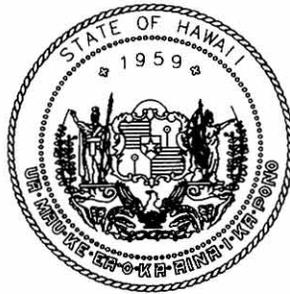


# MAUI ISLAND PLAN

State of Hawai'i  
Department of Hawaiian Home Lands



## **Hawaiian Homes Commission**

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Prepared by PBR Hawaii  
September 2004

# MAUI ISLAND PLAN

## 3.0 UPCOUNTRY MAUI

### A. REGIONAL OVERVIEW

The Upcountry planning region encompasses three DHHL holdings totaling 6,154.9 acres: Waiohuli/Kēōkea, 'Ulupalakua, and Kualapa (Figure 3-1). Located on the westerly slopes of Haleakalā, the region is within the County's Makawao-Pukalani-Kula Community Plan region (Figure 1-3).

The Upcountry planning region has extensive open space and rolling green hills with the summit of Haleakalā rising above the region to the east. To the west are views of the ocean and the West Maui Mountains. Coastal and ocean views are also visible to the north and south. Strong *paniolo* and farming traditions are evident and have affected architecture, patterns of development, and a uniquely Upcountry lifestyle.

Major population centers in the Makawao-Pukalani-Kula Community Plan region include Makawao and Pukalani. Both of these towns are characterized by a mixture of small-town urban and outlying rural land uses. Although Makawao has grown as a tourist destination, it retains its *paniolo* character.

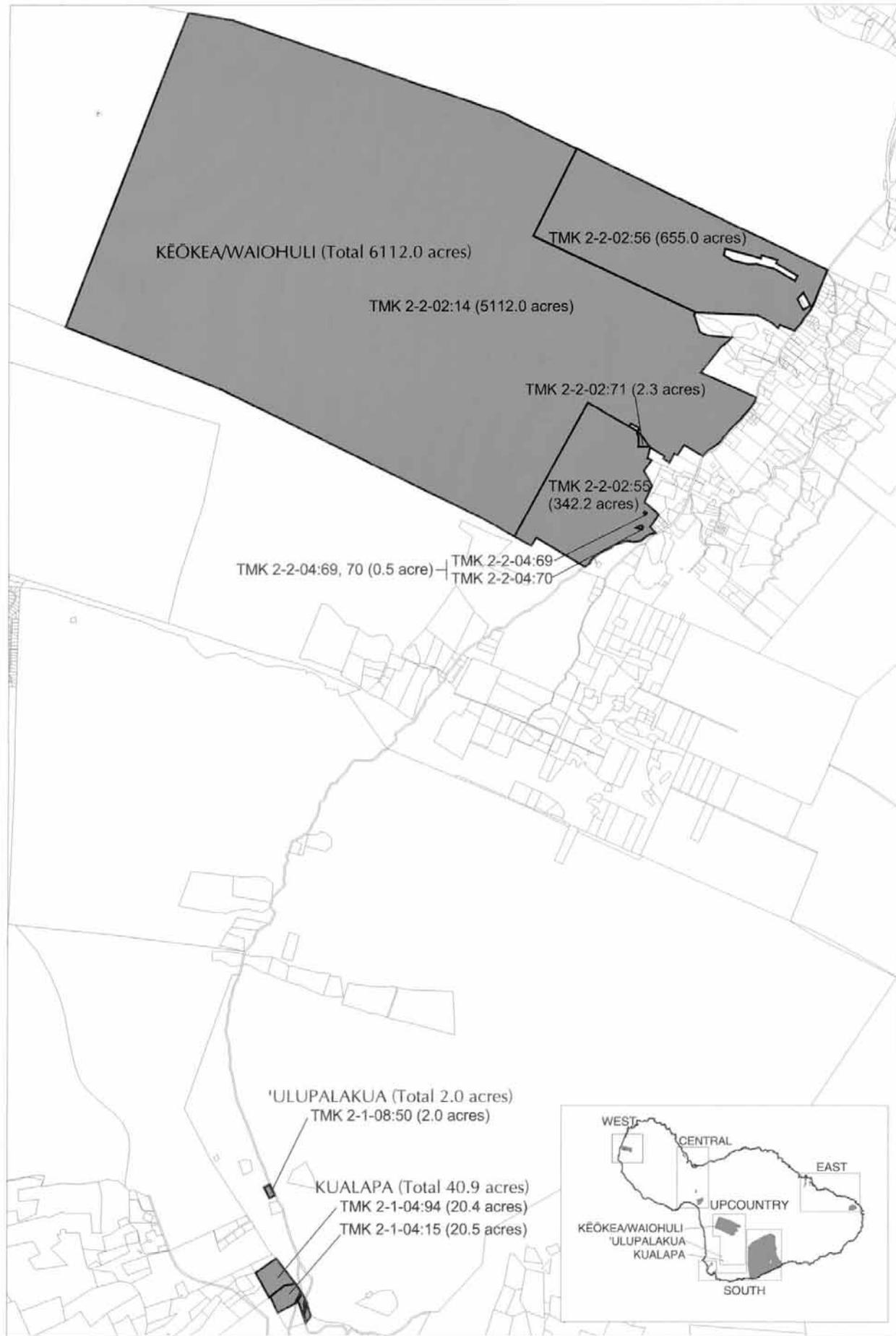
Within the DHHL Upcountry planning region, elevations range from approximately 640 feet above sea level in westerly (*makaī*) areas of the Waiohuli/Kēōkea tract to approximately 3,000 feet above sea level in the east (*mauka*). Annual rainfall varies greatly, from just 15 inches in westerly dryland forest areas to 30 inches in northerly rainforest areas. The rolling topography and rich soils are favorable for cattle ranching, pineapple cultivation, and diversified agriculture.

### 1. REGIONAL INFRASTRUCTURE

#### **Roadways**

Haleakalā Highway, a three-lane road (currently being widened to four lanes) serves as the primary access between Central and Upcountry Maui. Ōma'opio Road and Pūlehu Road provide secondary access into the DHHL Upcountry region. Kula Highway and Kekaulike Avenue provide access within Upcountry.

A Kīhei-Upcountry connector road is being proposed to link the Kīhei region to the Upcountry area. As proposed by the State Department of Transportation, the preferred alternative would intersect with Pi'ilani Highway in Kīhei and connect with Haleakalā Highway at the current intersection of Haleakalā Highway and Hāli'imaile Road.



**Legend**  
 ■ DHHL Properties

Figure 3-1  
 Upcountry Region  
**MAUI LAND INVENTORY**



# MAUI ISLAND PLAN

## ***Water System***

According to the *County of Maui Infrastructure Assessment Update*, the Makawao-Pukalani-Kula Community Plan region, which includes the DHHL Upcountry region, is primarily supplied by surface water sources. The municipal systems include the Makawao and Kula systems.

## **Supply**

The major source for the Makawao system is the intake at the end of the Wailoa Ditch system at an elevation of approximately 1,100 feet. The Kamole Water Treatment Plant is located at this site and has a capacity of approximately eight million gallons per day (mgd).

The Makawao system supplements the Kula system during dry periods. Although there is some additional water treatment capacity, there is inadequate surface water supply. Present agreements with East Maui Irrigation (EMI) allow the Department of Water Supply to take up to 12 mgd without prior notice. Although the Wailoa Ditch capacity is 190 mgd, the base flow (exceeded 90 percent of the time) is 34 mgd and flow has gone as low as two mgd.

The Kula system consists of an upper and lower system. The upper system, along an elevation of 4,200 feet, collects surface water from Haipua'ena, Puohakamoa, and Waiakamoi Streams. The water treatment plant at Olinda has a capacity of 1.7 mgd. Major storage reservoirs for the upper system include the 100-million gallon (MG) Kahakapao reservoir, the 10-MG Upper Waiakamoi dam/reservoir, the lower Waiakamoi dam, and the 3-MG Olinda tank.

The lower Kula system serves the Ōma'opio, Olinda, and Lower Kula communities. The system begins at an elevation of 3,000 feet and diverts water from Haipua'ena, Puohakamoa, Waiakamoi, and Honomanū Streams. It consists of over 13 miles of water lines, seven pump stations, and the 50-MG Pi'iholo reservoir.

## **Existing Demand**

In the Makawao-Pukalani-Kula Community Plan region, the municipal water demand was 6.40 mgd in the year ending June 2001 for the communities of Makawao, Pukalani, Hāli'imaile, Kula, and 'Ulupalakua.

## ***Agricultural Water System***

The County also has an Upcountry Maui Watershed Plan for upper Kula. The plan includes a separate agriculture water distribution system that supplies untreated water for agricultural irrigation purposes to farmers in upper Kula. This plan will relieve some demand on potable supplies and reduce non-potable costs by eliminating the need to treat water to be used for irrigation.

The Kahakapao Reservoir is the water source for the planned separate agricultural water distribution system. When completed, the main distribution pipeline will extend from

## MAUI ISLAND PLAN

Olinda to Kēōkea with nine lateral systems serving the areas of Olinda, Crater Road, Kimo Road, Pūlehuiki/Kamehameiki, Kealahou, Waiakoa, Ka'ono'ulu, Waiohuli, and Kēōkea/DHHL. The system will provide 473 acres of cropland with agricultural water supply at 91 percent reliability.

This separate water distribution system, when completed, will include 9.4 miles of eight- to 18-inch diameter high density polyethylene main distribution pipeline, 14.8 miles of lateral and sublateral pipelines, 9.2 miles of access roads, gulches and roadway crossings, and 16 acres acquired as easements and right-of-ways.

Total cost for the project is estimated to be \$8.2 million. Half of the cost is federally funded and half is State funded.

The first phase of the Agricultural Water Distribution System has been constructed through lands currently owned by Haleakalā Ranch. The line extends from the Kahakapao Reservoir to just before Kimo Drive in Upper Kula.

House Bill HB660, introduced in the State Legislature in 2003, would authorize six million dollars in general obligation bonds for the second phase of the water distribution system. HB660 was carried over from 2003 to the 2004 legislative session. If not passed during the 2004 session, the bill will die. Should this happen, the bill will have to be reintroduced in the 2005 session in order for the second phase to receive funding from general obligation bonds.

It is not known how much will be drawn by the agricultural areas served by the system and whether there will be enough to meet the needs of agricultural uses on the Kēōkea tract. In addition, the actual schedule of the water system reaching DHHL's Kēōkea landholdings has not been determined, nor has the cost of the water for farmers.

### **Projected Demand**

The projected demand for water in the Makawao-Pukalani-Kula region is based on projections supplied by the *County of Maui Socio-Economic Forecast Study Update* (SMS, May 2002). The projections include population growth projections to the year 2020, as well as household, employment, and visitor growth for each island and community plan region. Total water demand is projected to increase from 6.40 mgd in 2001 to 11.05 mgd by the year 2020, an overall increase of 4.65 mgd or approximately 72 percent of present consumption. Single-family residential uses and agriculture will create the greatest demand for water resources. Anticipated future plans for DHHL's properties in the region are not included in the above demand projections.

### **Analysis**

The Upcountry area has long faced with problems of inadequate water supply, pumping, storage, and treatment. Inadequate supply is most evident during prolonged dry periods. Improvements are required to provide reliable water to existing Upcountry areas, as well as to meet projected demands.

## MAUI ISLAND PLAN

The Po'okela Well development will help improve supply. A portion of the water supply from the Hāmākuapoko and proposed Ha'ikū wells may also be pumped to the Makawao system. The high cost of pumping water to the higher elevations renders it unlikely that the DWS would rely on this source other than to supplement Upcountry supplies during prolonged periods of low rainfall.

As mentioned above, most of the service area is at too high an elevation to be economically supplied by water pumped from lower elevations where ground and surface water sources are more easily developed. Higher-level sources are needed to avoid pumping.

Another problem is the inadequate storage capacity of the existing reservoirs, which needs to be expanded to stabilize the water supply. However, reservoirs are costly to develop.

Lastly, Upcountry is served primarily by surface water sources. Surface water must be treated to meet increasingly stringent standards of the Safe Drinking Water Act administered by the Environmental Protection Agency. Water treatment is costly and the amount of available water is dependent on the capacities of the treatment facilities. Developing ground water sources would alleviate the region's dependency on treated surface water.

### ***Wastewater Treatment and Disposal***

The Makawao-Pukalani-Kula region is not served by County wastewater facilities. For smaller developments, wastewater is generally handled by on-site septic systems. For developments of 50 or more residential lots, State Department of Health rules require a wastewater treatment facility to service the subdivision (HAR, Title 11, Subchapter 3, Section 11-62-31.1(1)(B)). However, individual septic systems may be allowed with a variance from the State Department of Health.

Proposed revisions to the DOH rules would allow septic systems for developments with 50 or more lots provided the development consists of one dwelling unit per acre or greater. As of March 8, 2004, the proposed revised rules are currently under review by the Governor and will become effective if signed by the Governor.

