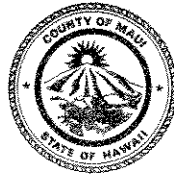


ALAN M. ARAKAWA  
Mayor

MICHAEL W. FOLEY  
Director

DON COUCH  
Deputy Director



COUNTY OF MAUI  
**DEPARTMENT OF PLANNING**

July 11, 2006

RECEIVED  
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OFFICE OF ENVIRONMENTAL  
QUALITY CONTROL

Ms. Genevieve Salmonson, Director  
Office of Environmental Quality Control  
235 South Beretania Street, Suite 702  
Honolulu, Hawaii 96813

Dear Ms. Salmonson:

RE: Final Environmental Assessment (DEA) for the Proposed Four-Unit Single-Family Condominium located at TMK: 2-1-007: 066, Makena, Island of Maui, Hawaii (EA 2006/0001) (DBA 2001/0003) (CPA 2001/0005) (CIZ 2001/0011) (SM1 2001/0017)

The Maui Planning Commission at its regular meeting on July 11, 2006, accepted the Final Environmental Assessment (FEA) for the subject project, and issued a Finding of No Significant Impact (FONSI). Please publish the FEA in the **August 8, 2006**, Office of Environmental Quality Control (OEQC) Environmental Notice.

We have enclosed a completed OEQC Publication Form and four (4) copies of the FEA. If you have any questions, please call Ms. Kivette Caigoy, Environmental Planner, of our office at 270-7735.

Sincerely,

MICHAEL W. FOLEY  
Planning Director

MWF:KAC:sec

Enclosures

c: Colleen Suyama, Staff Planner  
Karlynn Kawahara, Munekiyo & Hiraga, Inc. (w/ copies of enclosures)  
EA Project File (w/ copies of enclosures)  
General File  
K:\WP\_DOCS\PLANNING\EA\2006\0001\_4UnitCondoMakena\OEQCTransmitFEA.wpd

2006-08-08-MA-FEA-4 UNIT SINGLE FAMILY  
CONDOMINIUM AT MAKENA

AUG 18 2006  
**FILE COPY**

*Final*  
***Environmental Assessment***

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**PROPOSED FOUR-UNIT  
SINGLE-FAMILY CONDOMINIUM  
AT MAKENA, MAUI  
(TMK 2-1-07:66)**

Prepared for:

July 2006

Pacific Rim  
Land Incorporated  
and  
Accepting Authority,  
Maui Planning Commission

  
MUNEKIYO & HIRAGA, INC.

*Final*  
*Environmental Assessment*

---

**PROPOSED FOUR-UNIT  
SINGLE-FAMILY CONDOMINIUM  
AT MAKENA, MAUI  
(TMK 2-1-07:66)**

Prepared for:

July 2006

Pacific Rim  
Land Incorporated  
and  
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Maui Planning Commission

  
MUNEKIYO & HIRAGA, INC.

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pacrimbaknorih\lea.rpl



Executive Summary

**Project Name:** Proposed Four-Unit Single-Family Residential

**Type of Document:** Final Environmental Assessment

**Legal Authority:** Chapter 343, Hawaii Revised Statutes

**Applicable Trigger:** Amendment to County Community Plan

**Agency Determination:** Anticipated Findings of No Significant Impact

**Location:** Maui Island  
Makena, Maui, Hawaii  
TMK: 2-1-007:066

**Approving Agency:** Maui Planning Commission  
250 South High Street  
Wailuku, Hawaii 96793  
Contact: Ms. Kivette Caigoy  
Phone: (808) 270-7735

**Applicant:** Pacific Rim Land, Inc.  
381 Huku Li'i Place, Suite 202  
Kihei, Hawaii 96753

**Consultant:** Munekiyo & Hiraga, Inc.  
305 High Street, Suite 104  
Wailuku, Hawaii 96793  
Contact: Karlynn Kawahara  
Phone: (808) 244-2015

**Agencies Consulted:** A total of three (3) Federal Government agencies, nine (9) State of Hawaii Government agencies, seven (7) County of Maui agencies, one (1) private company and one (1) community group were consulted in making the assessment. For further information, refer to Chapter IX and Chapter X of this Final Environmental Assessment.

**Project Summary:** The applicant is proposing a four-unit single-family condominium at TMK 2-1-07:66 in Makena, Maui. The subject property is approximately 1.552 acres in size and was formerly occupied by a single-family dwelling, as well as two (2) storage sheds and a

temporary garage. These structures have been removed and the property lies vacant with large kiawe trees and introduced species of grasses and weeds.

The project proposes the construction of four (4) single-family condominium units, as well as grading to establish building pad elevations, construction of retaining walls, underground utility installation and drainage improvements. Each residence will be approximately 3,930 square feet in size and will include a swimming pool for each unit as well as landscaping. Residences will also be two-stories high. Access to the residences will be through two driveways off of Makena-Keoneoio Road.

To the north of the project site is an existing single-family residence on parcel TMK 2-1-07:67, which also forms the north and east borders of the project. Makena-Keoneoio Road is located to the west. To the south of the project site are a vacant parcel and the Maui Prince Hotel.

An analysis with regards to the action's technical, economic, social and environmental aspects is provided in the following Final Environmental Assessment.

**Preface**

The applicant, Pacific Rim Land, Inc. (PRL), proposes to construct four (4) single-family condominium units on a 1.552-acre parcel located in Makena, Maui, Hawaii (TMK 2-1-07:66). The project scope includes the grading to establish building pads, installation of underground utilities and drainage improvements, as well as the construction of retaining walls. The single-family dwellings will be approximately 3,930 square feet in size and will include an enclosed garage, swimming pool and landscaping.

Pursuant to Chapter 343, HRS, and Chapter 200 of Title 11, Department of Health Administrative Rules, Environmental Impact Statement Rules, this Environmental Assessment documents the project's technical characteristics, environmental impacts and alternatives, and advances findings and conclusions relative to the significance of the project.

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# **Chapter I**

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## ***Project Overview***

## **I. PROJECT OVERVIEW**

### **A. PROJECT LOCATION, EXISTING USE, AND LAND OWNERSHIP**

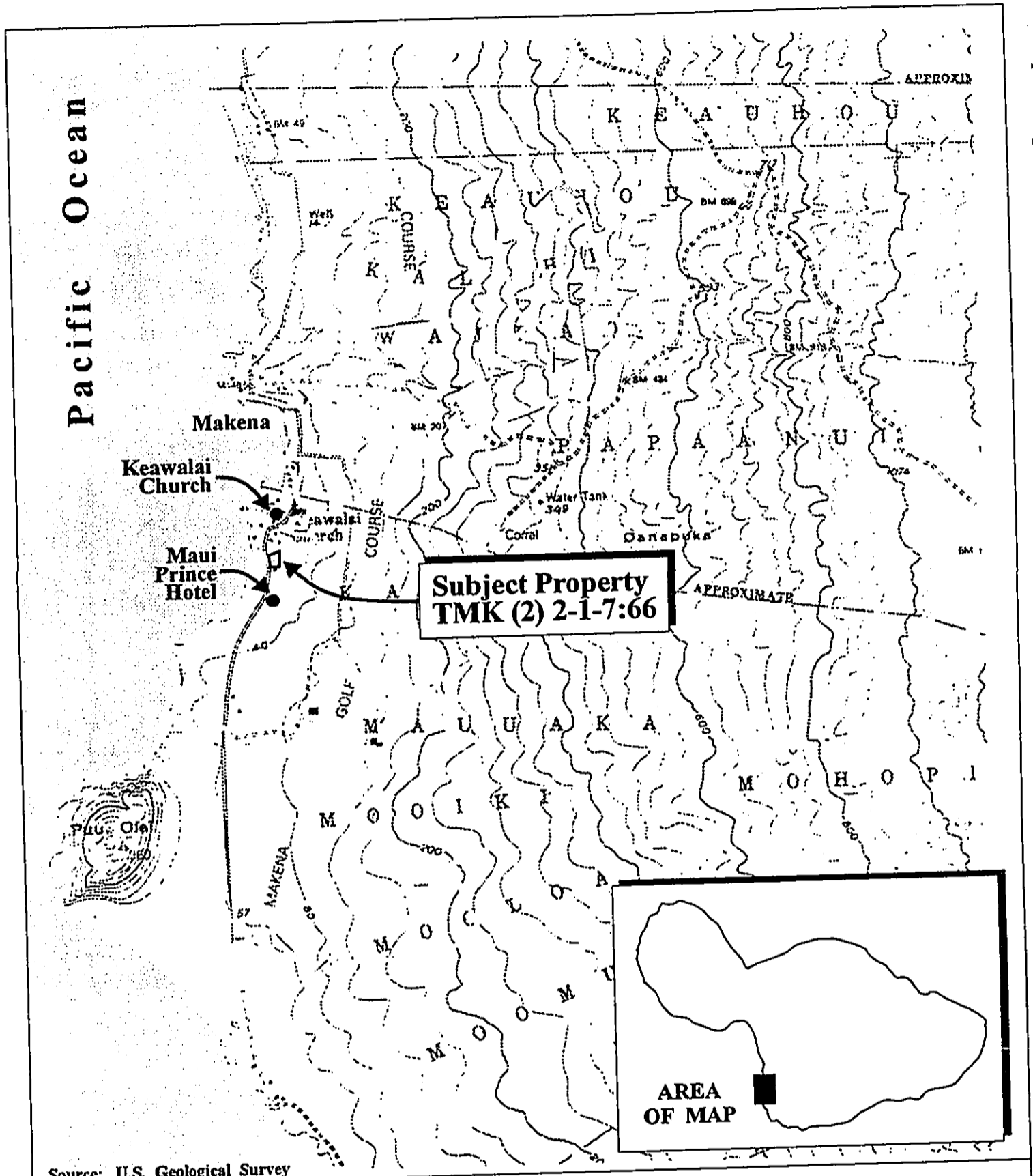
The applicant, Pacific Rim Land, Inc., on behalf of landowner, BNO1 Investment, LLC, proposes a four (4) unit single-family condominium at TMK 2-1-07:66, at Makena, Maui, Hawaii. The subject property encompasses approximately 1.552 acres and is situated on the mauka or east side of Makena-Keoneoio Road, in the vicinity of the Maui Prince Hotel. See Figure 1 and Figure 2. The property was formerly occupied by a single-family dwelling, as well as two (2) additional sheds and a temporary garage. These structures have been removed and the property is now largely overgrown with kiawe trees and introduced species of weeds and grasses. Access to the parcel is via Makena-Keoneoio Road, which is a paved two-lane, two-way County roadway fronting the parcel.

### **B. PROPOSED ACTION**

Pacific Rim Land, Inc. proposes the development of a four (4) unit single-family condominium on the subject property. See Figure 3. Site improvements will include grading to establish required building pad elevations, retaining walls, underground utility installation and drainage improvements in accordance with County of Maui requirements.

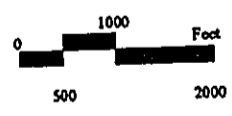
Single-family units proposed for the project will have similar designs and floor plans. See Figure 4. Each residence will be two (2) stories and measure approximately 3,930 square feet and will include a swimming pool for each unit, as well as landscaping. See Figure 5 and Figure 6. Access to the units will be via two (2) driveways off of Makena-Keoneoio Road.

The units are intended to address the resort residential market, with units to be held with fee simple interest.



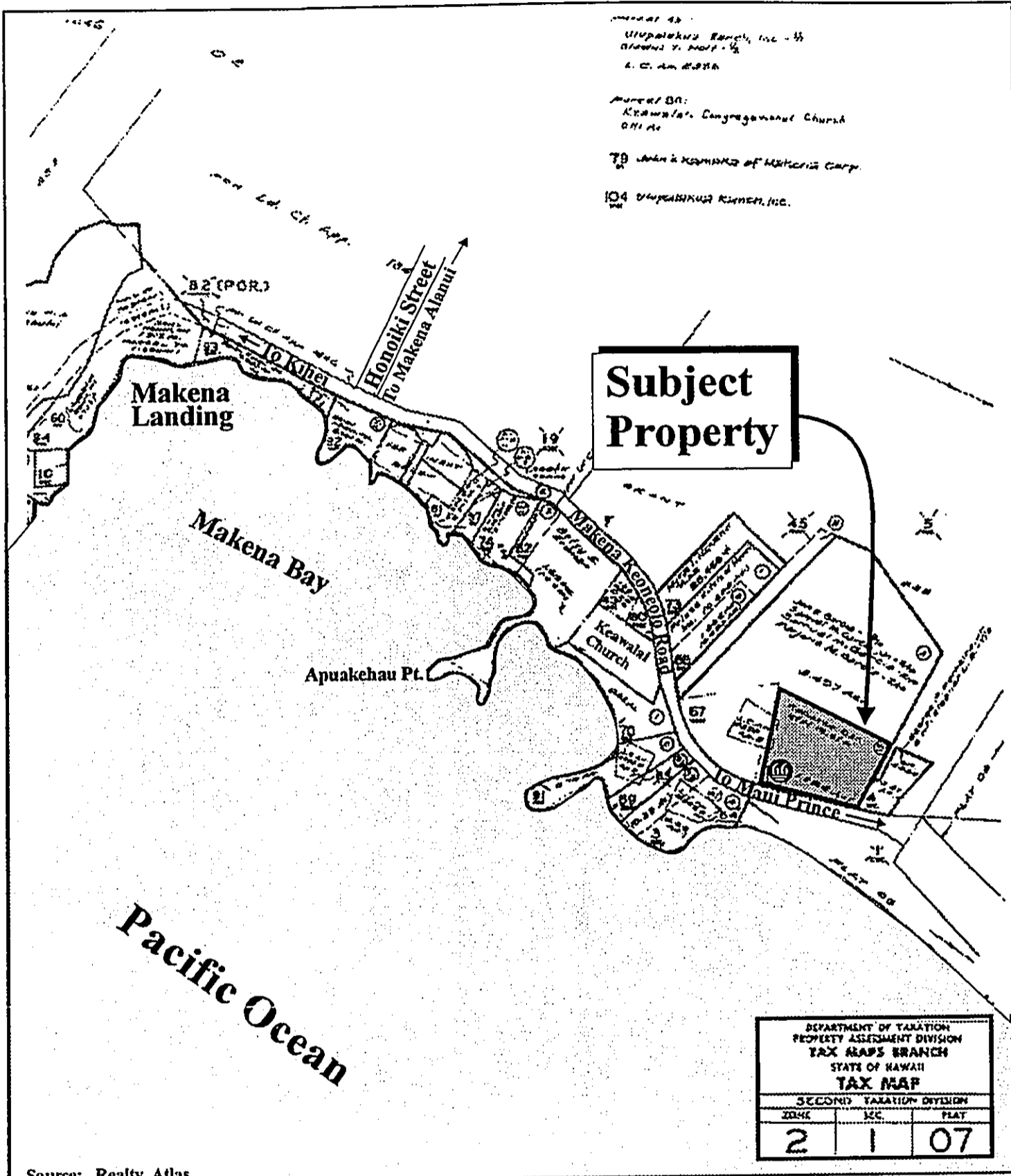
Source: U.S. Geological Survey

**Figure 1 Proposed Four-Unit Single-Family  
Condominium at Makena, Maui**  
Regional Location Map



MUNEKIYO & HIRAGA, INC.

