, Ahukini Road (Route 570) to Mana
2. Route 51, Kapule Highway, Rice Street to Kuhio Highway (Route 56)
3. Route 56, Kuhio Highway, Ahukini Highway (Route 570) to Princeville
4. Route 58, Rice Street to Kaumualii Highway (Route 50)
5. Route 540, Halewili Road off of Kaumualii Highway (Route 50)
6. Route 541, Waialo Road off of Kaumualii Highway (Route 50)
7. Route 550, Waimea Canyon Drive off of Kaumualii Highway (Route 50)
8. Route 560, Kuhio Highway, Princeville to Haena
9. Route 570, Ahukini Road Kuhio Highway (Route 56) to Kapule Highway (Route 51)
10. Route 580, Kuamoo Road off of Kuhio Highway (Route 56)
11. Route 583, Maalo Road off of Kuhio Highway (Route 56)
12. Route 50, Kaumualii Highway, Ahukini Road (Route 570) to Mana
13. Route 51, Kapule Highway, Rice Street to Kuhio Highway (Route 56)
14. Route 56, Kuhio Highway, Ahukini Highway (Route 570) to Princeville
15. Route 58, Rice Street to Kaumualii Highway (Route 50)
16. Route 540, Halewili Road off of Kaumualii Highway (Route 50)
17. Route 541, Waialo Road off of Kaumualii Highway (Route 50)
18. Route 550, Waimea Canyon Drive off of Kaumualii Highway (Route 50)
19. Route 560, Kuhio Highway, Princeville to Haena

- 20. Route 570, Ahukini Road Kuhio Highway (Route 56) to Kapule Highway (Route 51)
- 21. Route 580, Kuamoo Road off of Kuhio Highway (Route 56)
- 22. Route 583, Maalo Road off of Kuhio Highway (Route 56)

There are sections where traffic flow is poor. Peak hours in the morning and late afternoon result in extreme congestion, and this has resulted in the construction of bypass roads. Traffic congestion makes residents and visitors vulnerable to the impacts of disasters, because it is difficult to evacuate quickly during peak hours. It is also challenging for emergency vehicles to move through the traffic. Heavy rains will make the roads slick. Congestion and few arterial roads may make it difficult to evacuate risky areas. Large segments of the roadway run along the coastline, and many of these roadways could be engulfed in a tsunami. Cars sitting on the road trying to evacuate combined with the slow movement of traffic could result in high numbers of death and injury. During the flooding in March 2012, after which a disaster declaration was made for Kauai County, cars could not pass over high water and landslides. Many residents were “stuck” for three days and could not get home, and residents in their homes were prevented access to emergency services. Visitors, who may not have obtained information on the situation, were unable to leave communities, and relied on the kindness of residents for food, water, and safe haven.

4.6 Telecommunications

During any type of disaster, the ability to communicate across the island, within the county, and within the state remains critical. It is important to record the locations of telecommunications equipment and lines, and to be able to maintain operability. The overall system involves public facilities, private companies, most specifically Hawaii Telcom, and various cell phone companies. Because of privacy issues, not all of the information is available for inclusion in the GIS database for the County. To the extent possible, the GIS database and maps include: telephone switching stations; satellite dishes; microwave repeaters; cellular phone antenna; telephone lines; cable television lines; and, radio stations and transmission towers.

4.6.1 Hawaiian Telcom

Hawaiian Telcom has approximately 30 miles of fiber optic cable underground on Kaua’i and approximately 80 miles of fiber optic cables above ground. There are 100 miles of underwater fiber optic cable that run from Ko Olina on O’ahu to the Wailua Golf Course area of Kaua’i. This is the most secure system because it lays on the bottom of the ocean floor and is not prone to damages from natural disasters (tsunami, hurricanes) or human-induced sources (ships, etc). There is approximately 5,000 sheet miles of above ground phone lines on the island.

The company has 11,300 poles on Kaua’i, of which about 9,000 are jointly shared with Kaua’i Island Utility Cooperative. The telephone pole lines are rated at about 60 to 80 mph. Except for the Lihue to Kalaheo route, and the Lihue to Kapaa route, most fiber routes are more than 90% overhead. The Lihue to Kalaheo route is approximately 90% underground. The Lihue to Kapa'a route is 85% underground. For Kaua’i, except for the Lihue to Kalāheo route, and the Lihue to Kapa’a route, most fiber routes in Kaua’i are more than 90% overhead. The Lihue to

Kalaheo route is approximately 90% underground. The Līhu‘e to Kapa‘a route is 85% underground.

The replacement costs for the system in a catastrophic disaster, using 2015 dollars, have been estimated at approximately \$18 to \$23 million. Pole replacement cost runs about \$1,500 a pole. The system maps for the utilities were updated in 2006 and 2011.

Hawaiian Telcom has an Emergency Operating Center in Honolulu and the company has an emergency disaster management plan. They participate in the Kauai County Utility Disaster Preparedness and Response Group. Due to company downsizing, emergency staffing, labor or manpower, equipment, and materials needed to rebuild systems would be pulled from around the state.