### **Analysis**

Since the Makawao-Pukalani-Kula region is not served by County wastewater facilities, private wastewater facilities would have to be constructed for any new residential development. For subdivisions with fewer than 50 lots, individual on-site septic systems can be used. For subdivisions of 50 or more lots, a private wastewater treatment facility would have to be built unless DHHL seeks and receives a variance from the DOH.

### ***Solid Waste Disposal***

The County provides weekly garbage pick-up for a fee. The Central Maui Landfill, which is located in the Wailuku-Kahului Community Plan region, receives solid waste from the area.

# MAUI ISLAND PLAN

## Analysis

According to the *Public Facilities Assessment Update*, the Central Maui Landfill will have adequate capacity to accommodate commercial and residential waste through the year 2020, with a surplus of approximately one million cubic yards of landfill space.

## **Electrical Service**

A 69-kV line from the Mā'alaea Power Plant services Kīhei/Wailea and continues upcountry to Kula and Pukalani. At the Kula substation, a 23-kV line breaks from the 69-kV line to service Haleakalā customers. Another 69-kV line from Mā'alaea Power Plant services Kula and intersects the 69-kV line running from the plant through Kīhei/Wailea, Kula, Pukalani, and to Kahului. The Kīhei/Wailea/Kula 69-kV line links with the Ha'ikū/Makawao 23-kV line from the Kahului Power Plant at the Pukalani Substation in Pukalani, where the 23-kV line extends to Makawao and then to Ha'ikū.

## Analysis

According to the *County of Maui Infrastructure Assessment Update Electrical Systems*, the projected peak electric power demand in 2020 is 275.5 MW. Both the Kahului and Mā'alaea Generating Stations have limited space for additional generating units. Land has been appropriated to create a new generating site along Pūlehu and Waiko Roads in Central Maui. After a steam turbine generator is installed at the Mā'alaea Generating Station in 2007, all subsequent units will be installed at the new Waena Generating Station. This land is limited to producing 66 MW of fossil fuel burning energy production. The remaining land will be used for alternative energy and ancillary facilities.

## **2. SOCIO ECONOMIC INFRASTRUCTURE**

### **Police**

According to the *Public Facilities Assessment Update*, this region falls within the Maui Police Department's (MPD) District 1 – Wailuku (Central). This police district is served by the Wailuku Station, which houses the MPD Headquarters for the entire County. The Wailuku Station is currently staffed with 111 budgeted uniformed patrol officers and an estimated share of 38 investigative officers. Approximately 32 uniformed officers and 10 investigative officers are on call to service the policing needs of the Makawao-Pukalani-Kula Community Plan region.

### Analysis

According to the *Public Facilities Assessment Update*, the main problem facing this region is the distance from Wailuku Station and the limited number of motorized beats serving the area. This community plan region encompasses a large area with varied topography and a limited road network. This can result in lengthy response times to incidents in outlying areas, leaving Upcountry communities with less than ideal levels of service.

By 2020, police service needs in this region will increase by approximately 30 percent from the current allocation of 42 officers to 57. The 14 new officers will require a further addition of four new support positions (technical, clerical, and administrative) to be staffed

## MAUI ISLAND PLAN

at the existing Wailuku Station. In addition, total need in District 1 is projected to increase. To accommodate this growth, an expansion of the existing Wailuku Station may be required. Other alternatives include:

- Transferring patrol responsibilities for the Makawao-Pukalani-Kula Community Plan region out of the Wailuku Station to new police substations in those areas; and/or
- Expanding the service area of the planned Kihei-Mākena Station to include the Makawao-Pukalani-Kula Community Plan region.

An additional consideration for planning future police services is the number and distribution of patrol beats. Response times and service quality would be improved with the introduction of an additional patrol beat or new substation closer to the Makawao-Pukalani-Kula Community Plan region service population.

### **Fire**

According to the *Public Facilities Assessment Update*, this region falls within the coverage area of the Kula Fire Station. The Kula Fire Station serves portions of Pukalani, upper Kula, and the area towards Kēōkea.

### **Analysis**

According to the *Public Facilities Assessment Update*, all major business and commercial areas in the community appear to be adequately protected within the two road-mile radius of the Kula Fire Station. However, at the maximum radius of five road-miles, parts of eastern Ha'ikū and portions of southern Haleakalā are not covered. The Kula area is covered with the exception of the Kēōkea and 'Ulupalakua areas. The narrow winding roads common in many parts of the areas worsen the situation by further slowing emergency vehicle response times.

### **Emergency Services**

According to the *Public Facilities Assessment Update*, there is one 12-hour ambulance based in Kula that services the Makawao-Pukalani-Kula and Pā'ia-Ha'ikū Community Plan regions.

### **Analysis**

According to the *Public Facilities Assessment Update*, converting the 12-hour ambulance to a 24-hour service is a high priority (ranked seventh of the 10 highest priority areas statewide). Judging by population projections through 2020, one ambulance will continue to be sufficient to serve this area.

### **Health Care Services**

According to the *Public Facilities Assessment Update*, Maui Memorial Medical Center, located in Wailuku, is the County of Maui's only critical care facility. The Kula Hospital is a smaller scale facility that provides limited acute care (two beds), inpatient skilled nursing and intermediate care, developmentally disabled inpatient services, Alzheimer's and

## MAUI ISLAND PLAN

dementia care, family practice clinic services, physical and occupational therapy, outpatient services, and a pharmacy.

### **Analysis**

According to the *Public Facilities Assessment Update*, based on the estimated total demand, 20 additional acute care (inpatient services provided to patients whose average length of stay is usually less than 30 days) beds and 164 long term care beds, 34 of which would be allocated to Kula Hospital, will be needed by 2020.

### **Schools**

The 2002 *Public Facilities Assessment Update*, lists the following schools for this region<sup>1</sup>:

#### Public

Kula Elementary (4 miles)  
Pukalani Elementary (11 miles)  
Makawao Elementary (12 miles)  
Kalama Intermediate (12 miles)  
King Kekaulike High School (9 miles)

#### Private

Clearview Christian Girl's School (Grades 6-8) (10 miles)  
Haleakalā Waldorf (Grades K-8) (5 miles)  
Kamehameha Schools- Maui (Grades K-12) (9 miles)  
Montessori School of Maui (Grades K-5) (13 miles)  
Seabury Hall (Grades 6-12) (11 miles)  
Carden Academy- Upcountry (Grades K-5) (9 miles)  
St. Joseph (Grades K-5) (12 miles)

### **Analysis**

The *Public Facilities Assessment Update*, projected the enrollment for schools in this region to 2020 and made the following assessment:

#### Elementary Schools

Taken as a region, the elementary schools of Makawao-Pukalani-Kula appear to be adequate to meet demand throughout the planning period. This is consistent with current enrollment data for Makawao and Pukalani Elementary Schools, which range from 72 to 89 percent of capacity. It also is consistent with the high proportion of private school students in this region (35% of 2001 elementary-aged population).

#### Intermediate Schools

Using the Maui County forecast, demand for a second school increases in later years. However, Kalama Intermediate, with 2001 current enrollment of 1,179 students, is already operating at 118 percent of its rated capacity of 998 students. Thus, the Maui County

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<sup>1</sup>Distances (approximate) given are from the Waiohuli/Kēōkea tract to the listed school.

# MAUI ISLAND PLAN

population forecast appears to underestimate the demand for this age group and there may, in fact, be an existing demand for a second intermediate school in the Upcountry region.

## High Schools

Using the Board of Education design guideline of 1,000 students per high school, the high school facilities appear adequate through 2020 according to population forecasts, although overcrowding will intensify at the existing facilities. However, similar to the conditions at the intermediate school, the current high school has a rated capacity of 1,335 and an enrollment of 1,459 or 109 percent of capacity. At a rate of 1,000 students per high school, this region is already over capacity.

## **Recreation**

There are a number of quality park facilities in the Makawao-Pukalani-Kula Community Plan region, despite a lack of an extensive park system in terms of acreage. This area has three neighborhood parks, five district parks, six tennis courts, 21 sports fields, two sports courts, five community centers, and three gyms.

## **Analysis**

According to the *Public Facilities Assessment Update*, based on a standard of 10 acres of sub-regional park space per 1,000 persons, by 2020 this region will need to increase its aggregate park acreage by 180.1 acres to a total of 285.7 acres of sub-regional park space. In addition, the existing community park facilities will need to be supplemented by 13 tennis courts and two sports courts.

## **B. KĒŌKEA/WAIOHULI TRACT BASELINE INFORMATION**



The Kēōkea/Waiohuli tract is DHHL's second largest Maui land holding. The West Maui Mountains and Central Maui plain dominate views; coastal views include Mā'alaea Bay and Keālia Pond.

Kula Highway forms the eastern boundary of the Kēōkea/Waiohuli tract. Existing *kuleana* parcels interrupt the tract's street frontage in two areas along Kula Highway.

### **1. INVENTORY**

#### ***TMK and Acreage***

The Kēōkea/Waiohuli tract is 6,112.0 acres and is identified by TMK 2-2-02:14, 55, 56, 71, and 2-2-04:69, 70 (Figure 3-1).

# MAUI ISLAND PLAN

## ***Existing Uses***

Waiohuli Subdivision (also referred to as “Kula Residential Lots, Unit 1”) is located in the northwestern corner of the tract and contains 321 completed lots that were built in 2000 and are either ready for occupancy or are already occupied. These lots are developed to Rural Residential 0.5 standards. An additional 99 in-fill lots (referred to as “Kula Residential Lots, Unit 2”) are planned for development, bringing the total lot count to 420.

DHHL is also planning to develop 70 agriculture lots at the southeastern corner of the tract in Kēōkea. The Kēōkea Farm Lot Subdivision project represents the first phase of development on the tract.

DHHL leases roughly 200 acres to the U.S. Fish and Wildlife Service to preserve a large grove of Wiliwili trees in the southwest corner of the tract.

In addition to the above plans, DHHL has granted the following revocable permit, right of entry permits, and leases on land within the Kēōkea/Waiohuli Tract:

### Revocable Permit

Sakugawa - Pasture

TMK 2-2-02:14                      5,057 acres

### Right of Entry Permits

DePonte - access and waterline

TMK 2-2-02:56 (portion)      acreage N/A

DePonte - access and waterline

TMK 2-2-01:56 (portion)      acreage N/A

### Licenses

Maui Electric Company - Poles and Powerlines Easement

TMK 2-2-02:14 (portion)      7.445 acres

Bentley, Arian, and Hiu - Access, Easement A & A-1

TMK 2-2-02:55 (portion)      1.379 acres

Tanji - Access, Easement B & B-1

TMK 2-2-02:55 (portion)      0.209 acres

Rivers - Access, Easement C

TMK 2-2-02:55 (portion)      4.138 acres

Rivers - Waterline, Easement C-1

TMK 2-2-02:14 (portion)      0.606 acres

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Rivers - Utilities, Easement C-2  
TMK 2-2-02:14 (portion) 0.622 acres

Time Warner Entertainment - Cable Lines Easement  
TMK 2-2-04:36 (portion) acreage N/A

Tri-Isle Resource Conservation Development Council- Preservation/Protection of endangered Wiliwili trees and dryland forest  
TMK 2-2-02:14 (portion) 236 acres

## ***Adjacent Uses***

The Kēōkea/Waiohuli tract is bounded to the north by Ka'ono'ulu Ranch; to the south and west by Haleakalā Ranch; and to the east by Kula Highway. Corresponding adjacent uses include ranchland.

## ***Proposed Future Surrounding Uses***

Haleakalā Ranch has developed a master plan for an upper-income community above Kīhei adjacent to Kēōkea/Waiohuli tract to the west (*makaī*). Preliminary plans show a town center, parks, and residential communities at about the 600-foot elevation. The proposed Kīhei mid-level road would provide access to the master planned community.

## **2. REGULATORY**

### ***State Land Use District***

The tract is within the State Agricultural District (Figure 3-2).

### ***County Community Plan***

The *Makawao-Pukalani-Kula Community Plan* designates the land as Agricultural.

### ***County Zoning***

Maui County zoning for Kēōkea/Waiohuli is RU-0.5.

### ***Special Management Area (SMA)***

The tract is not within the Special Management Area.