Prepared for: Pacific Rim Land Inc.



Source: Realty Atlas

Figure 2 Proposed Four-Unit Single-Family Condominium at Makena, Maui NOT TO SCALE  
 Site Location Map



Prepared for: Pacific Rim Land Inc.

MUNEKIYO & HIRAGA, INC.

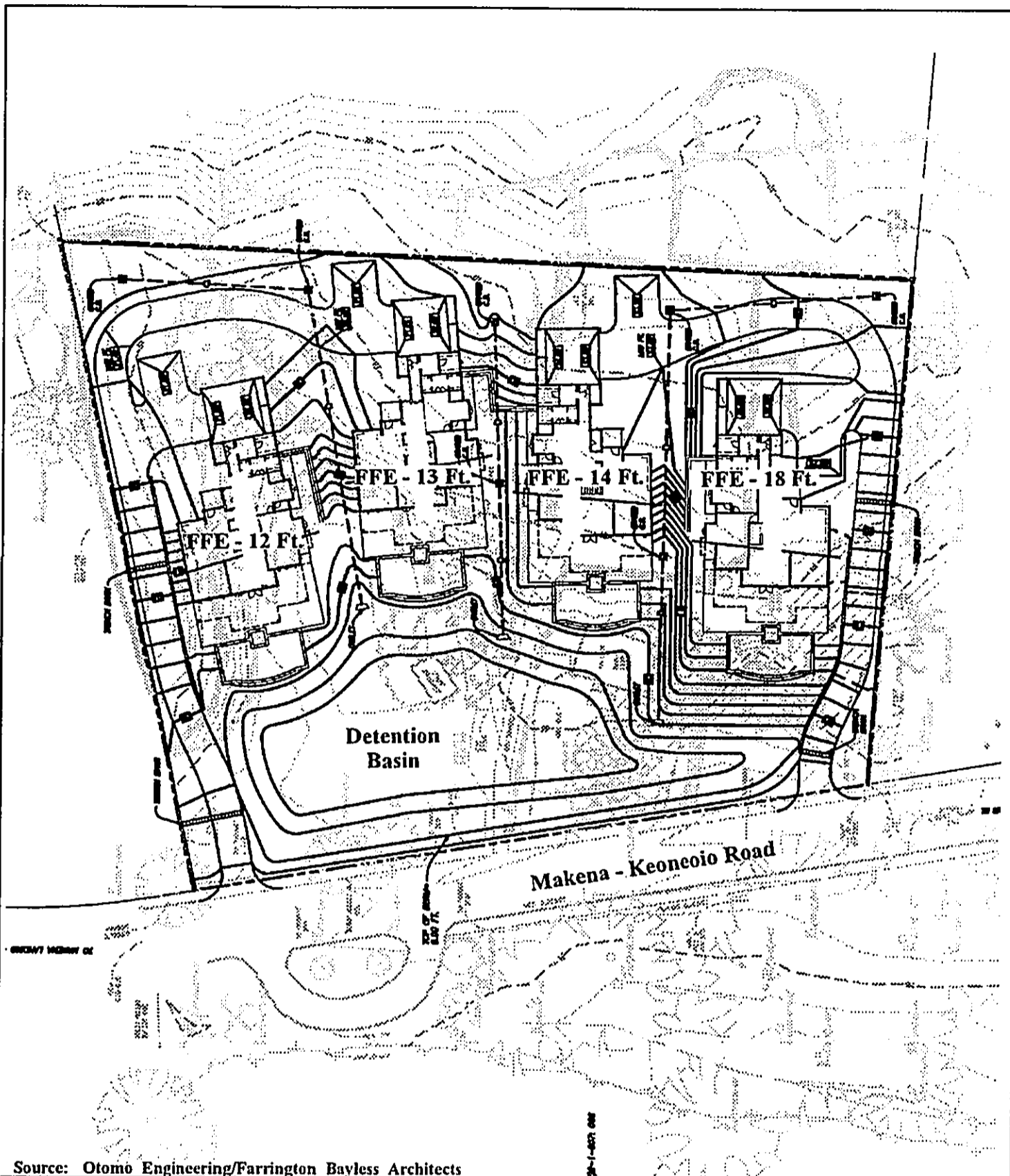


Figure 3 Proposed Four-Unit Single-Family  
 Condominium at Makena, Maui  
 Site Plan

NOT TO SCALE

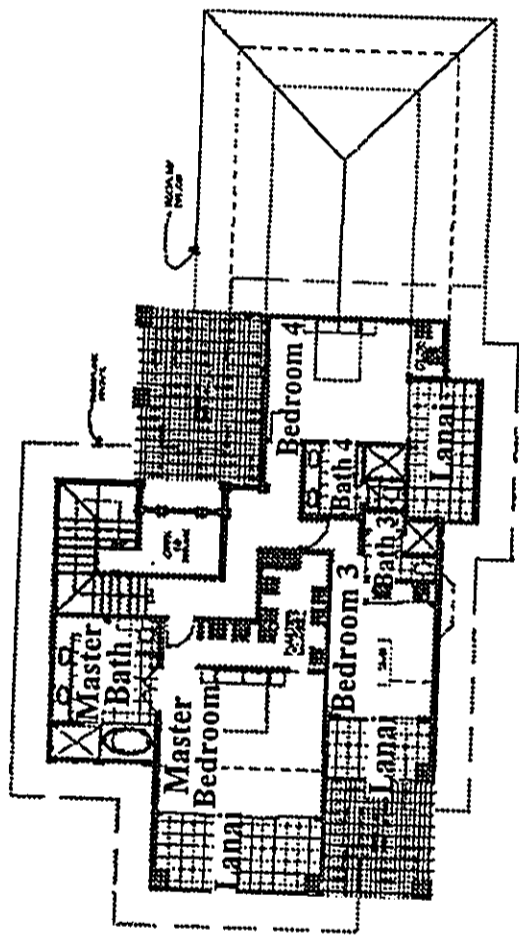


Prepared for: Pacific Rim Land Inc.

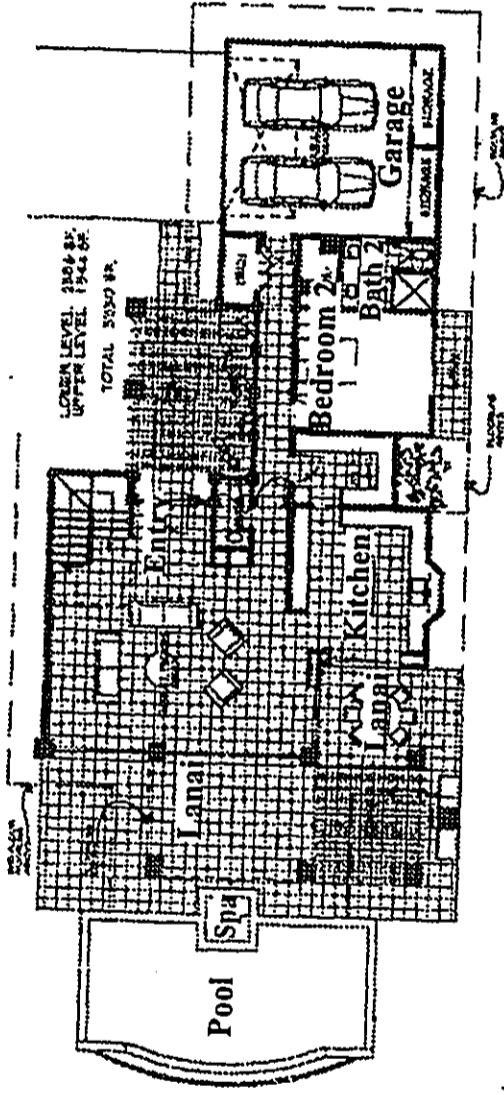
MUNEKIYO & HIRAGA, INC.

PacRimBakNorth\Rev SitePlan





**Upper Level**  
1,544 square feet



**Lower Level**  
2,386 square feet

Source: Farrington Bayless Architects

**Figure 4**

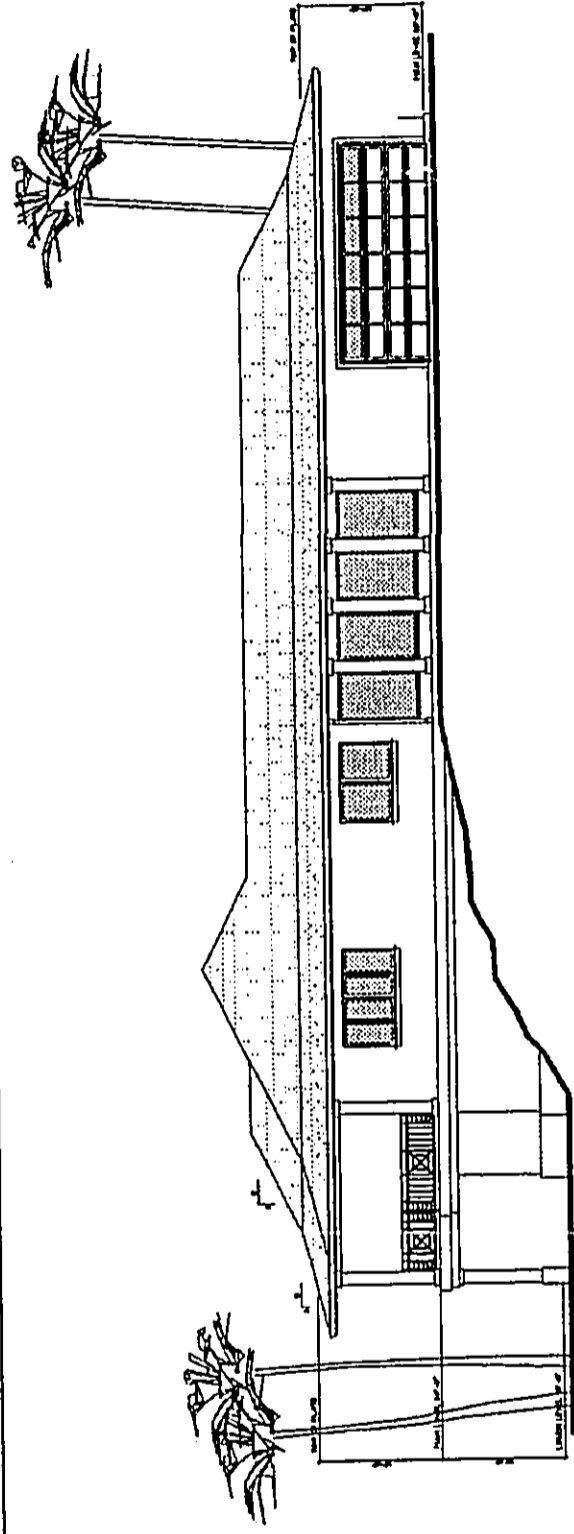
**Proposed Four-Unit Single-Family  
Condominium at Makena, Maui  
Typical Unit Floor Plan**

NOT TO SCALE

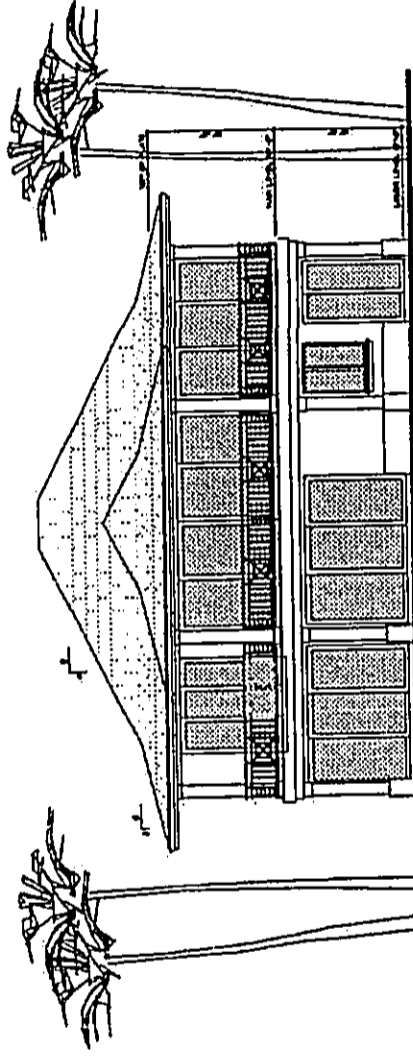
Prepared for: Pacific Rim Land Inc.







South Elevation



West Elevation

Source: Farrington Bayless Architects

Figure 6 Proposed Four-Unit Single-Family Condominium  
at Makena, Maui  
South and West Elevations

NOT TO SCALE

Prepared for: Pacific Rim Land Inc.



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C. ENTITLEMENTS REQUESTED

The property is currently designated for "Agricultural" use by the State Land Use Commission and designated for "Hotel" use by the Kihei-Makena Community Plan. County zoning for the property is "Interim".