4.6.2 Kaua'i Oceanic Time Warner Cable

The Kaua'i Oceanic Cable Office provides infrastructure and resources that are critical for Kaua'i. The plant mileage totals 541.1 miles, which includes 190.5 miles of underground cable and 350.6 miles of aerial cable. The estimated value of the cable system is \$13,648,250, with the unit cost valued at \$25,000 per mile (valued in 2015 dollars). Kaua'i Oceanic Cable Office participates in the Kauai County Utility Disaster Preparedness and Response Group. The fire stations and police station sites are connected within Oceanic's fiber optic cable (I-NET), which can be used in crisis for communications.

4.7 Protection from Solid Waste and Hazardous Materials

Guided by federal and state laws and regulations, the county government plays the primary role in solid waste management. The county provides direct service to the public by collecting solid waste and operating facilities and programs for reuse and disposal. With the exception of hazardous materials, the county is responsible for regulating the disposal of solid waste.

Kaua'i County maintains an islandwide system of solid waste collection and disposal that serves its resident and visitor population. The Road Construction and Maintenance Division of the Department of Public Works administers county solid waste facilities and services. A brief description of the system follows:

- **Kekaha Landfill Phase II** – This facility began operation in 1993 and is the primary disposal site for solid waste on Kauai. In FY 1999, the Kekaha Landfill Phase II accepted approximately 67,590 tons of solid waste. This facility also serves as a drop-off point for segregated recoverable waste. During FY 1999, approximately 10.6 tons of recoverable materials (e.g., cardboard, newspaper, glass, aluminum cans, batteries) and 1,000 gallons of used oil were recovered and/or recycled from the Kekaha Phase II operations.
- **Refuse Transfer Stations** – The County operates four refuse transfer stations that are located in Hanalei, Kapaa, Lihue, and Hanapepe. In FY 1999, a total of approximately 24,930 tons of solid waste was collected at all stations and transferred to the Kekaha Landfill Phase II. In addition, the Hanalei, Kapaa, and Hanapepe stations receive used oil through the Do-It Yourselfer (DIY) program. The Lihue station also receives scrap metal, white goods, and greenwaste. The latter is also received at the Kapaa and Hanapepe station.

- **Kekaha Debris Recycling Station** – This facility, also known as Kekaha Landfill Phase I, was used for Hurricane Iniki debris and stopped accepting solid waste in 1993. In FY 1999, approximately 404 tons of white goods and scrap metals were received at the station and subsequently shipped off-island for recycling. The Station serves as a recovery facility for segregated greenwaste. The facility accepts and shreds used automobile and truck tires that are used as alternate landfill daily cover at the Kekaha Phase II operations. (*Source:* Kauai General Plan 2000, 7-29-31).

Kaua'i County needs additional landfill capacity. Basic disposal capacity is rapidly disappearing. Hurricane Iniki exacerbated the landfill capacity by creating tons of additional debris. Emergency landfills for debris removal were placed around the island, but were closed after the crisis dissipated. A study has been completed to site new landfills. Unfortunately, it has been difficult to secure land agreements for appropriate sites.

In addition, a Disaster Debris Action Plan was completed in December 2002 that identified future needs for debris removal based on the experience with Hurricane Iniki. The plan was followed with environmental assessments and negotiated agreements with communities and landowners. A project to expand this study and identify suitable sites for emergency landfills has been accepted for funding under the State of Hawai'i's Pre-Disaster Mitigation planning projects with funding from the Federal Emergency Management Agency. When reviewing Solid Waste Management and the Debris Action Plan for the 2015 Plan Update process, it was determined that the plan is still relevant but the negotiated agreements should be reviewed and revised since some vendors are no longer operating in the County.

Hazardous Materials

Hazardous materials have been considered in the solid waste management plans, landfill site plans, and particularly in all emergency response plans. The State of Hawai'i through the Department of Health Office of Hazard Evaluation and Emergency Response (HEER) has initiated a process to update the State's Emergency Response Plan, which involves providing technical assistance and funding for each County to update the existing Hazardous Materials Emergency Response Plan. HEER is responsible for implementing the Hawai'i Environmental Response Law (HRS 128D) and the State Contingency Plan (HAR 11-451), as well as the Hawai'i Emergency Planning and Community Right-to-Know Act (HRS 128E). Kaua'i County updated its plan in 2004. In 2010, the County adopted the Integrated Solid Waste Plan, which includes hazardous materials.

Currently, the first responders to situations involving hazardous materials on Kaua'i will be the Kaua'i County Fire Department. Should the situation require additional resources and assessments, the State Department of Health will task one of its agents to Kaua'i County to deal with the situation.

Recognizing the importance of understanding the location of potential hazardous material sites during any natural hazard, the firefighters provided information for the risk and vulnerability assessment. Using maps at each of the county fire stations (with some of these maps incorporating use of CAMEO software that enables users to develop hazard spill and response scenarios) and Global Positioning System (GPS) technology, potential hazardous materials sites

were incorporated into the geographic information system (GIS) that will be used increasingly in Kaua'i County agencies. Some of the mapped sites include: gas stations, pumping stations, landfills, oil and fuel distribution areas, tank farms, paint and auto body shops, harbors, and sewage system lines and treatment plants.