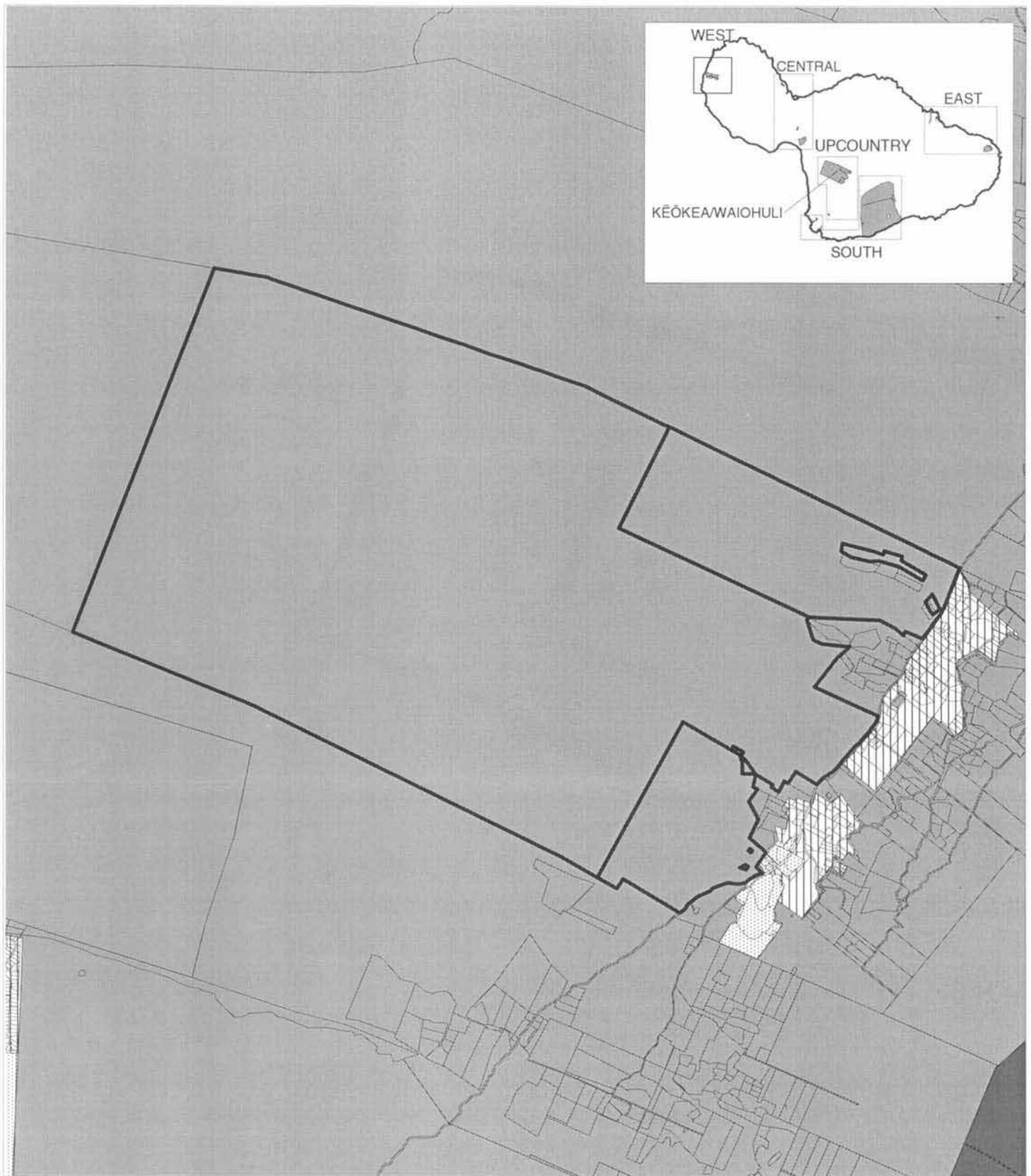
### ***Underground Injection Control (UIC) Line***

Kēōkea/Waiohuli is above the UIC line (Figure 3-3).

## **3. PHYSICAL CHARACTERISTICS**

### ***Climate***

In general, the climate of the Upcountry region is conducive to farming, with mild and warm days and cool evenings. Daytime temperatures range from the mid 60s (Fahrenheit) during the winter to the upper 80s in the summer.



**Legend**

-  Agricultural District
-  Conservation District
-  Rural District
-  Urban District
-  DHHL Land Boundary

Figure 3-2

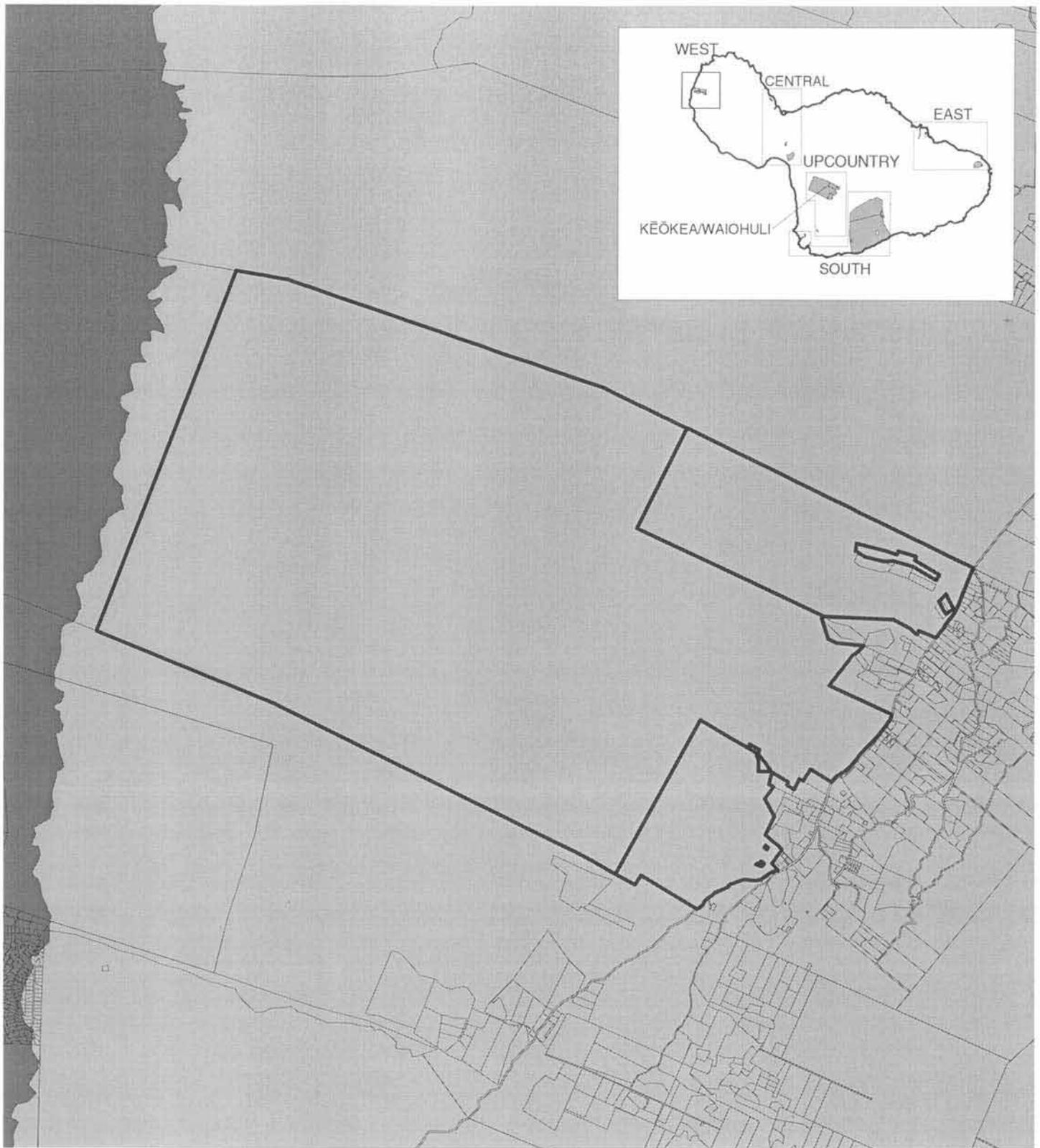
KĒŌKEAWAIOHULI  
State Land Use

**MAUI LAND INVENTORY**

DEPARTMENT OF HAWAIIAN HOME LANDS

NORTH





**Legend**

-  Areas Below (Makai) Underground Injection Control Line
-  Areas Above (Mauka) Underground Injection Control Line
-  DHHL Land Boundary

Figure 3-3

KĒŌKEAWAIOHULI

Underground Injection Control (UIC) Areas Map

**MAUI LAND INVENTORY**

DEPARTMENT OF HAWAIIAN HOME LANDS

NORTH



2,000 0 4,000



(FEET)



# MAUI ISLAND PLAN

## **Soils**

The U.S. Department of Agriculture Soil Conservation Service Survey shows the following soils in Kēōkea/Waiohuli (Figure 3-4):

- Keawakapu Extremely Stony Silty Clay Loam, 3 to 25 percent slopes – This soil is used for pasture and wildlife habitat. Permeability is moderate. Runoff is slow to medium, and the erosion hazard is slight to moderate.
- Kama'ole Very Stony Silt Loam, 3 to 15 percent slopes – This soil is used for pasture and wildlife habitat. Permeability is moderate. Runoff is slow to medium, and the erosion hazard is slight to moderate.
- Kula Cobbly Loam, 12 to 20 percent slopes – This soil is used for pasture. Permeability is moderately rapid. Runoff is medium, and the erosion hazard is moderate.
- Kama'ole Extremely Stony Silt Loam, 3 to 15 percent slopes – This soil is used for pasture and wildlife habitat.
- Waiakoa Extremely Stony Silty Clay Loam, 3 to 25 percent slopes, eroded – This soil is used for pasture and wildlife habitat. In most areas about 50 percent of the surface layer has been removed by erosion. Runoff is medium, and the erosion hazard is severe.
- Kula Loam, 12 to 20 percent slopes – This soil is used for pasture and truck crops.
- Kaimū Extremely Stony Peat, 7 to 25 percent slopes – This soil is used for pasture and wildlife habitat. Permeability is very rapid. Runoff is very slow, and the erosion hazard is no more than slight.
- Kula Very Rocky Loam, 12 to 40 percent slopes – This soil is used for pasture and wildlife habitat. Runoff is medium, and the erosion hazard is moderate.
- Very Stony Land – This land type is used for pasture and wildlife habitat. Pasture improvement is very difficult because of the many stones.
- Kula Loam, 4 to 12 percent slopes – This soil is used for truck crops and pasture.

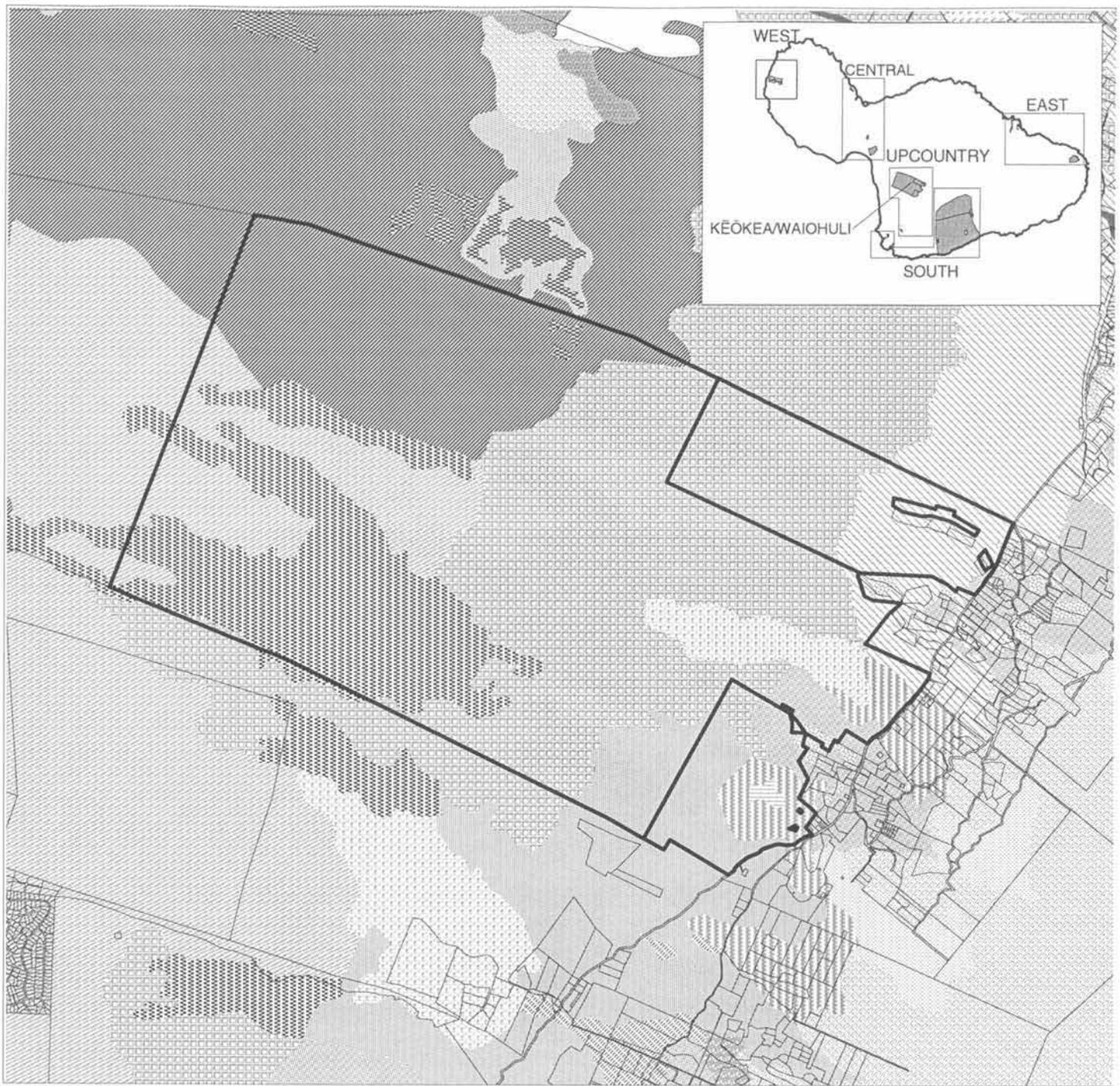
## ***Agricultural Lands of Importance to the State of Hawai'i (ALISH)***

The State of Hawai'i Department of Agriculture *Agricultural Lands of Importance to the State of Hawai'i (ALISH)* system of defining agricultural suitability classifies a portion of the soils in Kēōkea/Waiohuli as Other Agricultural Land and the remaining soils are not classified (Figure 3-5).