The applicant initially filed applications for a State Land Use District Boundary Amendment (DBA), and Change in Zoning (CIZ) with the County of Maui to reclassify the property to the State "Urban" district and to establish the "H-1, Hotel" zoning category, consistent with the "Hotel" community plan designation. Through the application review process, the Director of Planning recommended that the Kihei-Makena Community Plan instead be amended to the "Single-Family" land use designation, with a CIZ to the "R-3, Residential" zoning category. The applicant had no objections to the Planning Director's recommendation, as it is the intent to develop the project solely for single-family residential use. The Maui Planning Commission, at its January 8, 2002 meeting, approved the recommendation for a DBA to the "Urban" district, the CPA to the "Single-Family" designation, and the CIZ to the "R-3, Residential" category.

Subsequent to the Planning Commission's referral of their recommendations to the Maui County Council, the County's Department of the Corporation Counsel determined that a County-initiated CPA, such as that advanced by the Planning Director for the subject property, requires the preparation and processing of a Chapter 343, Hawaii Revised Statutes Environmental Assessment (EA).

In addition, since the property falls within the County of Maui's Special Management Area (SMA), a SMA use permit application was filed concurrently with the DBA, CPA and CIZ applications.

---

**D. PROJECT COST AND TIMETABLE**

Preliminary estimates place the cost of the proposed project at approximately \$5.75 million. Construction of project improvements will be initiated upon receipt of the DBA, CIZ and SMA approvals.

# ***Chapter II***

---

***Description of the  
Existing Environment***

## **II. DESCRIPTION OF THE EXISTING ENVIRONMENT**

### **A. PHYSICAL ENVIRONMENT**

#### **1. Surrounding Land Uses**

The subject property is located in Makena, in the vicinity of the Maui Prince Hotel. The Makena-Keoneoio Road terminus and cul-de-sac turnaround are located approximately 450 feet to the south of the subject property. The grounds of the Maui Prince Hotel begin at this location. Across the street from the property is a public beach right-of-way with a vehicular drop-off area for the County of Maui's Maluaka Beach Park. Further north, single-family beachfront homes are located along Makena-Keoneoio Road's makai side. A single-family residence occupies the adjacent parcel to the north. This parcel (TMK 2-1-07:67) forms the subject property's northern and eastern boundaries. Areas bordering the subject property along its eastern boundaries are undeveloped. A vacant and undeveloped parcel (TMK 2-1-07:4) lies to the immediate south of the subject property.

The Maui Prince Hotel, located further south of the subject property, is a six-story, 310-room resort hotel on an approximately 25-acre site. The hotel is part of the Makena Resort complex which includes golf courses and a tennis complex mauka of Makena Alanui Road.

Other notable landmarks in this vicinity include the Keawalai Church, located approximately 0.2 mile to the north, Makena Landing, located approximately 0.5 mile to the north and the remnants of the Kalani Heiau, located on the adjacent TMK 2-1-07:67. The property is situated approximately 0.8 mile from the Makena-Keoneoio Road/Makena Alanui Road intersection.

---

2. **Climate**

Like most of the State of Hawaii, Maui experiences a relatively uniform year-round climate with mild temperatures, moderate humidity and consistent northeasterly tradewinds. However, local terrain can greatly influence the climate in different areas. Because of its location on the leeward coast of the island, the property experiences a higher range of temperatures and lower rainfall than those areas located on the island's windward side. The region experiences a relatively even climate with little seasonal and day-night temperature variation. Cool tradewinds from the northeast help keep the warm summer months pleasant. However, during the months from October to April, Kona storms occasionally develop, bringing strong winds and rain out of the south.

Rainfall in the project vicinity is approximately 18 inches per year with most falling during the months of October to May. The months of June to September are generally much dryer with rainfall under one-half inch per month (Maui County Data Book, 2003).

Temperatures recorded at Makena Golf Course property indicate a hotter climate for the Kihei-Makena area, compared with Maui's average range. During the summer months, average mean high temperatures are near 80 degrees Fahrenheit. The winter months are cooler with highs in the low 70's (Maui County Data Book, 2003).

3. **Topography and Soil Characteristics**

The topography of the subject site is gently sloping. The elevation at the mauka portion is approximately 24 feet above sea level. The



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elevation near the makai boundary of the parcel along Makena-Keoneoio Road is approximately 5 feet above sea level.

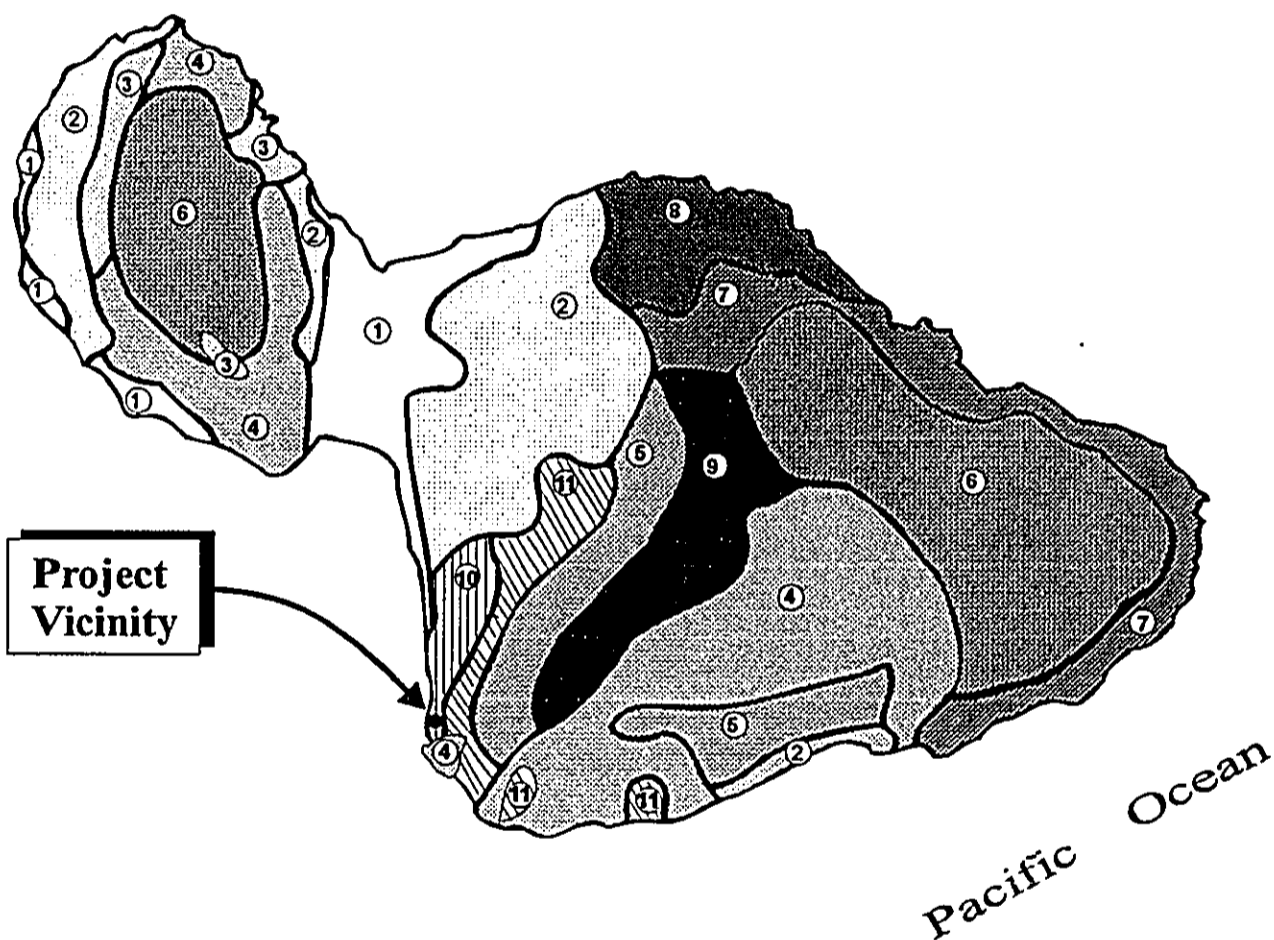
Underlying the project site are soils of the Makena-Keawakapu association. See Figure 7. These soils are located on lands which are gently sloping to moderately steep. The soils are well-drained with fine-textured to medium textured subsoil. This soil ranges from shallow to deep over fragmental lava and is located on low uplands.

The predominant soil type at the subject site is Makena loam, stony complex, 3 to 15 percent slopes (MXC). See Figure 8. This complex consists of Makena loam and Stony land. Stony land occurs on low ridges and makes up 30 to 60 percent of the complex. Makena loam occurs as gently sloping areas between the low ridges of Stony land. On the Makena loam portion of the complex, permeability is moderately rapid, runoff is slow to medium, and the erosion hazard is slight to moderate. On the stony land portion, permeability is very rapid and there is no erosion hazard.

In addition to the Makena loam soil type, pahoehoe outcrops occur throughout much of the subject property's surface areas. In 1977, the State Department of Agriculture established a classification system for identifying Agricultural Lands of Importance to the State of Hawaii (ALISH), primarily, but not exclusively on the basis of soil characteristics. The three (3) classes of ALISH lands are: "prime", "unique", and "other". As indicated by the ALISH map, the subject property adjoins land which has been developed for urban uses and does not fall within any of the agricultural land categories. See Figure 9.

## LEGEND

- |   |   |
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| <p>① Pulehu-Ewa-Jaucas association</p> <p>② Walakoa-Keahua-Molokai association</p> <p>③ Honolua-Olelo association</p> <p>④ Rock land-Rough mountainous land association</p> <p>⑤ Puu Pa-Kula-Pane association</p> <p>⑥ Hydrandepts-Tropaquods association</p> | <p>⑦ Hana-Makaalae-Kailua association</p> <p>⑧ Pauwela-Haiku association</p> <p>⑨ Laumaia-Kaipoi-Olinda association</p> <p>⑩ Keawakapu-Makena association</p> <p>⑪ Kamaole-Oanapuka association</p> |
|---|---|



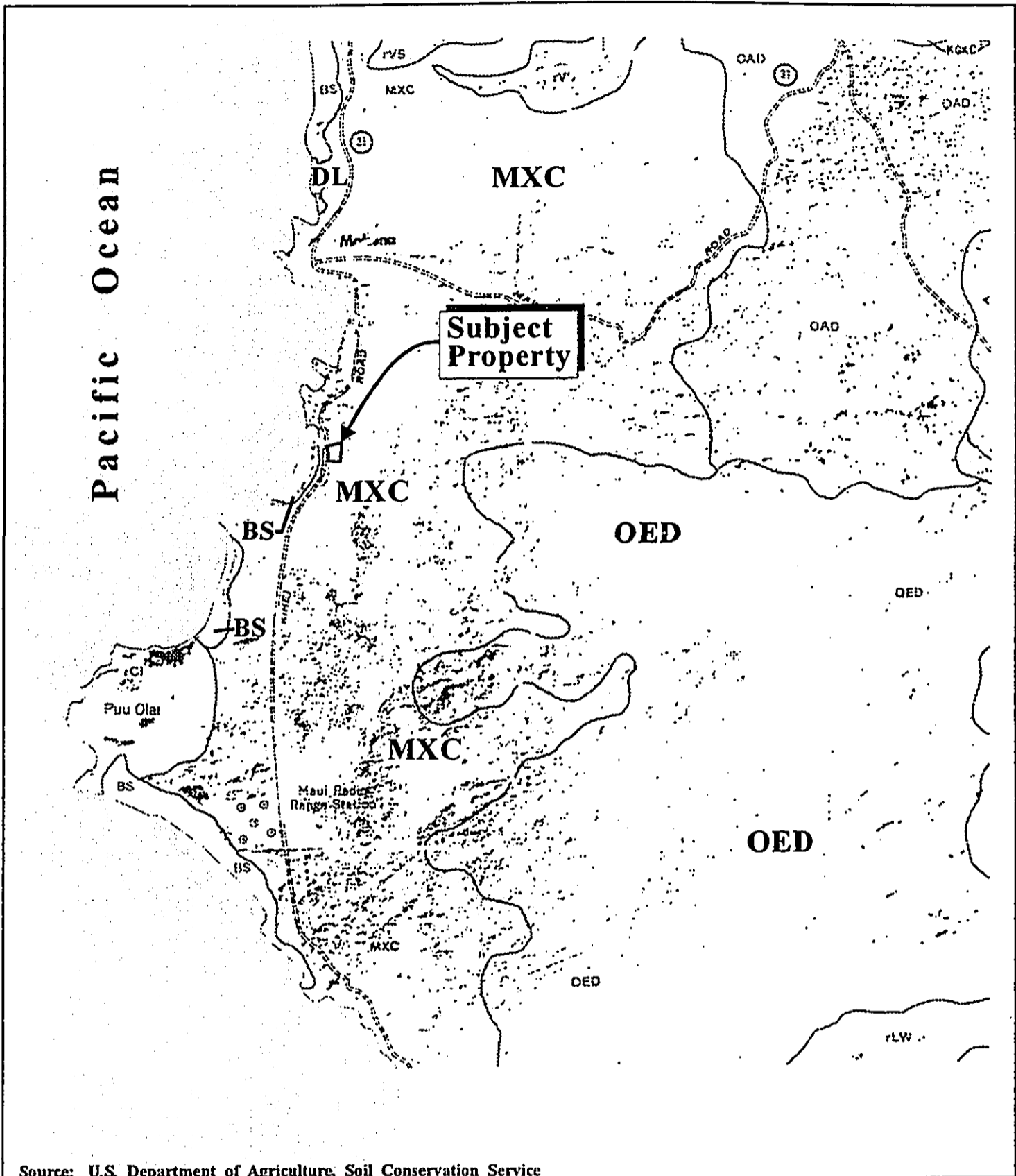
Source: USDA, Soil Conservation Service

**Figure 7** Proposed Four-Unit Single-Family Condominium at Makena, Maui NOT TO SCALE  
Soil Association Map



Prepared for: Pacific Rim Land Inc.

MUNEKIYO & HIRAGA, INC.