4.8 Economically Important Assets

The Small Business Administration (SBA), the Federal Emergency Management Agency (FEMA), and the Institute for Business and Home Safety (IBHS) have researched business failures



Figure 4.3. Hanalei Valley, 2015.

following disasters. They have found that 43% of businesses that do not reopen within 48 hours do not ever reopen. Kaua'i's experience following Hurricane Iniki demonstrated the detrimental effects of disasters. Well over a decade after the disaster, the economy was still struggling. Therefore, it is important to ensure that critical facilities relating to the economy should be protected.

As mentioned previously, the economy is largely dependent on the tourism sector. This means

that the facilities and networks that support the industry are critical economic assets. This includes hotels, timeshare condominiums, car rental agencies and lots, restaurants, parks, golf courses, tour operators, and activity centers. The airport, harbors, and roadways are critical infrastructure that support the tourism industry, as discussed in section 4.5.

There has been some diversification of the economy in the agricultural sector. Coffee and poi farms provide income for several local communities. In addition, the recent emphasis on seed corn production provides added economic benefit. The agricultural sector relies on water, and is sensitive to climate-related hazards. These include drought, flood, hurricanes, and wildfire, which can be exacerbated during El Niño periods.

In addition to the economy supported by the tourism industry, residents rely on financial institutions, supermarkets, and retail stores to supply necessary materials. The failure of any of these businesses negatively impacts the local population. The relevant GIS database and maps include: financial institutions; hotels and tourism facilities; building supplies; supermarkets; and, commercial and industrial areas.

4.9 Socially, Culturally, and Environmentally Important Assets

Although these assets usually appear at the bottom of the list of assets for a risk and vulnerability assessment, these are the things that make up the character and uniqueness of the Island of Kaua'i. To the extent that data exist and have been maintained, the GIS database and map include: churches, historic sites and buildings, archaeological sites, wetlands, unique environmental habitats and resources, trails (Na Ala Hele state trail system)/ firebreaks, hazardous materials storage, protective sand dune and coral reef systems, cemeteries and burial lands, heiau, halau, and community and cultural centers.

The communities provide critical assets for sustaining the important rural character of the island. As mentioned previously, the communities provide organization for managing important environmental resources using ahupua'a watershed management practices, which contributes to building resilience in these communities..

The following map of Kaua'i show coral reef research areas. The research and work to ensure a healthy coral reef ecosystem in Hawaii contributes to building a healthy coastal environment that provides critical habitat for marine resources. In addition, the coral reefs mitigate wave impacts and protect shorelines from storm inundation.

Figure 4.4. Coral Reef Research Sites in Kaua'i.

Source: Hawai'i Coral Reef Initiative Research Program,
<http://www.hawaii.edu/ssri/hcri/research/results/kauai/index.shtml>



- Anahola Bay / Kuaehu Point
- Anini Beach
- Beach House Reef
- Haena / Kailio Point
- Hanalei
- Hoai Bay
- Ikialoa
- Kukuuiula
- Limahuli
- Marriott Hotel Reef (Lihue)
- Milolii Valley
- Nawiliwili Bay
- Nomilu Pond
- Nualolo Kai
- Oomanu Point
- Pilaa
- Poipu Beach
- Polihale Beach
- Port Allen Harbor
- Princeville
- Salt Pond Beach
- Tiger's

4.10 Built Environment

4.10.1 Building Codes

Kaua'i County has been at the forefront of planning in the state for improved building standards for housing. The Building Code Enforcement Section is responsible for the review of projects to ensure compliance and enforcement, of the all applicable building trade codes and ordinances, related to building construction. As the central coordination agency in the building permitting process, the program is responsible for the circulation and consolidation of comments from County, State, and Federal agencies, prior to permit approval. The program is also responsible for building, electrical, plumbing, and sign code enforcement inspection, as part of the permitting process. Codes have been updated to reflect the International Building Code Standards.

In collaboration with the Planning Department and other agencies in Kaua'i, the County has organized a “one-stop” process for issuing building permits. This ensures coordination among agencies and eases the process for those requesting permits. In addition to strengthening buildings, Kaua'i has promoted safe room construction in new homes. The ordinance for safe room construction appears in the Chapter Six appendix. The County Planning Department recommended additional setbacks for rim lot development, because houses located on ridges and cliffs experienced an upsweep of wind.

4.10.2 Other Government Facilities

The government facilities are all important for maintaining operations and the economy of Kaua'i County. Most of these facilities lie in wind risk areas; however, Kaua'i County rebuilt facilities after Hurricane Iniki to much higher wind ratings than anywhere in the State of Hawai'i. Important government facilities and services mapped in the GIS system include: state, county, and federal buildings; schools (see shelters); equipment baseyards; weather monitoring stations; the Pacific Missile Range Facility (PMRF); public housing; and, Hawaiian Homelands.

Following Hurricane Iniki, debris management became a severe problem, prompting Kaua'i County to develop a Post-Disaster Debris Management Plan. Studies have been conducted on areas that would be suitable following a disaster. Agreements with landowners have been made.

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