## ***Ground/Surface Water***

The USGS topographic map shows Waiohuli Stream within the Kēōkea/Waiohuli tract. Waiohuli Stream is intermittent.

As discussed in the *Water Development Analysis for the Department of Hawaiian Home Lands Tracts on the Island of Maui* (C. Takumi Engineering, December 2003), an exploratory well (State Well 6-4421-01) located within the Waiohuli/Kēōkea tract penetrates 1,940 feet below the surface (1,864 feet above mean sea level). It has a 7 <sup>7</sup>/<sub>8</sub>-inch diameter hole with a 4-inch steel casing, which is too small for pump testing.



**Legend**

-  Keawakapu Extremely Stony Silty Clay Loam, 3-25% Slopes
-  Kamaole Very Stony Silt Loam, 3-15% Slopes
-  Kula Cobbly Loam, 12-20% Slopes
-  Kamaole Extremely Stony Silt Loam, 3-15% Slopes
-  Waiakoa Extremely Stony Silt Clay Loam, 3-25% Slopes, Eroded
-  Kula Loam, 12-20% Slopes
-  Kaimu Extremely Stony Peat, 7-25% Slopes
-  Kula Very Rocky Loam, 12-40% Slopes
-  Very Stony Land
-  Kula Loam, 4-12% Slopes
-  DHHL Land Boundary

Figure 3-4  
 KĒŌKEAWAIOHULI  
 Soil Conservation Service Survey  
**MAUI LAND INVENTORY**

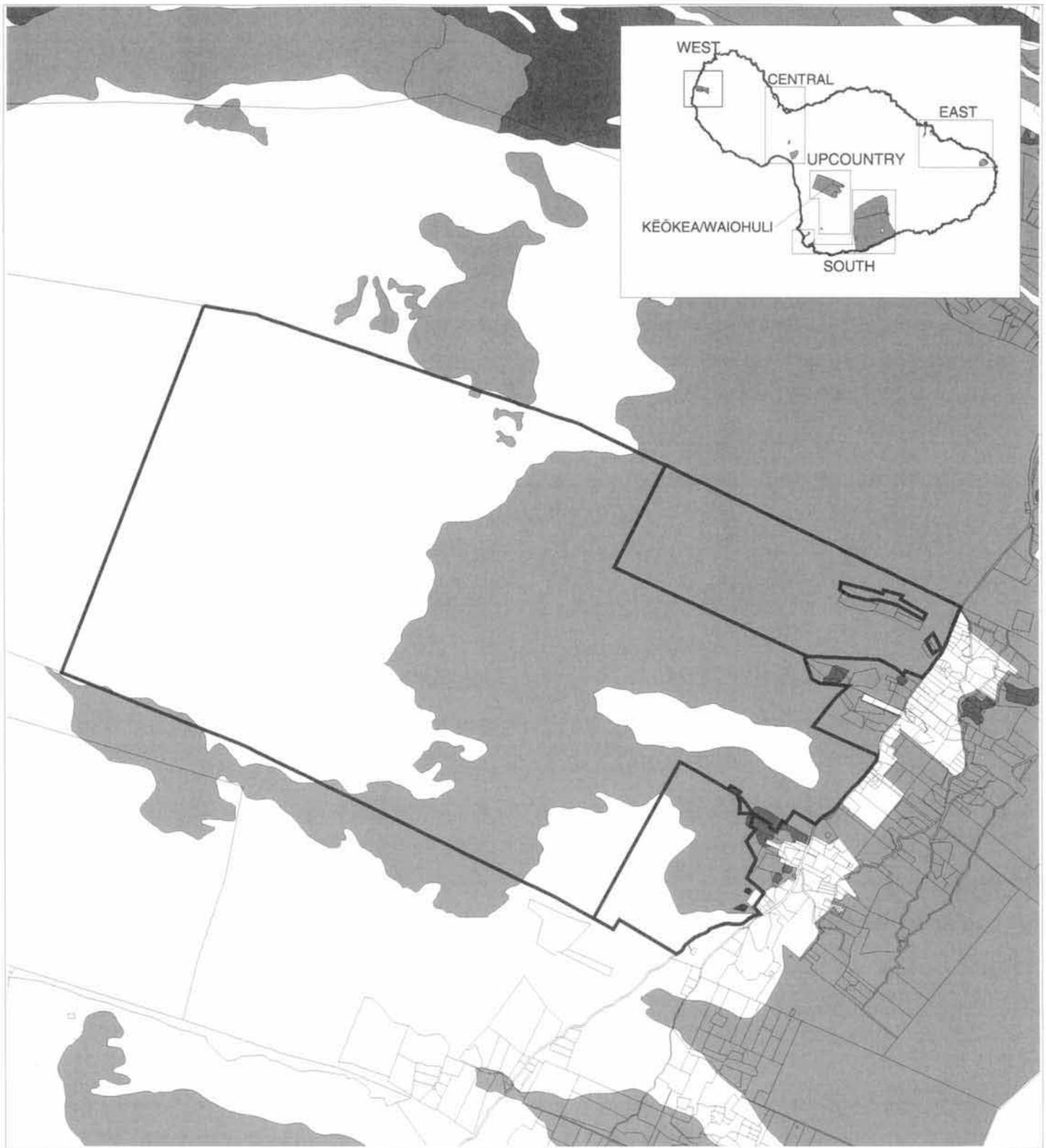
DEPARTMENT OF HAWAIIAN HOME LANDS

NORTH




(FEET)





**Legend**

-  Prime Agricultural Land
-  Unique Agricultural Land
-  Other Agricultural Land
-  Unclassified Land
-  DHHL Land Boundary

Figure 3-5

KĒŌKEA/WAIOHULI  
Agricultural Lands of Importance to the State of  
Hawaii (ALISH)

**MAUI LAND INVENTORY**

DEPARTMENT OF HAWAIIAN HOME LANDS

NORTH



# MAUI ISLAND PLAN

Measurements of the exploratory well, between September 2001 and April 2002, found water levels ranging between 5.58 and 6.11 feet above sea level.

## **Rainfall**

Rainfall ranges from 15 inches in the lower elevations to 30 inches in the upper the elevations (Figure 3-6).

## **Topography/Slope**

The topography of Kēōkea/Waiohuli is characterized by rolling hills that grow increasingly steep toward the *mauka* areas. According to the USGS topographic map, elevations range from approximately 640 feet above sea level in the western (*makai*) portion of the tract to approximately 3,000 feet above sea level in the eastern portion (*mauka*). There are several steeply sloping areas that exceed 25 percent slope (Figure 3-6).

## **Drainage**

Because of its largely undeveloped nature, the Kēōkea/Waiohuli area contains limited drainage infrastructure. However, the natural slope and well-draining soils provide adequate drainage for current conditions. When rainfall is heavy enough to produce overland flow, water sheet flows and enters natural drainage ways and gulches. The USGS topographic map shows Waiohuli Gulch as a natural drainage feature within Kēōkea/Waiohuli.

## **Flood Zone**

The Flood Insurance Rate Map indicates that Kēōkea/Waiohuli is located in Zone X, which designates areas determined to be outside the 500-year floodplain (Figure 3-7).

## **Noise**

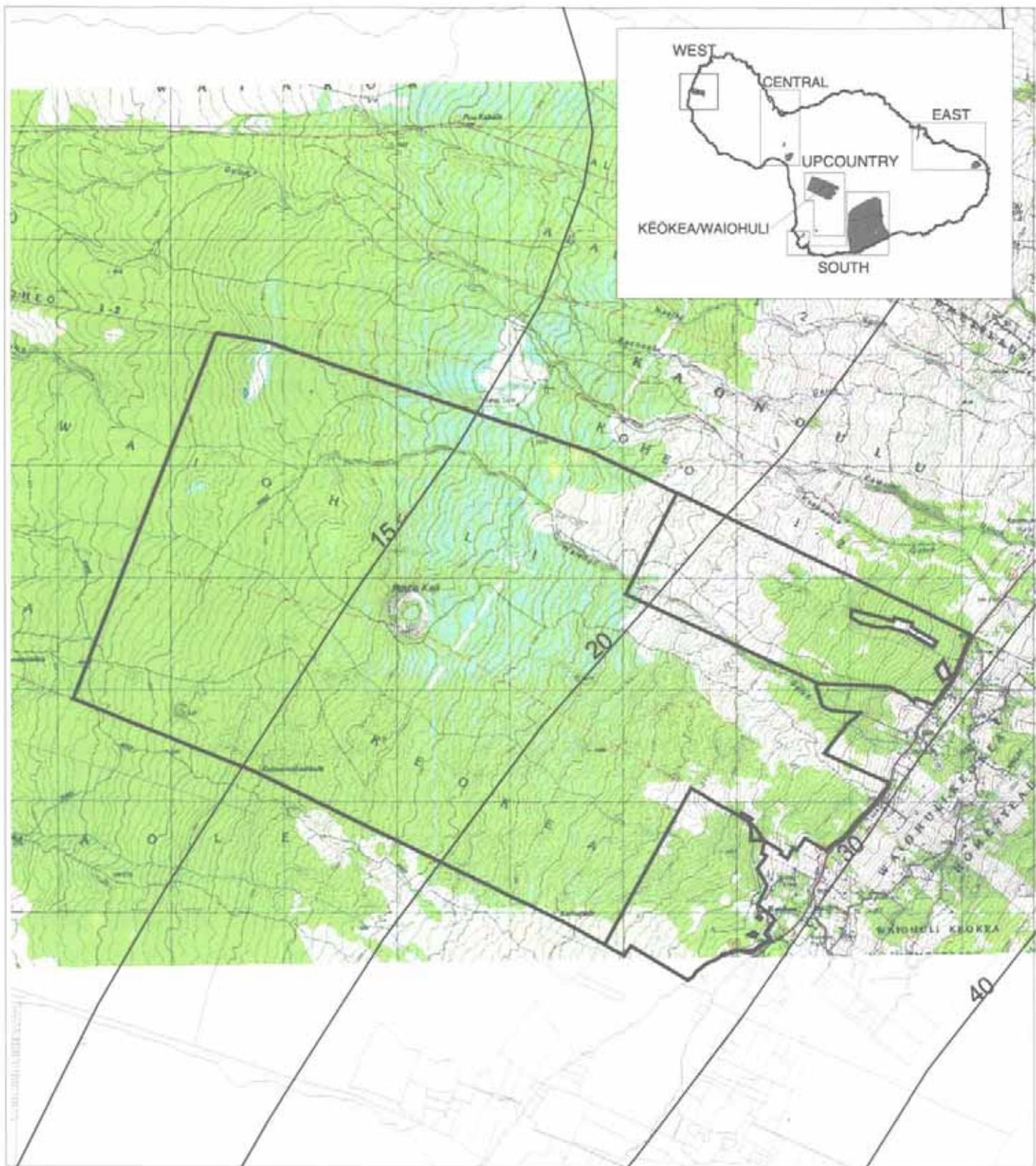
Due to the rural nature of the area, there are no major sources of noise. Ambient noise levels in the area are attributed to wind and wildlife, traffic along Kula Highway, and agricultural equipment such as tractors, sprayers, and trucks.

## **4. ENVIRONMENTAL CHARACTERISTICS**

### **Historic Sites/Archeology**

Kēōkea/Waiohuli is rich in Hawaiian culture and history. Early Hawaiian settlement is evident from the large numbers of archaeological sites in the region; including recorded and unrecorded *heiau*, stone walls, building platforms, and petroglyphs.

In 1989, PHRI conducted an archaeological inventory survey of approximately 1,025 acres in the areas of the Waiohuli and Kēōkea subdivisions (674 acres in Waiohuli and 351 acres in Kēōkea) that surveyed significant resources, including *heiau*, human burials, intact dryland agricultural field systems, and residential complexes. In total, the survey recorded 159 archaeological sites consisting of 274 features.