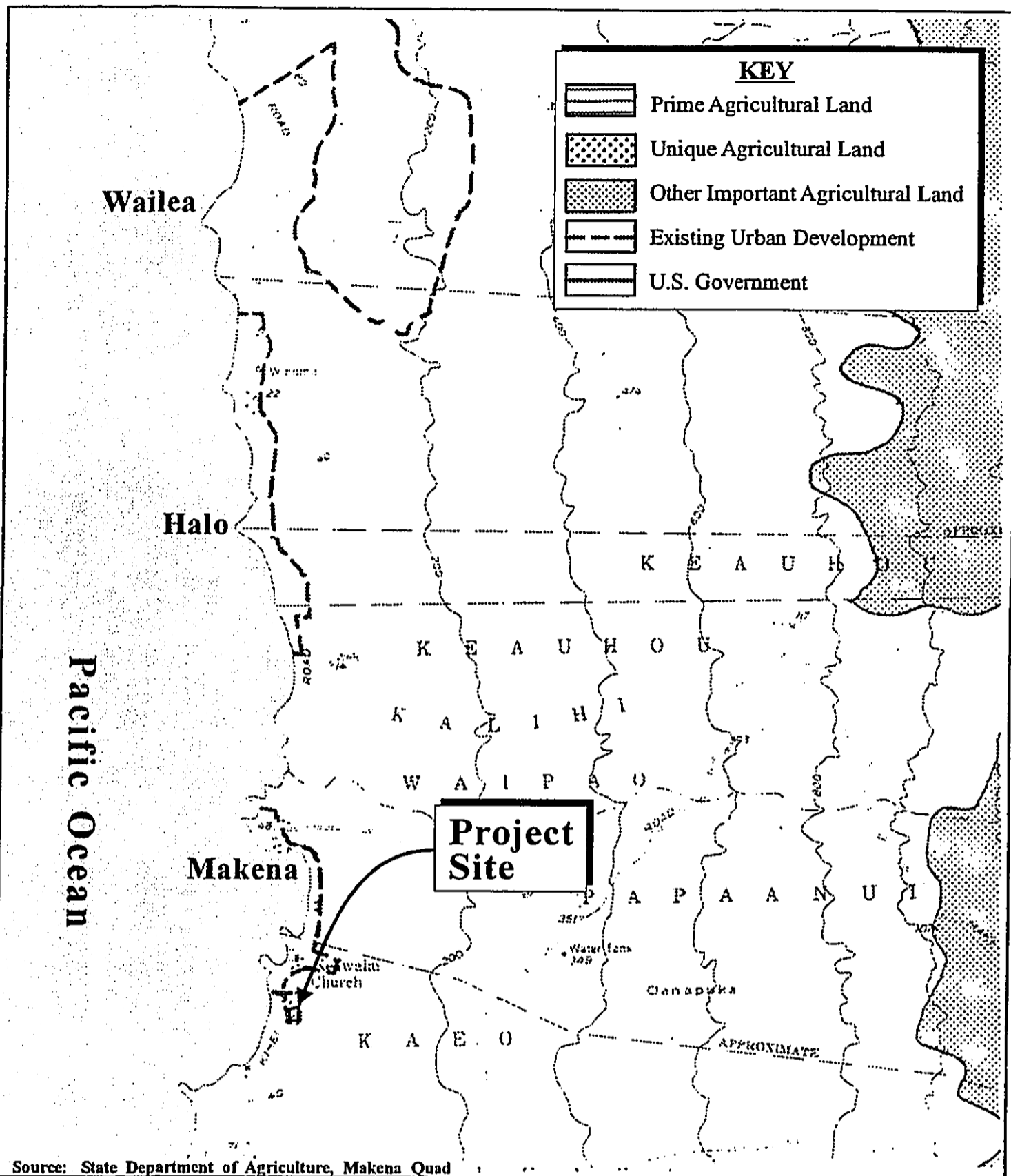
Source: U.S. Department of Agriculture, Soil Conservation Service

**Figure 8 Proposed Four-Unit Single-Family  
Condominium at Makena, Maui  
Soil Classifications**



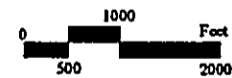
Prepared for: Pacific Rim Land Inc.

MUNEKIYO & HIRAGA, INC.



Source: State Department of Agriculture, Makena Quad

Figure 9 Proposed Four-Unit Single-Family Condominium at Makena, Maui  
ALISH Map



Prepared for: Pacific Rim Land Inc.

MUNEKIYO & HIRAGA, INC.

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4. **Flood and Tsunami Hazard**

According to the Flood Insurance Rate Maps issued by the Federal Emergency Management Agency, most of the site is located within Zone C, areas of minimal flooding. A small portion of the site located at its southwest corner is designated as Zone A4, areas of a 100-year flood with a base flood elevation of 9 feet above sea level. See Figure 10.

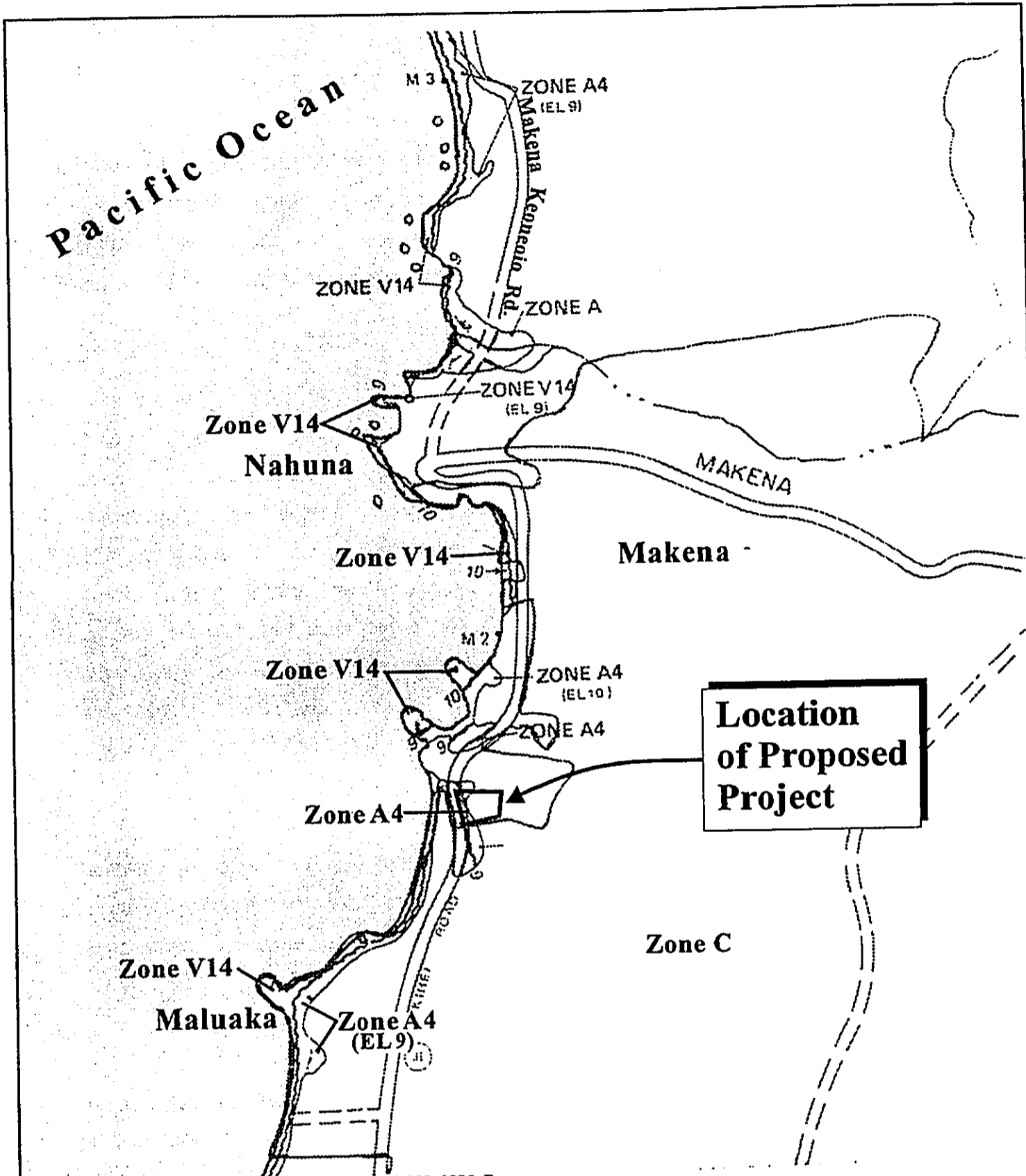
5. **Flora and Fauna**

Vegetation on the site of the subject property include introduced species of weeds and grasses, which combine with a moderately thick growth of kiawe trees spread over the entire property. Common flora in the area includes buffel grass, swollen fingergrass, and kiawe trees. Other flora found in the area are beach morning glory, koa-haole, ilima and uhaloa. Areas which immediately surrounded the sites of the former single-family dwelling and related structures were cleared of vegetative overgrowth.

Avifauna found in this area include the Barred Dove, Cardinal, Ricebird, English sparrow, Mockingbird, Myna and Japanese White-eye. Common mammals likely to be observed include dogs, cats, mice, and axis deer.

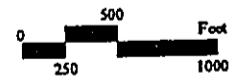
6. **Air Quality**

There are no point sources of airborne emissions in the immediate vicinity of the project site. The air quality of the Makena area is considered good with existing airborne pollutants attributed to automobile exhaust from the region's roadways. However, the project site may be temporarily affected by dust from nearby



Source: FEMA Community Panel Number 150003 0330 B

**Figure 10 Proposed Four-Unit Single-Family Condominium at Makena, Maui**  
 Flood Insurance Rate Map



Prepared for: Pacific Rim Land Inc.

MUNEKIYO & HIRAGA, INC.

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construction activities. Other sources may include smoke from sugarcane burning which occurs in the Central Maui isthmus. This source is intermittent, however, and prevailing tradewinds quickly disperse particulates generated.

7. **Noise**

Scattered single-family residential uses are clustered near the shoreline to the north of the subject property. The predominant noise sources are attributed to ocean surf and local vehicular traffic.

8. **Scenic and Open Space Resources**

The project site is located mauka of the Makena-Keoneoio Road and a public beach right-of-way. The proposed project site will not affect the beach right-of-way and shoreline access. The subject property is not a part of a scenic corridor.

9. **Archaeological Resources**

An archaeological inventory survey was conducted by Scientific Consultant Services in order to identify existing archaeological resources present on the subject property. The survey consisted of a field study in July of 2000, and included discussions of historical setting and previous archaeological studies undertaken within the larger Makena area. A copy of the full report is attached as Appendix "A".

The inventory survey identified 13 features, including enclosures, a modified outcrop, rock pavements (including coral cobbles), rock walls and rock mounds. The area was recorded and collectively designated Site No. 50-50-14-4986.

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During the field study, no suitable carbon material was obtained although midden was observed in small amounts on the surface and in several shovel probes. Several historic bottles and a bullet casing was recovered, indicating a possibility that the subject area could have been utilized as a rubbish depository during the early 1900's. The study also revealed evidence of grading and leveling that has taken place in the southeastern portion of the property. In addition, several amorphous mounds throughout the area were identified as bulldozer push or clearing piles.

Based on their construction, the existing rock walls are interpreted to have been built during the mid- to late-1800's and early 1900's and may have been associated with ranching activities. Existing walls appear to form enclosures and most likely served as multiple pens for separating stock before shipping from the Makena Landing. The report also indicated the existence of a heiau on the neighboring property to the east. The Kalani Heiau, believed to have been of sacrificial class, has now been reduced to a shapeless pile of rocks.

**10. Cultural Impact Considerations**

A cultural impact assessment was prepared for the project site. See Appendix "B". The assessment reviewed historic documents and maps, history narratives, and made contact with the Office of Hawaiian Affairs as well as local cultural practitioners, residents and groups familiar with the area.

The historical research showed that the area was likely utilized for agricultural purposes and in the mid-1800's was part of a sugarcane and ranch operation. It is also noted that a harbor in



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the area served as a loading area for the Ulupalakua Ranch, located mauka of the site and that in the 1940's the area was utilized by the U.S. military for activities related to World War II. Further, the assessment interviewees were not aware of any cultural activities that occurred in the project area.

In addition, cultural considerations were examined through personal interview with Mr. Leslie Kuloloio, who grew up in this area of Makena. According to Mr. Kuloloio, during his growing years, the property was owned by the Kailua Lono family who were known for their fishing knowledge and skills. Their connections to area fishing can be historically linked to their roles as caretakers of the *Hale Mano*, which is located in waters off of the Kealawai Church. The family, for generations, was respected not only for their fishing and diving expertise and as caretakers of *Hale Mano*, but also their generosity to the community.

Mr. Kuloloio noted that the property lies makai of the Kalani Heiau and further notes the property's proximity to the King's Trail (Makena-Keoneoio). However, as confirmed by the archaeological inventory survey, there are no surface archaeological features of significance which distinguished this property from others.

Mr. Kuloloio noted that an important natural resource in this area of Makena is the white sand beach which lies across the subject property. Known as *Naupaka*, this beach provided the context for the area's historical value as a place of fishing.

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It is in this light that he characterizes the families of earlier generations living in this area of Makena as highly responsible caretakers of the land and ocean.

**B. SOCIO-ECONOMIC ENVIRONMENT**

**1. Land Use and Community Character**

The project site is located along Maui's southwest coast which includes the community of Kihei and the master-planned resorts of Wailea and Makena. Kihei is an active visitor destination which includes several commercial centers and an expanding residential core. The resort communities of Wailea and Makena are home to several world-class hotels including the nearby Maui Prince Hotel, single-family and multi-family resort residential units, golf courses and tennis centers, and the recently completed Shops at Wailea commercial facility.

From a regional standpoint, the subject parcel is part of the Kihei-Makena Community Plan region which extends from Maalaea to LaPerouse Bay. The town of Kihei serves as the commercial and residential core of the region, with Wailea and Makena serving as the focal point for visitor activities.

**2. Population**

The population of Maui has exhibited relatively strong growth over the past decade, with the 2000 population reflecting a count of 117,644, a 28.8 percent increase over the 1990 population of 91,361 (SMS, 2002).

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Just as the island's population has grown, the resident population of the Kihei-Makena region has increased in the last two decades. Population gains were especially pronounced in the 1970's as the rapidly developing visitor industry attracted many new residents. The 1990 resident population of the Kihei-Makena region was approximately 15,365. The year 2000 population for Kihei was 22,870, reflecting an increase of 48.8 percent (SMS, 2002).

3. **Economy**

The economy of Maui is heavily dependent upon the visitor industry. In 2003, Maui was frequented by 2.1 million visitors (Maui County Data Book 2004). The dependency on the visitor industry is especially evident in Kihei-Makena, which is one of the State's major Resort destination areas. The Four Seasons Resort-Maui, the Grand Wailea Resort Hotel & Spa, the Kea Lani Hotel, and the Maui Prince Hotel have continued to reinforce the region's status as a premier resort destination.

The strength of the visitor industry in this region is reflected in hotel industry employment counts. Within the Kihei-Makena region, employment in the hotel industry accounted for 30 percent, or 4,166 of the region's 14,002 total jobs. Projected hotel industry employment for this region is estimated to be 4,116 and 4,167 in the years 2005 and 2010, respectively (SMS, 2002).

As of February 2006, the unemployment rate for Maui County and the island of Maui were estimated at 2.2 percent (State Department of Labor and Industrial Relations, April 2006).

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C. **PUBLIC SERVICES**

1. **Police and Fire Protection**

The Maui Police Department (MPD) headquarters is located at its Wailuku Station. The Wailuku Station, which services the Kihei-Makena subdistrict, is approximately twenty (20) miles northeast of Wailea, while the Department's Kihei substation is located in the Kihei Town Center, in the vicinity of Kalama Park. The Department's Kihei patrol covers the Kihei-Makena region.

Fire prevention, protection, and suppression services are provided by the Department of Fire and Public Safety (DFPS) Wailea Station situated approximately 3.5 miles north of the project site.

2. **Medical Facilities**

Maui Memorial Medical Center, the only major medical facility on the island, is approximately twenty (20) miles northeast of the project site. Operated by the Hawaii Health Systems Corporation, this hospital provides acute, emergency, and general care services. Several Kihei clinics, and dental and medical offices provide local health care services for Kihei-Makena residents and visitors.

3. **Recreational Facilities**

Many diverse recreational opportunities are available within the vicinity of the project site. Recreational facilities include the Wailea Resort's three (3) championship golf courses and its eleven (11) court tennis center. The Makena Resort is home to the Makena North and South Golf Courses as well as the Makena Tennis Club. A number of excellent, white sand beaches in the vicinity provide opportunities for diving, fishing, kayaking, surfing, swimming, and windsurfing. A public beach right-of-way, located across the street

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from the subject property provides access to the County's Maluaka Beach Park. Other shoreline resources in the Makena region include the Ahihi-Kinohiwa Natural Area Reserve, La Perouse Bay and Makena State Park.

4. **Schools**

The State Department of Education (DOE) operates three (3) public schools in the Kihei-Makena region. Kihei Elementary School, Kamali'i Elementary School and Lokelani Intermediate School are comprised of approximately 862, 716 and 795 students, respectively. Kihei Elementary School and Kamali'i Elementary School provide educational services for students from Kindergarten to Grade 5, while Lokelani Intermediate School provides instruction for students from Grades 6 to 8. The schools are located within the central Kihei area, north of the project site.

Students enrolled in Grades 9 to 12 attend Maui High School in Kahului.

Maui Community College, an institution of the University of Hawaii's higher education system, offers post-secondary education opportunities in Kahului.

5. **Solid Waste**

Single-family residential solid waste collection service is provided by the County of Maui on a twice-a-week basis in the South Maui area. Residential solid waste collected by County crews are disposed at the County's 55-acre Central Maui Landfill located four (4) miles southeast of the Kahului Airport. In addition to County-

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collected refuse, the Central Maui Landfill accepts commercial waste from private collection companies.

**D. INFRASTRUCTURE**

**1. Roadways**

The major routes servicing the Makena area are South Kihei Road and Piilani Highway. Wailea Ike Drive extends from Piilani Highway and serves as the main entrance into the Wailea Resort area. This four-lane roadway intersects Wailea Alanui near the Shops at Wailea shopping complex. Wailea Alanui is a four-lane divided parkway which carries traffic north-south through Wailea. This parkway intersects with Kaukahi Street approximately one mile south of its intersection with Wailea Ike Drive. Wailea Alanui becomes Makena Alanui Road south of its intersection with Kaukahi Street. Makena-Keoneoio Road intersects Makena Alanui in the vicinity of the Makena Surf condominium project. Following Makena-Keoneoio Road, the subject property lies approximately 0.8 mile south of its intersection with Makena Alanui.

**2. Water**

There are four (4) existing 3/4-inch and one (1) 1-inch water meters located on the project site. The water system in the area consists of an 8-inch waterline located within Makena-Keoneoio Road. This 8-inch line serves properties along the makai (west) side of Old Makena Road.

**3. Wastewater**

There is no County wastewater collection service in this vicinity of the Wailea-Makena region. It is noted, however, that a new private wastewater collection system is being implemented by the Makena

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station located across the Keawalai Church, to the north of the subject property.

4. **Drainage**

Currently, runoff generated from the subject project sheet flows from east to west, on to Makena-Keoneoio Road. Runoff then sheet flows in a southerly direction along Makena-Keoneoio Road to a low lying area situated on TMK (2) 2-1-007:4. It is estimated that the existing 50-year storm runoff from the project site is 1.9 cubic feet per second (cfs). See Appendix "C".

5. **Electrical, Telephone and CATV Systems**

Electrical, telephone, and cable television (CATV) services to the Makena region are provided by Maui Electric Company, Hawaiian Telcom, and Oceanic Time Warner Cable, respectively.

# ***Chapter iii***

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## ***Potential Impacts and Mitigation Measures***



### **III. POTENTIAL IMPACTS AND MITIGATION MEASURES**

#### **A. IMPACTS TO THE PHYSICAL ENVIRONMENT**

##### **1. Surrounding Land Uses**

The proposed project is not anticipated to cause any adverse impact to surrounding land uses. There are existing single-family residential uses to the north of the proposed property, providing a compatible land use environment for the proposed action. Lands to the south of the property are occupied by the Maui Prince Hotel, while a public beach right-of way is located across the street. The four (4) proposed single-family units would be in keeping with these land uses.

##### **2. Flooding and Tsunami Impacts**

Most of the subject property is located within "Zone C", which is defined as areas of minimal flooding. However, a small portion of the land along Makena-Keoneoio Road and adjacent to the shoreline is designated as "A4". This is an area of the 100-year flood and a base elevation of nine (9) feet above sea level. All future development plans will be designed to comply with applicable County flood hazard provisions.

##### **3. Flora and Fauna**

There are no known significant habitats or rare, endangered or threatened species of flora and fauna located within the project site. Therefore, the project is not anticipated to adversely impact the surrounding environmental features.

##### **4. Archaeological Resources**

One (1) site, designated as Site No. 50-50-14-4986, is located on the subject property. Refer to Appendix "A". Site features include

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a modified outcrop, rock pavements, walls and rock mounds. Data recovery for this site has been completed. Based on the close proximity to Kalani Heiau, small amounts of midden encountered, excavated branch coral and coral cobbles, early historic activities known to be present in the area, and previously documented results of excavations in the Makena region, it is considered possible that both pre-contact and early historic components are present on the subject property. The subject property has also been considered significant in terms of yielding research information related to the research of Hawaiian history and prehistory.

It is, therefore, recommended that a system of monitoring be incorporated during excavation activities of the subject property. In correspondence dated April 5, 2001, the State Historic Preservation Division has concurred with the archaeological inventory survey in its recommendation of monitoring for the project area to mitigate any future subsurface disturbances. See Appendix A-1. During construction, should any archaeological deposits be encountered, all work will be halted in the area, and the staff of the State Historic Preservation Division will be notified.

**5. Assessment of Cultural Impacts**

As previously noted, a cultural impact assessment was prepared for the subject project. Refer to Appendix "B". The assessment found that the project area was likely utilized for agricultural purposes, first with taro and breadfruit and later as part of sugarcane and ranching operations. In the 1940's the Makena area was utilized by the U.S. military for activities related to World

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War II. Interviews with individuals familiar with the project vicinity did not identify any cultural practices occurring on the property.

As such, the proposed four-unit residential project is not anticipated to have an impact on cultural activities.

6. **Air Quality and Noise**

The proposed action will involve construction activity which may be a source of airborne emissions and noise. Construction noise is attributable to operation of onsite equipment during the project construction period. Dust generated from the construction activities are generally attributed to clearing and grubbing activities. Construction equipment may also be a source of airborne emissions which would otherwise not be present at the site. To mitigate the impacts of dust during construction, Best Management Practices (BMPs) shall be incorporated in site construction activities in accordance with Chapter 20.08 of the Maui County Code. In addition, the contractor shall be responsible for properly maintaining vehicle and equipment engines to ensure their efficient operations. Finally, the contractor shall be required to comply with Hawaii Administrative Rules, Chapter 11-46 relating to "Community Noise Control". Construction activity will occur during daylight work hours. In the long term, the proposed action will not result in any adverse air quality or noise impacts.

7. **Scenic and Open Space Resources**

The proposed single-family condominium project is anticipated to complement the residential character of the surrounding environs, and is not anticipated to have an adverse impact upon scenic areas.

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**B. IMPACTS TO THE SOCIO-ECONOMIC ENVIRONMENT**

**1. Land Use and Community Character**

The proposed action is anticipated to complement existing residential and nearby resort uses in the Wailea-Makena area. From a land planning standpoint, the subject property provides an appropriate location for single-family residential use. The proposed project is in keeping with the general low density theme found along Makena-Keoneoio Road. In this regard, the proposed action is not anticipated to have an adverse impact upon surrounding uses and is considered compatible with existing land uses in the vicinity.

**2. Population and Local Economy**

The proposed action is anticipated to have a positive economic effect during the construction phase of development as expenditures for construction and related support services are made. In the longer term, the lot owners will contribute to the local economy through the payment of property taxes and through the purchases of goods and services.

The proposed project is not anticipated to have an adverse impact on population.

**C. IMPACTS TO PUBLIC SERVICES**

**1. Police, Fire and Medical Services**

The proposed project is not anticipated to affect the service capabilities of police, fire and emergency medical operations. The project will not extend the existing service area limits for emergency services.

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2. **Recreational Services and Educational Services**

The proposed project is not considered significant in terms of population generation. As such, the proposed improvements will not place any new demand on recreational activities. School enrollments or locations are not anticipated to be affected by the proposed action. As a result, no impacts to educational services are anticipated.

3. **Solid Waste Management**

Cleared and grubbed materials resulting from construction activities will be disposed or recycled at an acceptable construction waste disposal site. The four (4) single-family units, once completed, are not anticipated to have an adverse impact upon collection systems or landfill capacity.

D. **IMPACTS TO INFRASTRUCTURE**

1. **Roadways**

Access to the proposed project will be provided from Makena-Keoneoio Road. Two (2) driveway connections to Makena-Keoneoio Road will serve the single-family condominium units.

The traffic generated by the project are not anticipated to have adverse impacts to roadways operation along Makena-Keoneoio Road.

2. **Water**

Domestic water and fire flow for the proposed project will be provided by the County's potable water system which serves the region. Water service to the proposed project will be provided by the existing 8-inch waterline within Makena-Keoneoio Road.

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While the project is not anticipated to adversely impact regional water service requirements, water system requirements will be coordinated with the Department of Water Supply to ensure that adequate supply is available at the time of development.

3. Wastewater

Each of the single-family dwelling units will be served by an individual wastewater system, approved by the State Department of Health.

4. Drainage

Grading for the project will involve excavation and embankment for the construction of project improvements. Refer to Appendix "C". Erosion control measures and Best Management Practices (BMPs) will be implemented during the construction period to minimize soil loss and erosion. A detailed grading and erosion control plan will be prepared in accordance with County standards and will be submitted to the County Department of Public Works and Waste Management for review and approval. Should it be required, an application for a National Pollutant Discharge Elimination System (NPDES) permit will be submitted to the State Department of Health for review and approval.

Onsite runoff will sheet flow into grated catch basins and be diverted to an onsite underground subsurface drainage system. Project improvements will increase the 50-year storm runoff from 1.9 cfs to 4.0 cfs. The improved drainage system will be designed to accommodate the net increase of 2.1 cfs. No additional runoff generated from the proposed improvements will flow onto Makena-Keoneio Road or the existing low lying area on TMK (2) 2-1-

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007:4. All project related improvements will be designed in accordance with Chapter 4, "Rules for the Design of Storm Drainage Facilities in the County of Maui". The proposed project is not anticipated to adversely impact the drainage patterns of the subject parcel and adjoining or downstream properties.

5. **Electrical, Telephone, and CATV Systems**

Existing electrical lines are suspended from utility poles along the subject property's frontage on Makena-Keoneoio Road. The existing overhead power lines will be replaced with an underground system along the property's roadway frontage.

The installation of electrical and telephone systems for the project will be coordinated with Maui Electric Company and Hawaiian Telcom, respectively. Cable television connections will be coordinated with Oceanic Time Warner Cable.

**E. CUMULATIVE AND SECONDARY IMPACTS**

Cumulative impacts are defined as the impact on the environment which results from the incremental impact of action when added to other past, present and reasonably foreseeable future actions regardless of what agency or person undertakes such actions.

Secondary impacts are impacts that have the potential to occur later in time or are farther in distance but are still reasonably foreseeable. They can be viewed as actions of others that are taken because of the presence of the project. Secondary impacts from highway projects can occur, for example, because they can induce development by removing one of the impediments to growth - transportation access.

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In relation to the proposed four-unit single-family condominium project, there are no major cumulative impacts anticipated. It is noted that the project site is designated for Hotel use by the Kihei-Makena Community Plan, however, the proposed project is significantly less dense than what is allowable on the property. The four-unit project will provide onsite mitigation for anticipated drainage impacts and provides for the installation of underground utilities. The proposed project is not anticipated to generate a significant traffic impact to Makena-Keoneoio Road.

No secondary impacts are anticipated with the proposed project as improvements provided by the project will be constructed to serve the four (4) single-family units. There are existing urban uses in the surrounding area with the Maui Prince Hotel located further south and the Keawala Church located to the west, beyond Makena-Keoneoio Road.