**Legend**

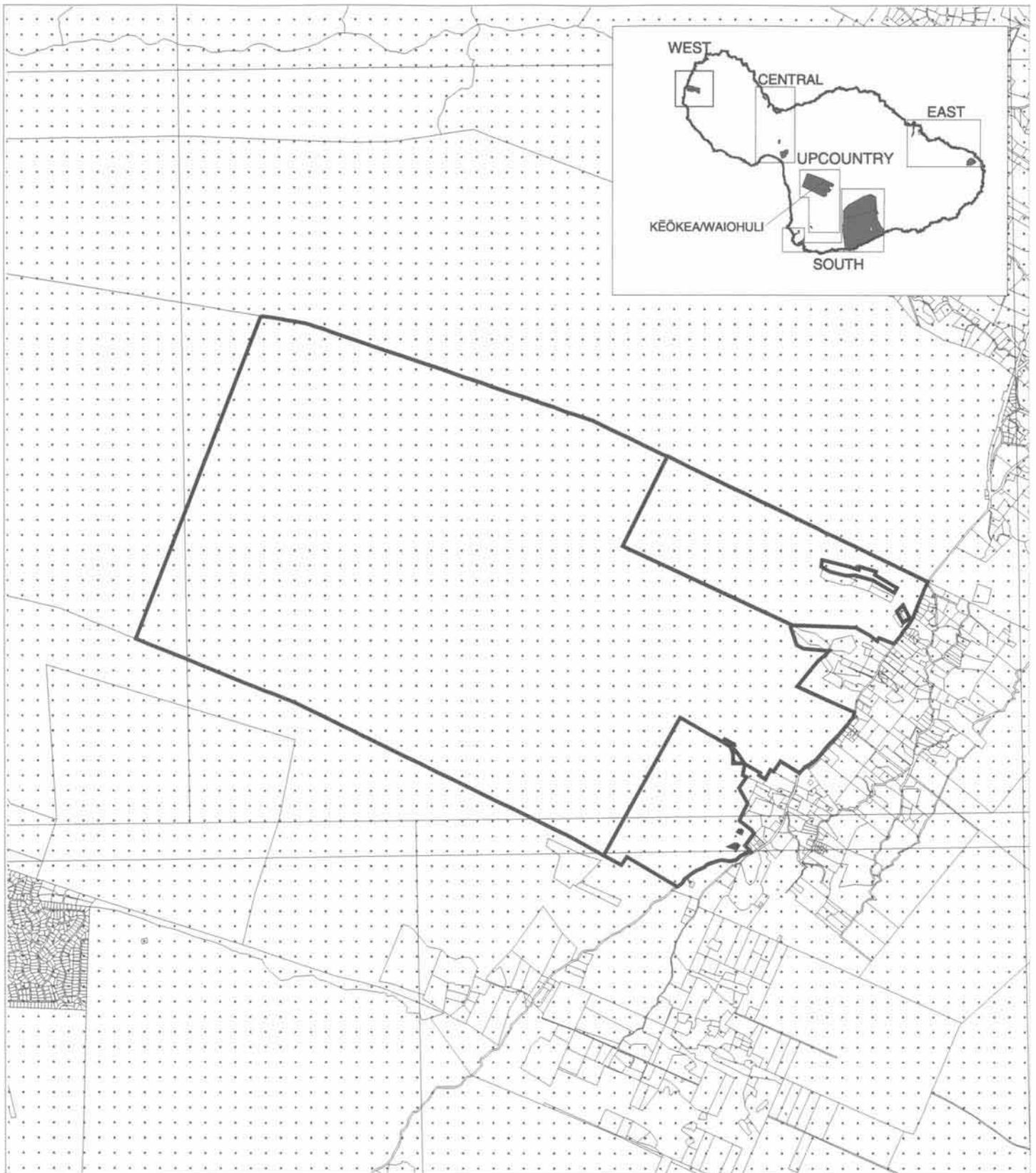
-  DHHL Properties
-  Lines of Equal Average Annual Rainfall in inches

Figure 3-6  
 KEOKEAWAIOHULI  
 USGS Map with Rainfall Isohyets  
**MAUI LAND INVENTORY**  
 DEPARTMENT OF HAWAIIAN HOME LANDS  
 NORTH




(FEET)





**Legend**

-  **ZONE X:**  
Areas Determined To Be Outside 500-Year Floodplain
-  **DHHL Land Boundary**

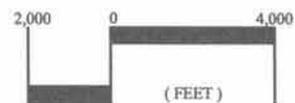
**Figure 3-7**

**KĒŌKĒAWAIOHULI  
Flood Insurance Rate Map**

**MAUI LAND INVENTORY**

DEPARTMENT OF HAWAIIAN HOME LANDS

NORTH



## MAUI ISLAND PLAN

In addition to the 1989 archaeological inventory survey, the State Historic Preservation Division also conducted an extensive survey of the Kēōkea/Waiohuli area for DHHL in the early 1990s. The survey area was located between the current Waiohuli and Kēōkea homesteads and ran far downslope. The survey found permanent habitation sites running down ridges with a large *heiau* at the end of the ridge, other types of permanent habitations, burials, and samples of agricultural fields.

In reviewing the PHRI survey, and combined with their own archaeological work, SHPD recommended a total of 18 sites for preservation (Figure 3-8). These sites include the Papakea *heiau*, the Molohai *heiau*, burial sites, a large agricultural terrace, two permanent habitation sites, a religious or high-ranking residence, and a habitation site with an enclosed sinkhole and agricultural features.

The State Historic Preservation Division also recommended data recovery for a number of sites for which preservation was deemed unnecessary. They highly recommended that data recovery be conducted prior to infrastructure installation and occupation of the lots.

### ***Cultural Resources***

The historic and archaeological context of the Kēōkea/Waiohuli area and the surrounding region indicates a once active community that used the land for agricultural, residential, and religious purposes. Past cultural practices associated with the property relate to gathering, religious, and day-to-day activities. Over the past century, the property has been leased out by DHHL for cattle grazing and agricultural uses.

A cultural impact assessment conducted for the *Kēōkea Agricultural Lots – Unit 1 Environmental Assessment* concludes that given the recent historical use for ranching and agriculture, Native Hawaiian cultural practices are no longer conducted on the property (Munekiyo 2001). The report further concludes that the conversion of the land to agricultural and residential use to replace more recent cattle grazing and other agricultural use is consistent with the area's past use for similar purposes. Moreover, the recommendations for archaeological mitigation, including site preservation, are intended to recognize the significance of past practices in the context of the property's local history. The combination of preservation, along with a land use pattern reflecting past tradition, is deemed to be appropriate in terms of recognizing the cultural practices and beliefs that once took place on the land.

### ***Endangered Species***

The following species in Kēōkea/Waiohuli are identified as either candidates or endangered by the Hawai'i Natural Heritage Program *Biological Conservation Datasystem (BCD)* for Department of Hawaiian Home Lands and the U.S. Fish and Wildlife Service.

#### Candidates

- *Canavalia pubescens*, 'Āwikiwiki

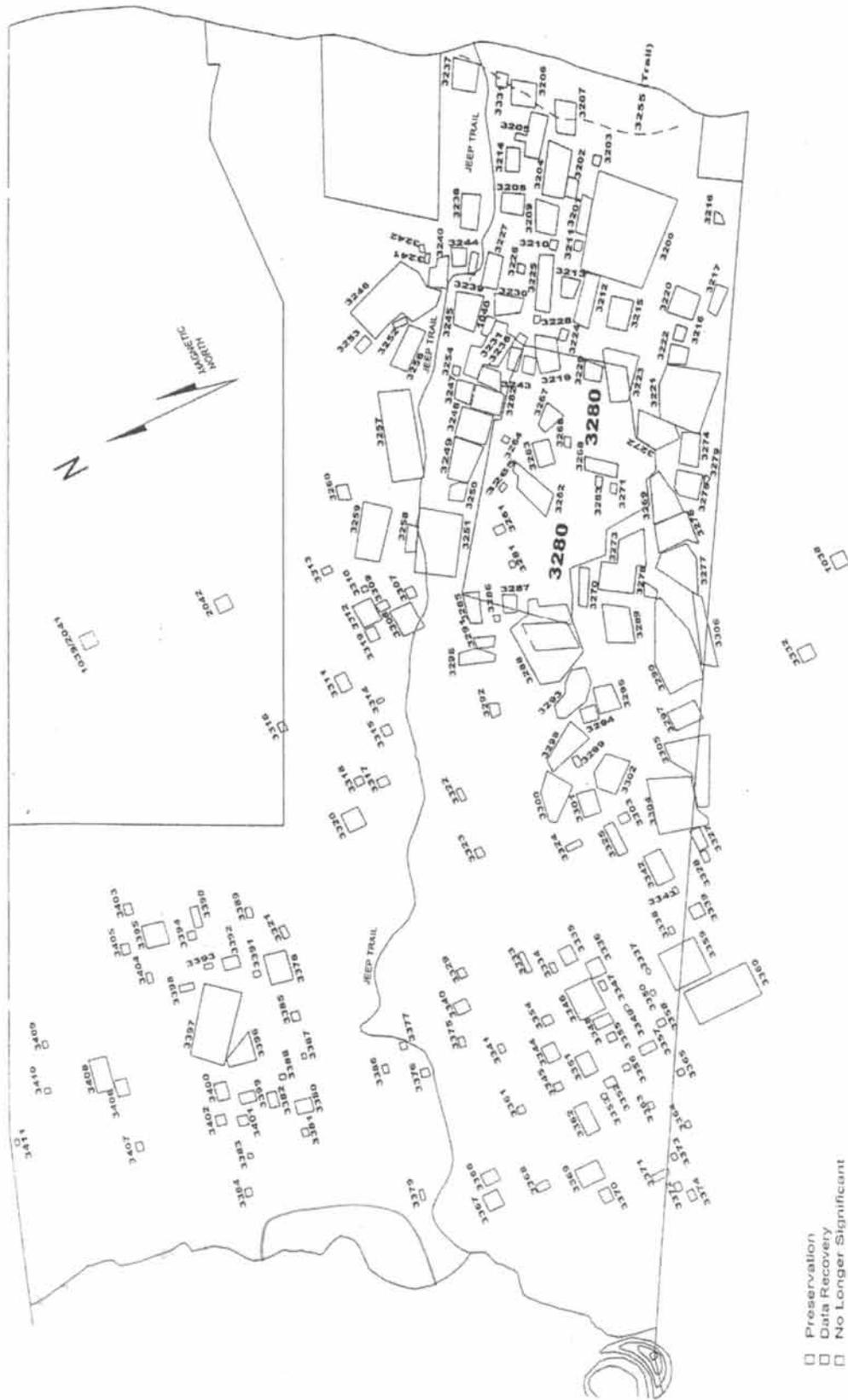


Figure 3-8  
**Project Area and Site Significance**  
 Waiohuli, Kula, Maui  
 SHPD MAUI ANNEX



- Preservation
- Data Recovery
- No Longer Significant

# MAUI ISLAND PLAN

## Endangered

- *Abutilon menziesii*, Ko'oloa'ula
- *Bonamia menziesii*
- *Hibiscus brackenridgei*, *ssp. brackenridgei*, Ma'o Hau Hele
- *Lasiurus cinereus semotus*, 'Ōpe'ape'a, Hawaiian Hoary Bat
- *Manduca blackburni*, Blackburn's Sphinx Moth

## ***Critical Habitat***

The U.S. Fish and Wildlife Service has not designated any critical habitat areas within the Kēōkea/Waiohuli tract.

While not classified by the USFWS as critical habitat, according to a *Maui News* article (Monson, 2002), the Pu'u-o-kali cinder cone and a surrounding area totaling 236 acres within the tract is home to a diverse native Hawaiian ecosystem. This dryland forest area includes the last intact Wiliwili forest in the islands, lama trees, and other native trees and shrubs.

DHHL licensed the Tri-Isle Resource Conservation Development Council to protect and restore the forest in this area.

## **5. INFRASTRUCTURE**

### ***Access/Roadways***

The Waiohuli Subdivision has two existing access points onto the Kula Highway. There is also an internal network of roadways serving the existing subdivision. The roadways are paved right-of-ways without curbs, gutters, or sidewalks, which conforms to County rural standards. Drainage is handled via drains located in the asphalt swells adjacent to the roadways.



### ***Water System (Lines, Wells)***

### **DHHL Water Credits Agreement**

DHHL has a Water Credits Agreement with the County of Maui Department of Water Supply, signed on December 9, 1997. This agreement states that DWS shall commit five hundred thousand gallons of potable water per average day to DHHL for the DHHL home sites. The agreement also states that upon completion of the DWS improvements and DHHL improvements pursuant to the Memorandum of Understanding (MOU) dated December 8, 1997, DWS shall maintain the improvements and deliver potable water, except during drought periods affecting lower Kula, as declared by the DWS in accordance with its rules and regulations. According to the agreement, DWS shall not

## MAUI ISLAND PLAN

impose any time limitations on DHHL to draw or use such reservation of potable water from the DWS system.

The number of lots that can be developed will be limited by the available water service, which will be determined using water system standards developed by DWS.

The existing 321-unit Kula Residential Unit 1, planned 99-unit Kula Residential Unit 2 in-fill development, and proposed 70-unit Kēōkea farm lots will use approximately 294,000 gallons of the 500,000 gallon Water Credits Agreement, leaving a balance of 206,000 gallons. Using the DWS standard of 600 gallons per unit, there is enough projected capacity to service an additional 343 units.