# **Chapter IV**

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***Relationship to Governmental  
Plans, Policies and Controls***

#### **IV. RELATIONSHIP TO GOVERNMENTAL PLANS, POLICIES AND CONTROLS**

##### **A. STATE LAND USE DISTRICTS**

Pursuant to Chapter 205, Hawaii Revised Statutes, all lands in the State have been placed into one (1) of four (4) land use districts by the State Land Use Commission. These land use districts have been designated "Urban", "Rural", "Agricultural", and "Conservation".

The project site is classified "Agricultural". See Figure 11. A District Boundary Amendment (DBA) request for classification from the "Agricultural" District to the "Urban" District was filed for the project site in 2001. Subsequently, the County Department of Planning determined that a Community Plan Amendment to establish the Single-Family land use designation is appropriate. As such, this Draft EA has been prepared for the Community Plan Amendment. Therefore, the DBA action is being held in abeyance until the environmental review process is complete.

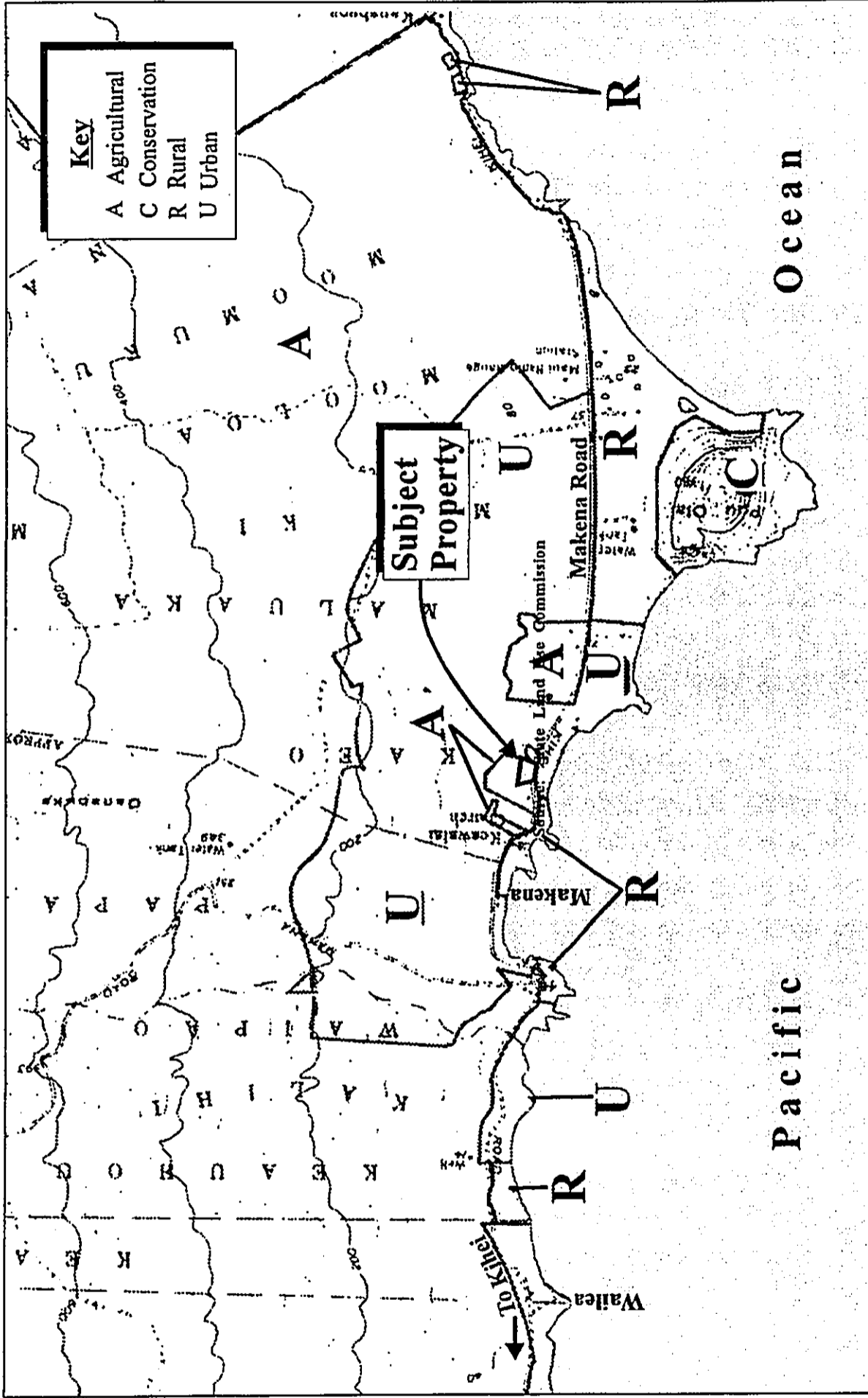
##### **B. LAND USE COMMISSION RULES, CHAPTER 15-15, HAWAII ADMINISTRATIVE RULES**

The proposed reclassification of the subject property is in conformance with the following standards of the Urban District set forth in Chapter 15-15-18, Hawaii Administrative Rules:

###### **Chapter 15-15-18**

- (1) It shall include lands characterized by "city-like" concentrations of people, structures, streets, urban level of services and other related land uses.

**Comment:** The proposed project is surrounded with single-family uses to the immediate north along Makena Road. The Maui Prince Hotel is located to the south of the property. Existing single-family



**Figure 11 Proposed Four-Unit Single-Family Condominium at Makena, Maui**  
 State Land Use Classifications



Prepared for: Pacific Rim Land Inc.



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and hotel land uses have established an appropriate land use context for a proposed four (4) unit single-family condominium.

- (2) It shall take into consideration the following specific factors:
- A. Proximity to centers of trading and employment except where the development would generate new centers of trading and employment.

**Comment:** The subject property is located within close proximity of the Wailea Resort area, complete with hotels, condominiums, shopping facilities, as well as golf and tennis recreational facilities. In addition, the proposed project is located within close proximity (approximately 3 miles) of the Kihei region, which provides convenient access to services and employment in Kihei town areas.

- B. Availability of basic services such as schools, parks, wastewater systems, solid waste disposal, drainage, water, transportation systems, public utilities, and police and fire protection.

**Comment:** Basic infrastructure services, including roadways, water, and electrical/telephone lines are available in close proximity to the project as established by existing residential and hotel uses immediately surrounding the subject property. Police services are provided by the Kihei Substation located at the Kihei Town Center, while fire protection services are provided by the Wailea Fire Station, located at the north end of the Wailea Resort.

- C. Sufficient reserve areas for foreseeable urban growth.

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**Comment:** The area of the proposed reclassification utilizes 1.552 acres for single-family residential purposes. Development of the subject property should not significantly affect reserve areas for urban growth.

- (3) It shall include lands with satisfactory topography, drainage, and reasonably free from the danger of any flood, tsunami, unstable soil condition, and other adverse environmental effects.

**Comment:** The subject property slopes from the mauka to makai direction. Drainage improvements will be constructed to County standards to accommodate additional flows resulting from the proposed four (4) unit single family condominium. A majority of the property is located within "Zone C", an area of minimal flooding, while a small portion of the property at its southwest extent, is designated "Zone A4", an area of 100-year flooding, with a base elevation of nine (9) feet above sea level. The project site is not subject to coastal flooding and unstable soil conditions.

- (4) Land contiguous with existing urban areas shall be given more consideration than non-contiguous land, and particularly when indicated for future urban use on state or county general plans.

**Comment:** Lands pertaining to the subject request are contiguous to areas already in the Urban District.

- (5) It shall include lands in appropriate locations for new urban concentrations and shall give consideration to areas of urban growth as shown on the state and county general plans.

**Comment:** With the exception of TMK 2-1-07:67, which establishes the subject property's east and west boundary lines, surrounding nearby properties are designated for urban-related

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uses. The subject property is designated by the Kihei-Makena Community Plan as "Hotel".

- (6) It may include lands which do not conform to the standards in paragraphs (1) to (5):
- A. When surrounded by or adjacent to existing urban development; and
  - B. Only when those lands represent a minor portion of this district

**Comment:** The subject property conforms with standards in paragraphs (1) to (5). Moreover, the proposed project site represents a very small percentage of the Agricultural District acreage on the island of Maui.

- (7) It shall not include lands, the urbanization of which will contribute toward scattered spot urban development, necessitating unreasonable investment in public infrastructure or support services.

**Comment:** The proposed reclassification does not contribute to scattered spot urban development. It is adjacent to existing single-family residences along Makena-Keoneoio Road as well as the Maui Prince Resort. The proposed development will not necessitate unreasonable public investment in infrastructural facilities or public services. The applicant will comply with applicable requirements for the provision of infrastructural facilities.

- (8) It may include lands with a general slope of twenty percent or more if the commission finds that those lands are desirable and suitable for urban purposes and that the design and construction controls, as adopted by any federal, state or county agency, are adequate to protect the public health, welfare and safety, and the public's interest in the aesthetic quality of the landscape.

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**Comment:** The area of the proposed reclassification contains an average slope of approximately 10 percent, significantly less than 20 percent.

**C. GENERAL PLAN OF THE COUNTY OF MAUI**

The General Plan of the County of Maui (1990 Update) sets forth broad objectives and policies to help guide the long-range development of the County. As stated in the Maui County Charter:

*... indicate desired population and physical development patterns for each island within the county; shall address the unique problems and needs of each island and region within the county; shall explain the opportunities and the social, economic, and environmental consequences related to potential developments; and shall set forth the desired sequence, patterns, and characteristics of future developments. The general plan shall identify objectives to be achieved, and priorities, policies and implementing actions to be pursued with respect to population density, land use maps, land use regulations, transportation systems, public and community facility locations, waster and sewage systems, visitor destinations, urban design and other matters related to development.*

The proposed action is in keeping with the following General Plan objectives and policies:

**Objectives:**

- To preserve for present and future generations existing geographic, cultural and traditional community lifestyles by limiting and managing growth through environmentally sensitive and effective use of land in accordance with the individual character of the various communities and regions of the County.
- To see that all developments are well designed and in harmony with their surroundings.

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**Policies:**

- Provide and maintain a range of land use districts sufficient to meet the social, physical, environmental and economic needs of the community.
- Encourage the construction of housing in a variety of price ranges and geographic locations.

**D. KIHEI-MAKENA COMMUNITY PLAN**

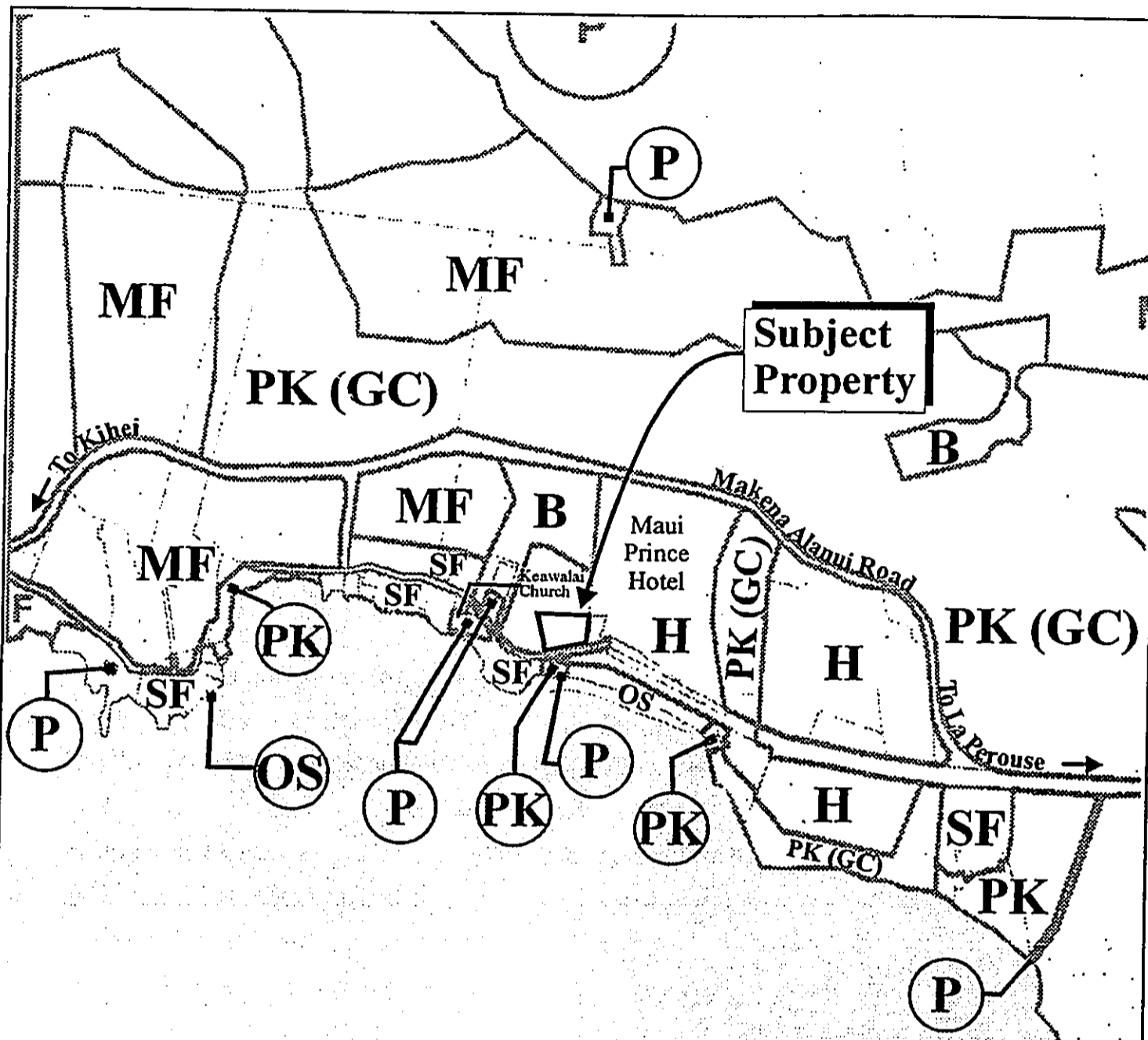
The subject parcel is located in the Kihei-Makena Community Plan region which is one (1) of nine (9) Community Plan regions established in the County of Maui. Planning for each region is guided by the respective Community Plans, which are designed to implement the General Plan of the County of Maui. Each Community Plan contains recommendations and standards which guide the sequencing, patterns and characteristics of future development in the region. Land use guidelines for the region are established by the Kihei-Makena Community Plan. The project site is designated "Hotel" in the Kihei-Makena Community Plan. See Figure 12. While the proposed development of the subject property is consistent with its Community Plan land use designation, a Community Plan Amendment request has been initiated by the County of Maui, Department of Planning to change the Community Plan designation from "Hotel" to "Single-Family". The proposed project is in conformance with the following goals, objectives and policies of the Kihei-Makena Community Plan:

**ENVIRONMENT**

**Goal**

Preservation, protection, and enhancement of Kihei-Makena's unique and fragile environmental resources.

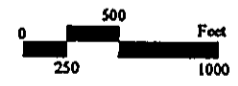




KEY	
B	Business/Commercial
H	Hotel
MF	Multi-Family Residential
OS	Open Space
PK	Park
PK(GC)	Park-Golf Course
P	Public/Quasi-Public
SF	Single-Family Residential

Source: County of Maui, Department of Planning

Figure 12 Proposed Four-Unit Single-Family  
 Condominium at Makena, Maui  
 Kihei-Makena Community Plan  
 Land Use Map



Prepared for: Pacific Rim Land Inc.

MUNEKIYO & HIRAGA, INC.

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**Objectives and Policies:**

- a. Maintain and enhance the long-term availability of shoreline resources for public enjoyment through adequate access, space, and facility provisions, and through on-going resource management programs.

**HOUSING AND URBAN DESIGN**

**Goal**

A variety of attractive, sanitary, safe and affordable homes for Kihei's residents, especially for families earning less than the median income for families within the County. Also, a built environment which provides complementary and aesthetically pleasing physical and visual linkages with the natural environment.

**Objectives and Policies:**

- a. Provide an adequate variety of housing choices and range of prices for the needs of Kihei's residents, especially for families earning less than the median income for families within the County, through the project district approach and other related programs. Choices can be increased through public/private sector cooperation and coordinated development of necessary support facilities and services.

**PHYSICAL AND SOCIAL INFRASTRUCTURE**

**Goal**

Provision of facility systems, public services and capital improvement projects in an efficient, reliable, cost effective, and environmentally sensitive manner which accommodates the needs of the Kihei-Makena community, and fully support present and planned land uses, especially in the case of project district implementation.

Allow no development for which infrastructure may not be available concurrent with the development's impacts.

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**DRAINAGE**

**Objective and Policy**

- a. Design drainage systems that protect coastal water quality by incorporating best management practices to remove pollutants from runoff. Construct and maintain, as needed, sediment retention basins and other best management practices to remove sediments and other pollutants from runoff.

**E. ZONING**

The subject property is identified by TMK 2-1-07:66 and is zoned "Interim" by the County of Maui. In order to implement the proposed four (4) unit single family condominium, the applicant is seeking a change from the "Interim" zoning to "R-3, Residential" zoning. The proposed entitlement action would establish the required consistency with the new Kihei-Makena Community Plan designation of "Single-Family" being sought by the project.

**F. SPECIAL MANAGEMENT AREA**

The subject property is located within the County of Maui's Special Management Area. Pursuant to Chapter 205A, Hawaii Revised Statutes, and the Rules and Regulations of the Maui Planning Commission of the County of Maui, projects located within the SMA are evaluated with respect to SMA objectives, policies and guidelines.

This section addresses the project's relationship to applicable coastal zone management considerations, as set forth in Chapter 205A and the Rules and Regulations of the Maui Planning Commission.

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(1) **Recreational Resources**

**Objective:**

Provide coastal recreational opportunities accessible to the public.

**Policies:**

- (A) Improve coordination and funding of coastal recreational planning and management; and
- (B) Provide adequate, accessible, and diverse recreational opportunities in the coastal zone management area by:
  - (i) Protecting coastal resources uniquely suited for recreational activities that cannot be provided in other areas;
  - (ii) Requiring replacement of coastal resources having significant recreational value, including but not limited to surfing sites, fishponds, and sand beaches, when such resources will be unavoidably damaged by development; or requiring reasonable monetary compensation to the state for recreation when replacement is not feasible or desirable;
  - (iii) Providing and managing adequate public access, consistent with conservation of natural resources, to and along shorelines with recreational value;
  - (iv) Providing an adequate supply of shoreline parks and other recreational facilities suitable for public recreation;
  - (v) Ensuring public recreational use of county, state, and federally owned or controlled shoreline lands and waters having recreational value consistent with public safety standards and conservation of natural resources;
  - (vi) Adopting water quality standards and regulating point and non-point sources of pollution to protect, and where feasible, restore the recreational value of coastal waters;
  - (vii) Developing new shoreline recreational opportunities, where appropriate, such as artificial lagoons, artificial beaches, and artificial reefs for surfing and fishing; and
  - (viii) Encouraging reasonable dedication of shoreline areas with recreational value for public use as part of discretionary approvals or permits by the land use commission, board of land and natural resources,

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county planning commissions; and crediting such dedication against the requirements of Section 46-6, HRS.

**Response:** The proposed project is not anticipated to affect existing coastal recreational resources. Access to the shoreline areas will not be affected by the proposed action.

(2) **Historic Resources**

**Objective:**

Protect, preserve and, where desirable, restore those natural and manmade historic and prehistoric resources in the coastal zone management area that are significant in Hawaiian and American history and culture.

**Policies:**

- (A) Identify and analyze significant archeological resources;
- (B) Maximize information retention through preservation of remains and artifacts or salvage operations; and
- (C) Support state goals for protection, restoration, interpretation, and display of historic resources.

**Response:** The archaeological inventory survey recovered sufficient data to address potential impacts relating to walls and mounds found on the property (Site No. 50-50-14-4986). However, given the property's close proximity to the Kalani Heiau, as well as midden and branch coral and coral cobbles found at the site, a monitoring program is recommended for the property. The applicant will coordinate with the State Historic Preservation Division to ensure the implementation of an approved monitoring plan.

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(3) **Scenic and Open Space Resources**

**Objective:**

Protect, preserve and, where desirable, restore or improve the quality of coastal scenic and open space resources.

**Policies:**

- (A) Identify valued scenic resources in the coastal zone management area;
- (B) Ensure that new developments are compatible with their visual environment by designing and locating such developments to minimize the alteration of natural landforms and existing public views to and along the shoreline;
- (C) Preserve, maintain, and, where desirable, improve and restore shoreline open space and scenic resources; and
- (D) Encourage those developments which are not coastal dependent to locate in inland areas.

**Response:** The proposed project will be developed to ensure visual compatibility with the surrounding environs. The project is not anticipated to impact coastal and scenic open space resources.

(4) **Coastal Ecosystems**

**Objective:**

Protect valuable coastal ecosystems, including reefs, from disruption and minimize adverse impacts on all coastal ecosystems.

**Policies:**

- (A) Improve the technical basis for natural resource management;
- (B) Preserve valuable coastal ecosystems, including reefs, of significant biological or economic importance;
- (C) Minimize disruption or degradation of coastal water ecosystems by effective regulation of stream diversions, channelization, and similar land and water uses, recognizing competing water needs; and

- 
- (D) Promote water quantity and quality planning and management practices which reflect the tolerance of fresh water and marine ecosystems and prohibit land and water uses which violate state water quality standards.

**Response:** Improvements to the subject property are not expected to adversely impact coastal ecosystems. Drainage improvements shall be engineered to ensure that coastal water impacts are mitigated. Mitigative measures for soil erosion control will be implemented during and after construction.

(5) **Economic Uses**

**Objective:**

Provide public or private facilities and improvements important to the State's economy in suitable locations.

**Policies:**

- (A) Concentrate coastal dependent development in appropriate areas;
- (B) Ensure that coastal dependent development such as harbors and ports, and coastal related development such as visitor facilities and energy generating facilities, are located, designed, and constructed to minimize adverse social, visual, and environmental impacts in the coastal zone management area; and
- (C) Direct the location and expansion of coastal dependent developments to areas presently designated and used for such developments and permit reasonable long-term growth at such areas, and permit coastal dependent development outside of presently designated areas when:
- (i) Use of presently designated locations is not feasible;
  - (ii) Adverse environmental effects are minimized; and
  - (iii) The development is important to the State's economy.

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**Response:** The proposed four (4) unit single-family condominium will support short-term construction and construction-related jobs. The project area does not affect coastal development necessary to the State's economy. The project is in keeping with the land use patterns established by the Kihei-Makena Community Plan.

(6) **Coastal Hazards**

**Objective:**

Reduce hazard to life and property from tsunami, storm waves, stream flooding, erosion, subsidence and pollution.

**Policies:**

- (A) Develop and communicate adequate information about storm wave, tsunami, flood, erosion, subsidence, and point and nonpoint source pollution hazards;
- (B) Control development in areas subject to storm wave, tsunami, flood, erosion, hurricane, wind, subsidence, and point and nonpoint pollution hazards;
- (C) Ensure that developments comply with requirements of the Federal Flood Insurance Program;
- (D) Prevent coastal flooding from inland projects; and
- (E) Develop a coastal point and nonpoint source pollution control program.

**Response:** The property lies within "Zone C" and "A4", which are defined as areas of minimal flooding and areas of a 100-year flood (base flood elevation of 9 feet above sea level), respectively. It is noted that changes in drainage patterns are not anticipated with the construction of the proposed improvements and no adverse drainage impacts to surrounding properties are anticipated. A drainage and soil erosion control plan shall be prepared and submitted in connection with the project's review and approval process. Appropriate drainage measures will be implemented to



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ensure that downstream and adjacent properties will not be adversely impacted.

(7) **Managing Development**

**Objective:**

Improve the development review process, communication, and public participation in the management of coastal resources and hazards.

**Policies:**

- (A) Use, implement, and enforce existing law effectively to the maximum extent possible in managing present and future coastal zone development;
- (B) Facilitate timely processing of applications for development permits and resolve overlapping of conflicting permit requirements; and
- (C) Communicate the potential short and long-term impacts of proposed significant coastal developments early in their life-cycle and in terms understandable to the public to facilitate public participation in the planning and review process.

**Response:** In compliance with Title 19 of the Maui County Code, the Rules of Practice and Procedures for the Maui Planning Commission and the Special Management Area Rules for the Maui Planning Commission, required documentation for the project was filed with the County Department of Planning and followed a process of public review, public hearing, and decision by the Maui Planning Commission (MPC). The proposed project's DBA, CPA and CIZ applications were reviewed and approval was recommended by the MPC at its regular meeting on January 8, 2002. Agency comments were received during the initial project review. See Appendix "D". In discussion with the Planning Department, the Director of Planning initiated the CPA request for the subject property.

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(8) **Public Participation**

**Objective:**

Stimulate public awareness, education, and participation in coastal management.

**Policies:**

- (A) Maintain a public advisory body to identify coastal management problems and to provide policy advice and assistance to the coastal zone management program;
- (B) Disseminate information on coastal management issues by means of educational materials, published reports, staff contact, and public workshops for persons and organizations concerned with coastal-related issues, developments, and government activities; and
- (C) Organize workshops, policy dialogues, and site-specific mediations to respond to coastal issues and conflicts.

**Response:** Opportunity for public awareness, education and participation pertaining to significant resource attributes of the coastal zone is provided through the Special Management Area and land use entitlements procedures. A public hearing on the proposed DBA, CPA and CIZ request was completed on January 8, 2002 with the Maui Planning Commission. Following the land use entitlement process, the applicant's SMA application will be considered for action by the Maui Planning Commission.

(9) **Beach Protection**

**Objective:**

Protect beaches for public use and recreation.

**Policies:**

- (A) Locate new structures inland from the shoreline setback to conserve open space and to minimize loss of improvements due to erosion;

- 
- (B) Prohibit construction of private erosion-protection structures seaward of the shoreline, except when they result in improved aesthetic and engineering solutions to erosion at the sites and do not interfere with existing recreational and waterline activities; and
  - (C) Minimize the construction of public erosion-protection structures seaward of the shoreline.

**Response:** The proposed project will not impact shoreline activities. No adverse impact to beach processes is anticipated.

**(10) Marine Resources**

**Objective:**

Implement the State's ocean resources management plan.

**Policies:**

- (A) Exercise an overall conservation ethic, and practice stewardship in the protection, use, and development of marine and coastal resources;
- (B) Assure that the use and development of marine and coastal resources are ecologically and environmentally sound and economically beneficial;
- (C) Coordinate the management of marine and coastal resources and activities management to improve effectiveness and efficiency;
- (D) Assert and articulate the interests of the State as a partner with federal agencies in the sound management of ocean resources within the United States exclusive economic zone;
- (E) Promote research, study, and understanding of ocean processes, marine life, and other ocean resources in order to acquire and inventory information necessary to understand how ocean development activities relate to and impact upon ocean and coastal resources; and
- (F) Encourage research and development of new, innovative technologies for exploring, using, or protecting marine and coastal resources.

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**Response:** Improvements to the subject property will not adversely impact ocean resources. The proposed project is not anticipated to affect marine and coastal resources.

In addition to the foregoing objectives and policies, SMA permit review criteria pursuant to Act 224 provides that:

No special management area use permit or special management area minor permit shall be granted for structures that allow artificial light from floodlights, uplights, or spotlights used for decorative or aesthetic purposes when the light:

- (1) Directly illuminates the shoreline and ocean waters; or
- (2) Is directed to travel across property boundaries toward the shoreline and ocean waters.

In addressing light pollution issues, the proposed project's exterior site lighting will be carefully shielded and directed away from the shoreline and ocean water areas. Areas throughout the property where safety and security illumination is necessary, such as pathways, will be illuminated with fully shielded light sources. Special attention will be given to the placement of the fully shielded luminaires to avoid unnecessary trespass onto shoreline and ocean water areas as well as adjacent properties.

# **Chapter V**

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***Summary of Environmental  
Effects Which Cannot Be  
Avoided, and Irreversible and  
Irretrievable Commitment  
of Resources***

**V. SUMMARY OF ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED, AND IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES**

The proposed project will result in unavoidable construction-related impacts which include noise-generated impacts occurring from the proposed improvements. In addition, there may be temporary air quality impacts associated with dust generated from site work and exhaust emissions discharged by construction equipment.