### **Existing Waiohuli Water System**

Water from Pi'iholo is collected in the Kula Kai Reservoir. A booster station then pumps the water via an 18-inch transmission line from the Kula Kai reservoir to Waiohuli, where it enters the tract at an elevation of 2,615 feet. A booster pump station and three reservoirs at elevations 3,000, 2,750 and 2,355 feet currently serve the Waiohuli Subdivision.

Due to the significant change in elevation across the tract, there are four service zones spanning the property between the 2,150-foot and 3,100-foot elevations. Pressure reducer valves are used throughout the system.

### **Analysis**

The upper service zone does not have available capacity for additional development until a proposed off-site reservoir is constructed. There are no plans to build this reservoir in the near future, thus limiting any development between the 2,900-foot and 3,100-foot elevations.

The 3,000-foot elevation reservoir was originally designed to service the proposed 70 Kēōkea Farm Lots via a 12-inch transmission line along Kula Highway. The available capacity for this reservoir has been allocated and no further development could occur between the 2,650-foot and 2,900-foot elevations without improvements and upgrades to this reservoir.

The reservoirs at the 2,355-foot and 2,750-foot elevations currently serve the mid and lower sections of the Waiohuli Subdivision. These reservoirs have available capacity to service additional residential lots. The additional development would need to occur between the 2,255-foot and 2,650-foot elevations. The installation of pressure reducers could further extend water service down slope.

According to the Water Credits Agreement, 343 additional residential lots could be developed using the existing DWS waster system. Based on the existing water system, the 343 lots need to be developed between the 2,255-foot and 2,650-foot elevations or lower if pressure reducers are used.

# MAUI ISLAND PLAN

## ***Wastewater Treatment and Disposal***

The existing Kēōkea/Waiohuli community is served entirely by on-site septic systems or cesspools.

## ***Solid Waste Disposal***

Solid waste is collected by the County and taken to the Central Maui Landfill.

## ***Telephone Service***

Sandwich Isles Communications will provide telephone service to the tract.

## ***Electrical Service***

MECO provides electrical service to the Kēōkea/Waiohuli community through a 23-kV line from the Pukalani substation. The Pukalani substation is connected to the Mā'alaea Generating Station by a 69-kV line and the Kahului Generating Station by a 23-kV line.

## ***Cable Television Service***

The tract is within the Oceanic Cable service area.

## **C. KĒŌKEA/WAIOHULI ANALYSIS**

A number of factors weighed heavily in the development of the alternatives for the Kēōkea/Waiohuli tract (Figure 3-9).

### ***Beneficiary Demand***

The *Maui Island Plan* beneficiary survey indicated that the majority of the beneficiaries (39.2%) preferred the Upcountry region for a residential homestead. Approximately 1,111 units are needed in Upcountry to meet beneficiary demand. Of the Upcountry lands that are in the DHHL inventory, Kēōkea/Waiohuli presents the best opportunity to develop residential homesteads and meet beneficiary demand.

### ***Existing Development***

The existing Kula Residential Lots Unit 1, planned Unit 2 in-fill, and proposed Kēōkea Farm Lots subdivisions present an opportunity to share existing and future infrastructure with the additional 1,111 units proposed in this document. The projects could share access points from Kula Highway, the existing network of roads, and water and electric systems, which would help to lower overall development costs.

### ***Infrastructure Availability – Water Service***

The number of lots that can be developed will be limited by the available water service, which will be determined using the DWS water system standards for residential development. There are two strategies to provide water to Waiohuli. The first strategy is for DHHL to collaborate with DWS to provide water service to the lots. The second strategy is to develop a new groundwater resource.

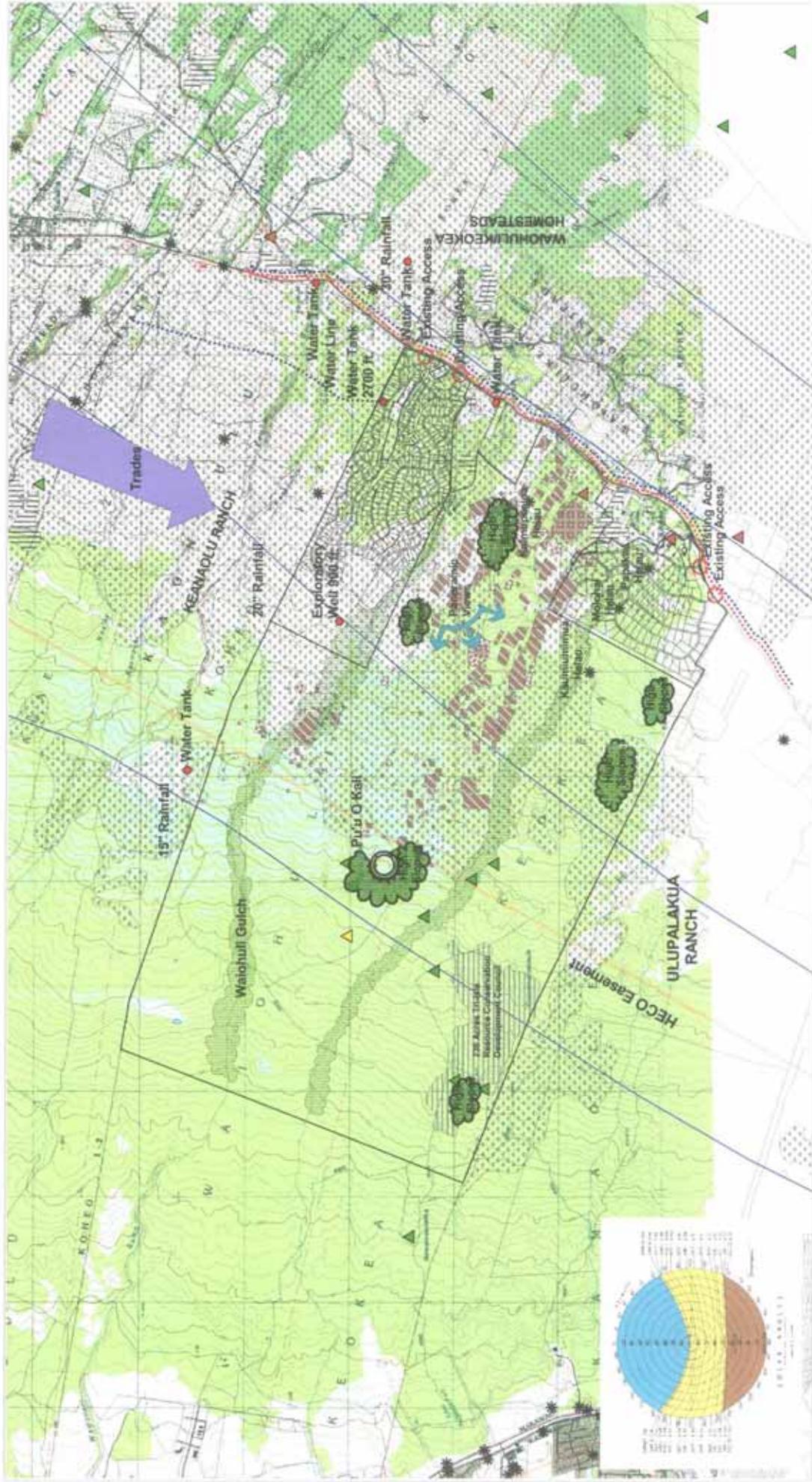


Figure 3-9  
 KEOKEA WAIOHULI  
 Site Analysis  
**MAUI LAND INVENTORY**  
 DEPARTMENT OF LAND AND NATURAL RESOURCES  
 MAHUI  
 (1987)



- Legend**
- DHHL Land Boundary
  - Lines of Equal Average Annual Rainfall in Inches
  - Water Line
  - Electrical Line
  - Endanger Species (Animal)
  - Endanger Species (Invertebrate)
  - Endanger Species (Plant)
  - Huihu
  - ALISH (Other Agricultural Lands)
  - Archaeological Site
  - Preservation
  - Data Recovery
  - No Longer Significant

Source: County of Maui, Department of Hawaiian Home Lands; United States Geological Survey; Hawaii Department of Land and Natural Resources; The Nature Conservancy of Hawaii; and State of Hawaii Department of Agriculture.

# MAUI ISLAND PLAN

The first strategy would include using the balance of the existing 500,000-gallon per day water commitment from the Department of Water Supply through the Water Credits Agreement. As explained on pages 3-15 and -16, there is adequate projected capacity in the existing County Water system to accommodate an additional 343 units in Waiohuli.

The water service elevation – the point where the County water line enters the Kēōkea/Waiohuli tract – is a determining factor in the location of the additional 343 units. The water service elevation is at the 2,750-foot elevation where a 500,000 gallon reservoir is located. The new 343 units need to be located below the 2,650-foot elevation to be served by this existing reservoir, which would mitigate the need for additional storage and transmission facilities.

A second water source is needed for the development of an additional 768 units to meet the beneficiary demand of 1,111 total units in the Upcountry region. An alternative strategy to meet this water need would be to develop an on-site private water system. An exploratory well at the 1,900-foot elevation of the Waiohuli tract located water at approximately six feet above sea level. Further hydrological studies of the aquifer conditions and well capacity, which would include drilling and testing a new well, will be required to determine the quality and quantity of the water. A new 18-inch diameter cased well is assumed to be able to produce 700 GPM or approximately 1.0 MGD. Utilizing the design criteria set forth by DWS, multiple wells will be required to supply the additional 768 units. (From *Water Development Analysis for DHHL Tract at Waiohuli/Kēōkea* by C. Takumi Engineering.)

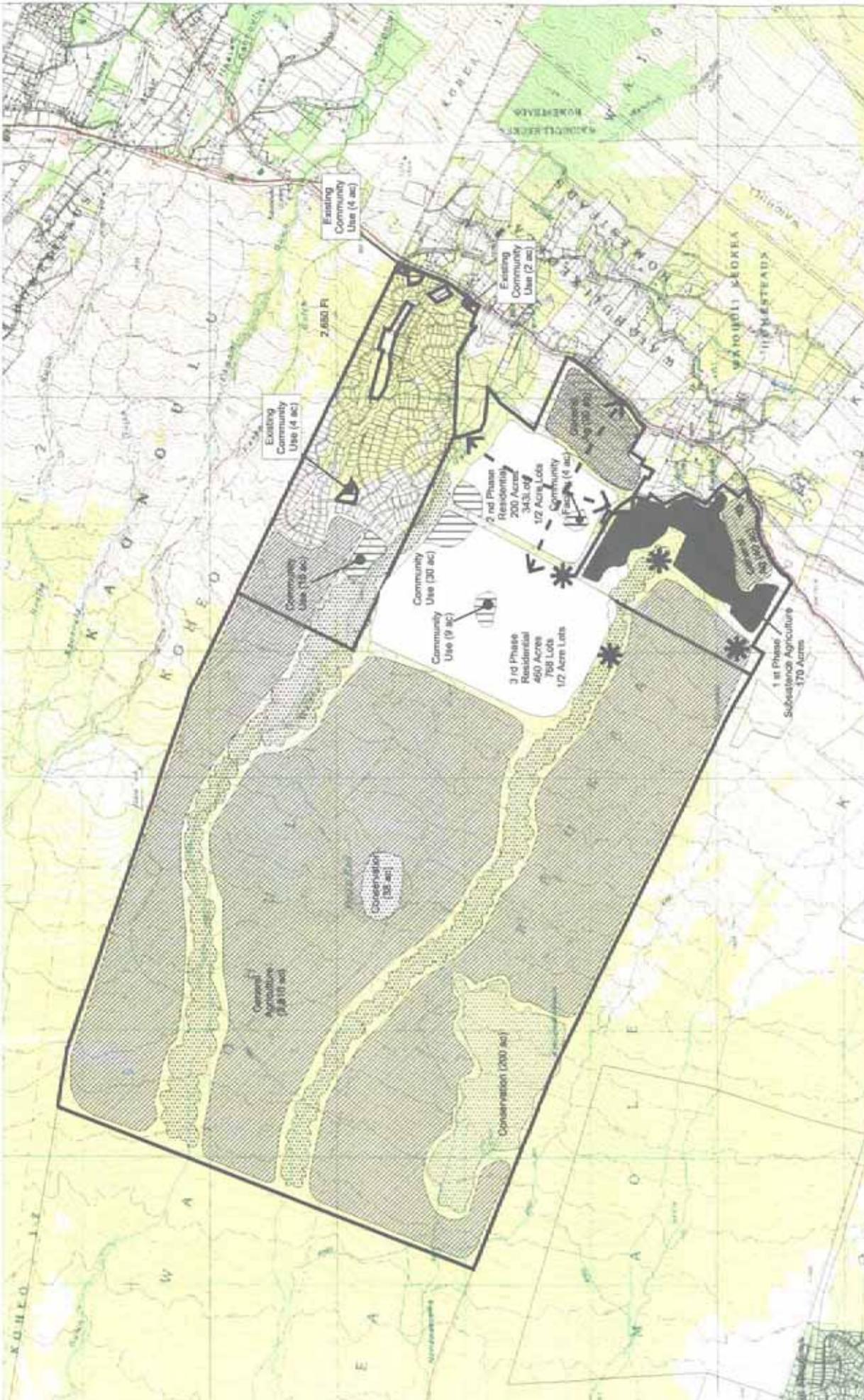
## 1. ALTERNATIVES

The *Maui Island Plan* proposes two alternatives for the Kēōkea/Waiohuli tract. The major difference between the two alternatives is lot size, which impacts infrastructure improvements and the resulting development costs.

### a. Alternative 1 – One-half Acre Scenario

The first alternative proposes 1,111 half-acre residential lots on 660 acres of land between the 1,750-foot and the 2,650-foot elevation (Figure 3-10). Sixty-nine acres are designated for community use, which will include schools, parks, and open space. Seven hundred seventy-three acres of gulches, high-sloped areas, and areas containing critical habitat or endangered species are designated as conservation. The balance of 3,940 acres will be used for general agriculture as an interim use. The land use plan also reflects DHHL's 321-unit Kula Residential Lots, Unit 1 at Waiohuli and the 70-unit farm lot subdivision in Kēōkea. The Kēōkea Farm Lot Subdivision is represented as Phase 1.

Alternative 1 proposes the development of the 1,111 residential units in two increments, known as Phase 2 and Phase 3 (Phase 1 refers to the proposed Kēōkea Farm Lot Subdivision). Phase 2 proposes 343 units between the 2,400-foot and 2,650-foot elevations. Phase 3 proposes 768 units between the 1,750-foot and 2,400-foot elevation.



**Figure 3-10**  
**KĒŌKEAWAIOHULI**  
**1/2 Acre Alternative 1**  
**MAUI LAND INVENTORY**  
 DEPARTMENT OF HAWAIIAN HOME LANDS

Land Use Summary	Lot Size	Number of Lots	Approx Acres
Residential	1/2	1,111	660 ac
Community Use			69 ac
General Agriculture			3,940 ac
Conservation			773 ac
Subsistence Agriculture	2	70	170 ac
Existing Residential			500 ac
<b>Total</b>		<b>1,181</b>	<b>6,112 ac</b>

**Legend**

- DHHL Land Boundary
- Heiau

Source: United States Geologic Survey and Department of Hawaiian Homelands  
 Q:\Maui\dhhl\inventory\GIS\project\land use\kahului.apr

# MAUI ISLAND PLAN

## **Phase 1**

The 70-unit Kēōkea Farm Lot Subdivision represents the first phase of the Kēōkea/Waiohuli final land use plan. These lots will average two to three acres in size and will be located in the southeast corner of the tract. The farm lots were proposed and planned prior to the *Maui Island Plan*, and therefore are not included in the following discussion of infrastructure needs and development costs.

## **Phase 2**

The number of units within Phase 2 is directly proportionate to the available water capacity in the DWS water system. According to initial calculations, DHHL's water commitment with DWS has an available capacity to serve an additional 343 residential lots. Water demand for the 343 lots is approximately 205,800 gallons per day.

The lots are located below the 2,650-foot elevation to take advantage of pressure from an existing tank in Waiohuli that is at the 2,750-foot elevation.

Access to Phase 2 will be through the road network within the existing Waiohuli subdivision and proposed Kēōkea Farm Lot Subdivision. A mid-level road that connects Waiohuli and Kēōkea is proposed at roughly the 2,500-foot elevation. This mid-level road will provide multiple access points to the entire 1,111 lots.

Sewage from Phase 2 units will be handled by individual septic systems. DHHL currently has an application for a variance with the Department of Health

## **Phase 3**

In Phase 3, 768 units are proposed. This phase is planned *makai* of Phase 2 in the area between the two major gulches. Water service to the 768 lots will have to come from a private water system composed of wells drilled at approximately the 1,900-foot elevation. Water demand for 768 lots is 460,800 gallons per day.

Access to Phase 3 will be via the mid-level road built in Phase 2 and the existing access points within the Waiohuli and Kēōkea subdivisions. A fourth access point connecting the mid-level road to Kula Highway is also proposed. This access point will provide a direct connection to the highway.

The 768 units will be serviced by individual septic systems

The land *makai* of Phase 3 will be designated for general agriculture as an interim use.

## **Infrastructure**

### **Access**

Road improvements within the existing Kula Residential Lots and the proposed Kēōkea Farm Lots will serve as the primary access to the proposed development. A mid-level road at the 2,500-foot elevation will connect Waiohuli and Kēōkea and provide three access

## MAUI ISLAND PLAN

points from Kula Highway to the proposed 343 lot subdivision. During Phase 3 development, a fourth access point from Kula Highway to the mid-level road is proposed.

The development plan stage will include a traffic study to determine the level of service along Kula Highway and the necessary traffic improvements required to maintain an adequate level of service.

### **Water**

Alternative 1 proposes to use the remaining County water commitment for the 343 lots proposed in Phase 2. The 343 lots will be located between the 2,400-foot and 2,650-foot elevations to make use of the available pressure from the existing Waiohuli reservoirs.

The remaining 768 lots in Phase 3 will require a private water system, as discussed above.

### **Wastewater**

The existing Waiohuli community, as well as most of the Upcountry region (with the exception of Pukalani), is served entirely by on-site septic systems. For developments of 50 or more residential lots, State Department of Health rules require a wastewater treatment facility to service the subdivision (HAR, Title 11, Subchapter 3, Section 11-62-31.1(1)(B)). However, for subdivisions with more than 50 lots, individual septic systems may be allowed with a variance from the State Department of Health. DHHL will seek a variance to use individual septic tanks for both phases.

### **Electrical and Telephone**

A 23-kV line from the Pukalani substation currently serves the tract. Waiohuli is also within the cable television service area of Oceanic Cable. Sandwich Isles Communication will provide telephone service.

### **Costs**

This section of the alternatives focuses on costs associated with residential development, and on the primary limiting conditions affecting those costs for each tract. Per-lot costs are also determined by total tract costs and the number of lots feasibly developed within each tract. Estimates are presented as “order of magnitude costs” only. Further, they are limited to costs associated with preparation for and provision of infrastructure, and exclude the cost of the housing itself, which in the case of DHHL lands is the responsibility of the leaseholder.

A total of 70 farm lots and 1,111 residential lots are proposed. However, costs for Phase 1 are not included because the planning and design of the 70 Kēōkea farm lots preceded the *Maui Island Plan*. Projected on- and off-site costs are summarized in the following tables.

### **Phase 2 – Residential**

Total Lots = 343 lots

Lot Size = 20,000 square feet

# MAUI ISLAND PLAN

**Table 3-1: Projected Costs for One-half Acre Phase 1 Residential Lots at Waiohuli**

Improvements	Total Cost \$	Cost Per Lot \$
Off-Site	2,439,553	7,112
On-Site	20,607,013	60,079
Total	23,046,566	67,191

## Cost Factors

- Rural development standards
- Cost estimates include the use of individual septic tanks. According to the State Department of Health rules (11-62-31.1(1)(B)), a variance is needed for septic tank use on subdivisions with more than 50 lots.
- 22-foot wide asphalt road pavement and asphalt shoulders
- Overhead electrical lines
- Water supplied by existing DWS system
- Off-site road connections to Kula Residential Lots Unit 1

## **Phase 3 – Residential**

Total Lots = 768 lots

Lot Size = 20,000 square feet

**Table 3-2: Projected Costs for Phase 2 One-half Acre Residential Lots at Waiohuli**

Improvements	Total Cost \$	Cost Per Lot \$
Off-Site	16,869,487	21,964
On-Site	46,674,610	60,774
Total	63,543,098	82,738

## Cost Factors

- Rural development standards
- Cost estimates include the use of individual septic tanks. According to the State Department of Health rules (11-62-31.1(1)(B)), a variance is needed for septic tank use on subdivisions with more than 50 lots.
- 22-foot wide asphalt road pavement and asphalt shoulders
- Overhead electrical lines

# MAUI ISLAND PLAN

- On-site water system consisting of three wells, storage, and distribution system to serve the proposed residential lots
- Off-site road connections to Kula Highway.

## **Alternative 1 Discussion**

Alternative 1 proposes the development of 70 farm lots and 1,111 residential lots over three phases. Phase 1 is the 70 Kēōkea farm lots, which was planned prior to the *Maui Island Plan*. Phase 2 proposes 343 lots at a cost of \$67,191 per lot. Phase 3 proposes 768 lots at a cost of \$82,738 per lot. The higher per lot costs in Phase 3 is due to the need to develop a private water system. As mentioned earlier, these costs reflect rural standards.

## **b. Alternative 2 – One-Acre Scenario**

The second alternative proposes 1,111 one-acre residential lots on 1,300 acres of land (Figure 3-11). Seventy acres are designated for community use, which will include schools, parks, and open space. Seven hundred seventy-three acres of gulches, high-sloped areas, and areas containing critical habitat or endangered species are designated as conservation. The balance of 3,289 acres is designated for general agriculture as an interim use. The land use plan also reflects DHHL's 321 unit Kula Residential Lots, Unit 1 at Waiohuli and the 70-unit agriculture lot subdivision in Kēōkea (Phase 1).

The land area required for the 1,111 one-acre lots proposed by Alternative 2 is more double the amount of land needed for Alternative 1. The residential units are located between the 1,500-foot and 2,650-foot elevations. Similar to Alternative 1, development of Alternative 2 is planned in two increments, known as Phase 2 and Phase 3. (Phase 1 refers to the 70-unit Kēōkea Farm Lot Subdivision planned prior to the *Maui Island Plan*.) Phase 2 proposes 343 units located between the 2,200-foot and 2,650-foot elevations. Phase 3 proposes 768 units between the 1,500-foot and 2,200-foot elevations.

### **Phase 1**

The 70-unit Kēōkea Farm Lot Subdivision represents the first phase of the Kēōkea/Waiohuli final land use plan. These lots will average two to three acres in size and will be located in the southeast corner of the tract. The farm lots were proposed and planned prior to the *Maui Island Plan*, and therefore are not included in the following discussion of infrastructure needs and development costs.

### **Phase 2**

The 343 units within Phase 2 are directly proportionate to the available water capacity of the DWS water system and similar to Alternative 1. Water demand for the 343 units is 262,200 gallons per day.

The lots are located below the 2,650-foot elevation level to take advantage of pressure from an existing tank in Waiohuli that is located at the 2,750-foot elevation.



## MAUI ISLAND PLAN

The mid-level road discussed for Alternative 1 is also proposed for Alternative 2. It provides access to Phase 2 through a connection between Waiohuli and Kēōkea and by utilizing the existing road network to Kula Highway.

### **Phase 3**

A total of 768 units are proposed for Phase 3. This phase is planned *makai* of Phase 2 and extends across the entire width of the tract. Water service for the 674 lots will require development of a private water system composed of wells drilled at approximately the 1,900-foot elevation. Water demand for the 674 units is estimated at 404,400 gallons per day.

The mid-level road built in Phase 2 and the existing Kula Highway access points within the Waiohuli and Kēōkea subdivisions will provide access to Phase 3. A fourth access point connecting the mid-level road to Kula Highway is proposed to provide a direct connection to the highway.

The land *makai* of the Phase 3 will go into general agriculture as an interim use.

### **Infrastructure**

#### **Access**

The primary access to the residential lots is similar to the access plan proposed for Alternative 1. A mid-level road connecting Waiohuli and Kēōkea will provide three access points to Kula Highway using existing intersections. During Phase 3, a fourth access point to Kula Highway from the mid-level road is proposed.

The development plan stage will include a traffic study to more accurately determine the level of service along Kula Highway and the necessary traffic improvements.

#### **Water**

Alternative 2 proposes to utilize the remaining County water system commitment for the 343 lots proposed in Phase 2. The 343 lots will be located between the 2,400-foot and 2,700-foot elevations to make use of the available pressure from the existing Waiohuli reservoirs. The remaining 768 lots in Phase 3 will require a private water system, as previously discussed.

#### **Wastewater**

The existing Waiohuli community, as well as most of the Upcountry region (with the exception of Pukalani), is served entirely by on-site septic systems.

A sewage treatment plant is not planned for either phase. While current DOH rules require a sewage treatment plant for subdivisions over 50 lots, a variance may be requested to allow individual septic systems to be used. It should be noted that proposed revisions to the DOH rules would allow septic systems for developments with 50 or more lots provided the development consists of one dwelling unit per acre or greater. As of

# MAUI ISLAND PLAN

March 8, 2004, the proposed revised rules are currently under review by the Governor and will become effective if signed by the Governor.

## ***Electrical and Telephone***

A 23-kV line from the Pukalani substation connected to the Mā'alaea Generating Station by a 69-kV line and to the Kahului Generating Station by a 23-kV line provides electric service. Waiohuli is also within the cable television service area of Oceanic Cable. Sandwich Isle Communication will provide telephone service.

## ***Costs***

Alternative 2 proposed a total of 1,111 lots averaging one-acre in size. Projected on- and off-site costs are summarized in Table 3-3 below.

## **Phase 2 – Residential**

Total Lots = 343 lots

Lot Size = 1 acre lots

***Table 3-3: Projected Costs for Phase 2 – One-Acre Residential Lots at Waiohuli***

<b>Improvements</b>	<b>Total Cost \$</b>	<b>Cost Per Lot \$</b>
Off-Site	3,449,600	10,057
On-Site	27,597,663	80,460
Total	31,047,263	90,517

## **Cost Factors**

- Numerous lots require extensive site preparation, such as road grading and utilities installation, thereby increasing overall on-site costs.
- A sewage treatment plant is not planned for either phase. Proposed rule revisions exempting developments with more than 50 lots greater than one acre in size may go into effect. If not, a variance from existing DOH rules will be requested.
- The one-acre lot size diminishes the overall cost savings because more roads are needed to serve the larger lots.
- Costs are further reduced given the proximity of the tract to the existing DHHL Waiohuli homestead and readily available road, electrical, and telephone connections within the subdivision.
- Off-site costs include estimates to construct a private water system consisting of three wells, storage, and distribution system to serve the proposed residential lots in Phase 3.

# MAUI ISLAND PLAN

- Existing Waiohuli roads composed of a paved right-of-way with concrete swales and drainage were used as a model to prepare the cost estimates. Full utilities are also reflected in the on-site costs.

## Phase 3 – Residential

Total Lots = 768 lots

Lot Size = 20,000 square feet

**Table 3-4: Projected Costs for Phase 3 – One-Acre Residential Lots at Waiohuli**

Improvements	Total Cost \$	Cost Per Lot \$
Off-Site	14,888,488	19,386
On-Site	65,098,349	84,763
Total	79,986,837	104,150

## Cost Factors

- Numerous lots require extensive site preparation and connections, thereby increasing overall on-site costs.
- A sewage treatment plant is not planned for either phase. Proposed rule revisions exempting developments with more than 50 lots greater than one acre in size may go into effect. If not, a variance from existing DOH rules will be requested.
- The one-acre lot size diminishes the overall cost savings because more roads are needed to serve the larger lots.
- Costs are further reduced given the proximity of the tract to the existing DHHL Waiohuli homestead and readily available road, electrical, and telephone connections within the subdivision.
- Off-site costs include estimates to construct a private water system consisting of three wells, storage, and distribution system to serve the proposed residential lots in Phase 3.
- Existing Waiohuli roads composed of a paved right-of-way with concrete swales and drainage were used as a model to prepare the cost estimates. Full utilities are also reflected in the on-site costs.

## **Alternative 2 Discussion**

Alternative 2 proposes the development of 1,111 one-acre lots over two phases. Phase 2 includes 343 lots at a cost of \$106,151 per lot. Phase 3 proposes 768 lots at a cost of \$118,887 per lot.

Per lot costs for Alternative 2 were comparatively higher than those for Alternative 1. This is primarily due to the large lot sizes, which extends the distance of road construction.

# MAUI ISLAND PLAN

These costs reflect County development standards. Using lesser standards may result in a reduction of costs.

## c. Final Plan

Alternative 1 (one-half acre scenario) is recommended as the final plan based on the lower development costs (Figure 3-12). Although both alternatives propose the development of 1,111 residential lots over two phases, the smaller lot size proposed in Alternative 1 accounts for the main difference in development costs.

The final land use plan, as discussed in Alternative 1, includes:

- 1,111 half-acre residential lots on 660 acres
- 69 acres of community and park use (10 of which are existing)
- 773 acres of gulches, high sloped areas, and areas containing critical habitat or endangered species designated as conservation
- 3,940 acres designated as general agriculture
- 70 previously planned agricultural lots in Kēōkea

This land use summary is included on the Kēōkea/Waiohuli Land Use Plan (Figure 3-12). The 70 farm units will be developed in Phase 1, followed by 343 residential units in Phase 2 and 768 residential units in Phase 3.

### ***Phase 1***

The 70-unit Kēōkea Farm Lot subdivision represents the first phase of the Kēōkea/Waiohuli final land use plan. These lots will average two to three acres in size and will be located in the southeast corner of the tract.

### ***Phase 2***

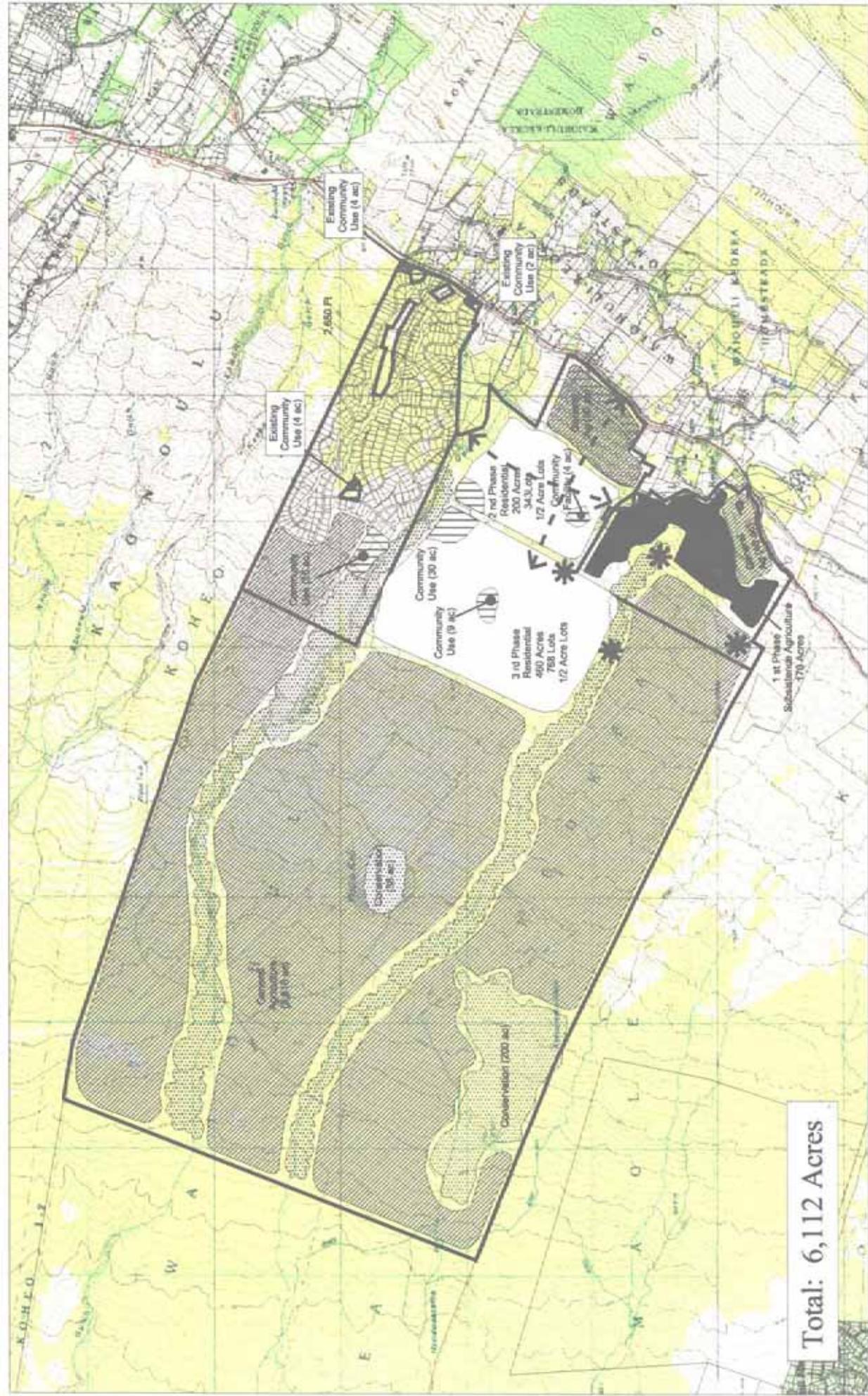
Phase 2 includes 343 one-half acre residential lots. The lots will be located between the 2,400-foot and 2,650-foot elevations, south of the existing Waiohuli Subdivision and between the two gulches shown in Figure 3-9.

### **Water**

Water from the DWS water system will serve the lots developed in Phase 2 in accordance with the previously discussed 500,000-GDP water credits agreement.

### **Access**

The existing road network within the Waiohuli Subdivision and the proposed road network in the Kēōkea Farm Lot Subdivision will serve as the access for Phase 2 residential units. A mid-level road that connects Waiohuli and Kēōkea at roughly the 2,500-foot elevation is also proposed in Phase 2. As mentioned earlier, this mid-level road will serve as the main arterial through the entire 1,111-unit project.



**Total: 6,112 Acres**

**Legend**  
 DHHHL Land Boundary  
 Heiau

Land Use Summary	Lot Size	Number of Lots	Approx Acres
Residential	1/2	1,111	660 ac
Community Use			69 ac
General Agriculture			3,940 ac
Conservation			773 ac
Subsistence Agriculture	2	70	170 ac
Existing Residential			500 ac
<b>Total</b>		<b>1,181</b>	<b>6,112 ac</b>

**Figure 3-12**  
**KŌKEAWĀIOHULI**  
**Land Use Plan**  
**MAUI LAND INVENTORY**  
 DEPARTMENT OF HAWAIIAN HOME LANDS  
 NORTH

701/03

Source: United States Geologic Survey and Department of Hawaiian Home Lands  
 Q:\Maui\dhhl inventory\GIS\projects\land use\kahului.apr

# MAUI ISLAND PLAN

## Sewer

Sewage will be handled by on-site septic tanks.

## **Phase 3**

Phase 3 includes 768 residential units. This phase is planned below the 2,400-foot elevation between the two major gulches.

## Water

Water service for the 768 lots will come from a private water system composed of wells drilled at the 1,900-foot elevation, as discussed in the alternatives section.

## Access

The mid-level road will provide access to Phase 3 at access points within the Waiohuli and Kēōkea Subdivisions. A fourth access point directly connecting the mid-level road to Kula Highway is also proposed for Phase 3.

## Sewer

The 768 units will be serviced by on-site septic tanks.

## Community Facilities

The final land use plan designates approximately 69 acres for community use. There are already twenty-six existing acres of community areas located within the Waiohuli Subdivision that are planned for parks, community facilities, and open space. An additional thirteen acres for parks and open space are planned for Phase 2 and Phase 3. The amount of acres set aside for parks and open space was determined using the County of Maui Park Standards. The remaining 30 acres is planned for an elementary and/or intermediate school. Discussions with the Department of Education indicated the need for schools given the number of units proposed in Phases 2 and 3.

## Remaining Land

According to the final land use plan, approximately 3,940 acres *makai* of the proposed residential development area are proposed for general agriculture use. DHHL may renew the revocable permit with Sakagawa for these lands and generate income in the interim.

Approximately 773 acres are proposed for conservation use. These areas include the two major gulches, Pu'u o Kali, and the 236-acre area licensed to Tri-Isle Resource Conservation Development Council to protect a portion of an existing dryland forest.

## Costs

The tables below present the projected costs for the recommended final land use plan. Costs for Phase 1 are not included because the planning and design of the 70 Kēōkea farm lots preceded the *Maui Island Plan*.

# MAUI ISLAND PLAN

## Phase 2 – Residential

Total Lots = 343 lots

Lot Size = 20,000 square feet

**Table 3-5: Projected Costs for One-half Acre Phase 2 Residential Lots at Waiohuli**

Improvements	Total Cost \$	Cost Per Lot \$
Off-Site	2,439,553	7,112
On-Site	20,607,013	60,079
Total	23,046,566	67,191

## Phase 2 – Residential

Total Lots = 768 lots

Lot Size = 20,000 square feet

**Table 3-6: Projected Costs for Phase 3 One-half Acre Residential Lots at Waiohuli**

Improvements	Total Cost \$	Cost Per Lot \$
Off-Site	16,869,487	21,964
On-Site	46,674,610	60,774
Total	63,543,098	82,738

## D. 'ULUPALAKUA PARCEL BASELINE INFORMATION

DHHL's 'Ulupalakua parcel is approximately one quarter-mile from 'Ulupalakua's town center, along a fairly well known tourist route with traditional ranch-style architecture, winery tours, and a ranch store. Significant coastal views include 'Āhihi Bay and Mākena Bay.

### 1. INVENTORY

#### **TMK and Acreage**

The 'Ulupalakua parcel is 2.0 acres and is identified as TMK 2-1-08:50 (Figure 3-1).

#### **Existing Uses**

Although the two-acre site is currently vacant, it is used as a water source by residents of DHHL's Kahikinui *kuleana* lots. A water tap is provided for residents to fill portable containers that they then haul to their lots in Kahikinui.



#### **Adjacent Uses**

The parcel is bounded to the north and east by Kula Highway and to the south and west by 'Ulupalakua Ranch.