The development of the four (4) unit single-family condominium would involve the commitment of land for the proposed action. However, this commitment is consistent with the existing "Hotel" land use designation established for the property by the Kihei-Makena Community Plan, as well as the proposed "Single-Family" designation sought by the current request.

There are no other significant irreversible and irretrievable commitment of resources associated with the proposed action, nor are there any significant, long-term adverse environmental effects anticipated.

# ***Chapter VI***

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## ***Alternatives Analysis***

## **VI. ALTERNATIVE ANALYSIS**

### **A. NO ACTION ALTERNATIVE**

Alternative A is the no action or no build alternative. The project site was formerly occupied by a dilapidated dwelling unit, two (2) make shift sheds and a temporary garage. The remainder of the site is vacant and is primarily vegetated with kiawe and introduced weeds and grasses. The no action or no build alternative would involve a continuation of the underutilized and unmaintained nature of the property. The no action alternative is not considered a viable scenario in the context of the property's established land use allocation set forth by the Kihei-Makena Community Plan.

### **B. SITE DESIGN ALTERNATIVES**

A number of site design alternatives were evaluated to ensure that site development constraints were adequately addressed. For example, an early design concept called for a single driveway off of Makena-Keoneoio Road to serve the four (4) units. However, topographic, functional and dimensional considerations made the dual driveway alternative preferable. The proposed site plan is considered optimum in terms of the foregoing criteria.



# ***Chapter VII***

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***Anticipated Determination  
and Findings and Reasons  
Supporting the Determination***

## **VII. ANTICIPATED DETERMINATION AND FINDINGS AND REASONS SUPPORTING THE DETERMINATION**

The significance criteria of Section 12, of the Administrative Rules of Title 11, Chapter 200, "Environmental Impact Statement Rules", were reviewed and analyzed to determine whether the proposed action will have adverse impacts to the environment.

1. **No Irrevocable Commitment to Loss or Destruction of any Natural or Cultural Resources Would Occur as a Result of the Project**

The project will not result in any adverse environmental impacts. There are no known, rare, threatened, or endangered species of flora, fauna or avifauna located within the project site.

As previously noted, an archaeological inventory survey was completed on the project site. The survey recovered sufficient data to address potential impacts relating to walls and mounds found on the property (Site No. 50-50-14-4986). However, given the property's close proximity to the Kalani Heiau, as well as midden and coral cobbles found at the site, an archaeological monitoring plan was prepared for the project. The applicant has submitted the plan for review and approval by the State Historic Preservation Division (SHPD). Upon approval, the applicant will implement the archaeological monitoring plan during ground-altering activities.

2. **The Proposed Action Would Not Curtail the Range of Beneficial Uses of the Environment**

The proposed project and the commitment of land resources would not curtail the range of beneficial uses of the environment.

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3. **The Proposed Action Does Not Conflict with the State's Long-Term Environmental Policies or Goals or Guidelines as Expressed in Chapter 344, Hawaii Revised Statutes**

The State's Environmental Policy and Guidelines are set forth in Chapter 344, Hawaii Revised Statutes. The proposed action does not contravene provisions of Chapter 344, Hawaii Revised Statutes.

4. **The Economic or Social Welfare of the Community or State Would Not Be Substantially Affected**

The proposed project will have a beneficial impact on the local economy during construction. No adverse impacts to the economic or social welfare of the community or state are anticipated.

5. **The Proposed Action Does Not Affect Public Health**

No adverse impacts to the public's health and welfare are anticipated as a result of the proposed project. The proposed four-unit single-family condominium project will include subsurface drainage improvements to mitigate any additional anticipated runoff.

6. **No Substantial Secondary Impacts, Such as Population Changes or Effects on Public Facilities are Anticipated**

No major population changes are anticipated as a result of the four-unit single-family residential project.

From a land use standpoint, the proposed project is in keeping with the objectives and policies of the Kihei-Makena Community Plan. The proposed project complements and is compatible with surrounding land uses.

No significant adverse impacts to water and wastewater capacities and facilities are anticipated.

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7. **No Substantial Degradation of Environmental Quality is Anticipated**

During the construction phase of the project, there will be short-term air quality and noise impacts as a result of the project. In the long term, effects upon air quality and ambient noise levels should be minimal. The project is not anticipated to significantly affect the open space and scenic character of the area.

No substantial degradation of environmental quality resulting from the project is anticipated.

8. **The Proposed Action Does Not Involve a Commitment to Larger Actions, Nor Would Cumulative Impacts Result in Considerable Effects on the Environment**

The proposed action does not represent a commitment to larger actions. In addition, the proposed action is not expected to result in cumulative impacts that would adversely affect the environment.

9. **No Rare, Threatened or Endangered Species or Their Habitats Would Be Adversely Affected By the Proposed Action**

There are no rare, threatened or endangered species of flora, fauna or avifauna that will be adversely affected by the proposed action.

10. **Air Quality, Water Quality or Ambient Noise Levels Would Not Be Detrimentially Affected by the Action**

Construction activities will result in short-term air quality and noise impacts. Dust control measures, such as regular watering and sprinkling, will be implemented to minimize wind-blown emissions. Noise impacts will occur primarily from construction-related activities. It is anticipated that construction will be limited to daylight working hours. Water quality is not expected to be affected.

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In the long term, the project is not anticipated to have a significant impact on air, noise and water quality.

11. **The Proposed Project Would Not Affect Environmentally Sensitive Areas, Such as Flood Plains, Tsunami Zones, Erosion-prone Areas, Geologically Hazardous Lands, Estuaries, Fresh Waters or Coastal Waters**

The project is not located within and would not affect environmentally sensitive areas. As previously noted, a small portion of the property, adjacent to Makena-Keoneoio Road, is designated as Zone A4, areas of the 100-year flood. Development plans will be designed to comply with applicable County flood hazard provisions. Soils underlying the project site are not considered to be erosion-prone. There are no estuaries or coastal waters within or adjacent to the project site. As its closest point, the parcel is approximately 125 feet away from the shoreline.

12. **The Proposed Action Would Not Substantially Affect Scenic Views and Viewplanes Identified in County Plans or Studies**

The project site is not identified as a scenic vista or viewplane. The proposed project will not affect scenic corridors and coastal scenic and open space resources.

13. **The Proposed Action Would Not Require Substantial Energy Consumption**

The proposed project will involve the short-term commitment of fuel for equipment, vehicles, and machinery during construction activities. However, this use is not anticipated to result in a substantial consumption of energy resources.

Based on the foregoing findings, it is anticipated that the proposed action will not result in significant adverse impacts.

# ***Chapter VIII***

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***List of Permits  
and Approvals***

## **VIII. LIST OF PERMITS AND APPROVALS**

The following permits and approvals will be required prior to the implementation of the proposed four-unit residential project.

### **State of Hawaii**

1. NPDES permit (for stormwater discharge associated with construction activities)
2. Noise permit, as applicable

### **County of Maui**

1. District Boundary Amendment
2. Change in Zoning
3. Community Plan Amendment
4. Special Management Area Use Permit
5. Grading/Grubbing Permit
6. Building Permit

# ***Chapter IX***

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***Agencies Consulted During the  
Preparation of the Draft  
Environmental Assessment,  
Letters Received and Responses  
to Substantive Comments***



**IX. AGENCIES CONSULTED DURING THE PREPARATION OF THE DRAFT ENVIRONMENTAL ASSESSMENT, LETTERS RECEIVED AND RESPONSES TO SUBSTANTIATE COMMENTS**

The following agencies were consulted during the preparation of the Draft Environmental Assessment. Agency comments and responses to substantive comments are also included in this section.

1. Ranae Ganske-Cerizo, Acting  
District Conservationist  
**Natural Resources Conservation Service**  
**U.S. Department of Agriculture**  
210 Imi Kala Street, Suite 209  
Wailuku, Hawaii 96793-2100
2. George Young, P.E.  
**Department of the Army**  
U.S. Army Engineer District, Hnl.  
Attn: Regulatory Branch  
Building 230  
Fort Shafter, Hawaii 96858-5440
3. Robert P. Smith  
Pacific Islands Manager  
**U. S. Fish and Wildlife Service**  
P.O. Box 50167  
Honolulu, Hawaii 96850
4. Chiyome L. Fukino, M.D., Director  
State of Hawaii  
**Department of Health**  
P.O. Box 3378  
Honolulu, Hawaii 96801
5. Herbert Matsubayashi  
District Environmental Health  
Program Chief  
State of Hawaii  
**Department of Health**  
54 High Street  
Wailuku, Hawaii 96793
6. Laura Thielen, Director  
State of Hawaii  
**Office of Planning**  
P. O. Box 2359  
Honolulu, Hawaii 96804
7. Denis Lau, Chief  
**Clean Water Branch**  
State of Hawaii  
**Department of Health**  
919 Ala Moana Blvd., Room 300  
Honolulu, Hawaii 96814
8. Peter T. Young, Chairperson  
State of Hawaii  
**Department of Land and Natural Resources**  
P. O. Box 621  
Honolulu, Hawaii 96809
9. Patricia Hamamoto, Superintendent  
State of Hawaii  
**Department of Education**  
P.O. Box 2360  
Honolulu, Hawaii 96804
10. Melanie Chinen, Administrator  
State of Hawaii  
**Department of Land and Natural Resources**  
**State Historic Preservation Division**  
601 Kamokila Blvd., Room 555  
Kapolei, Hawaii 96707
11. Rodney Haraga, Director  
State of Hawaii  
**Department of Transportation**  
869 Punchbowl Street  
Honolulu, Hawaii 96813  
cc: Fred Cajigal
12. Clyde Namu'o, Administrator  
**Office of Hawaiian Affairs**  
711 Kapiolani Boulevard, Suite 500  
Honolulu, Hawaii 96813

- 
13. Carl Kaupalolo, Chief  
County of Maui  
**Department of Fire and Public  
Safety**  
200 Dairy Road  
Kahului, Hawaii 96732
  14. Alice Lee, Director  
**Department of Housing and  
Human Concerns**  
200 South High Street  
Wailuku, Hawaii 96793
  15. Michael W. Foley, Director  
County of Maui  
**Department of Planning**  
250 South High Street  
Wailuku, Hawaii 96793
  16. Glenn Correa, Director  
County of Maui  
**Department of Parks and  
Recreation**  
700 Hali'a Nakoia Street, Unit 2  
Wailuku, Hawaii 96793
  17. Tom Phillips, Chief  
County of Maui  
**Police Department**  
55 Mahalani Street  
Wailuku, Hawaii 96793
  18. Milton Arakawa, Director  
County of Maui  
**Department of Public Works  
and Environmental Management**  
200 South High Street  
Wailuku, Hawaii 96793
  19. George Tengan, Director  
County of Maui  
**Department of Water Supply**  
200 South High Street  
Wailuku, Hawaii 96793
  20. Rudy Luuwai  
**Makena Homeowners Association**  
5100 Makena Road  
Kihei, Hawaii 96753

OCT 17 2005

United States Department of Agriculture

USDA

 NRCS Natural Resources  
Conservation Service

*Our People...Our Islands...In Harmony*

210 Iki Kala Street, Suite #209, Wailuku, HI 96793-2100

October 14, 2005

Mr. Michael T. Munekiyo, Project Manager  
Munekiyo & Hiraga  
305 High Street, Suite 104  
Wailuku, Hawaii 96793

Subject: Proposed 4-Unit Single-Family Condominium  
TMK (2) 2-1-07:66

Dear Mr. Munekiyo,


Design parking lot/driveways which will direct and capture run off to landscape areas..

Maintenance of temporary erosion control measures should be maintained and grubbing materials needs to be discarded correctly to reduce the impact of run off to the ocean

Native plants and groundcovers are highly recommended for this area to reduce water usage. Landscaping should be incorporated and coordinated with construction activities so that vegetated areas will be planted and irrigated as soon as possible.

Thank you for the opportunity to comment.

Sincerely,



Ranae Ganske-Cerizo  
District Conservationist



December 1, 2005

Ms. Ranae Ganske-Cerizo  
District Conservationist  
United States Department of Agriculture  
Natural Resources Conservation Service  
210 Imi Kala Street, Suite #209  
Wailuku, Hawaii 96793

SUBJECT: Proposed 4-Unit Single-Family Condominium at Tax Map Key (2)2-1-07:66, Makena, Maui, Hawaii


Dear Ms. Ganske-Cerizo:

Thank you for your letter of October 14, 2005, providing comments on the subject action. In response to your comments, we note the following.

1. A site drainage plan will be developed to ensure that additional runoff generated from the project is captured onsite. Preliminarily, an onsite retention area within proposed landscaped areas of the property is envisioned.
2. Appropriate Best Management Practices will be used to prevent discharge of site-generated runoff during construction to ocean waters.
3. Landscape planting materials will, to the extent practicable, utilize native species. Cleared and graded areas will be revegetated and irrigated, as soon as possible, to minimize erosion potential from these locations.

A copy of the Draft Environmental Assessment will be provided to your office for review and comment.

Very truly yours,

  
Michael T. Munekiyo, A.I.C.P.  
Project Manager

MTM:yp  
cc: John Maloney, Pacific Rim Land, Inc.  
F:\DATA\PacRim\BakNorth\rvcs.res.wpd

305 High Street, Suite 104 • Wailuku, Hawaii 96793 • ph: (808)244-2015 • fax: (808)244-8729 • [planning@mhinonline.com](mailto:planning@mhinonline.com)

environment  
planning  
government

NOV 04 2005



DEPARTMENT OF THE ARMY  
U. S. ARMY ENGINEER DISTRICT, HONOLULU  
FT. SHAFTER, HAWAII 96858-5440

REPLY TO  
ATTENTION OF

November 2, 2005

Regulatory Branch

File No. POH-2005-35-3

Mr. Michael T. Munekiyo  
Munekio & Hiraga, Inc.  
305 High Street, Suite 104  
Wailuku, Hawaii 96793

Dear Mr. Munekiyo:

This responds to your written request dated October 6, 2005 for comments on your draft environmental assessment (EA) preparation for a 4-unit single-family condominium at Makena, Maui Island, Hawaii (TMK: (2) 4-1-07: 066). We have reviewed the preliminary project information you submitted with respect to the Corps' authority to issue Department of the Army (DA) permits pursuant to Section 10 of the Rivers and Harbors Act (RHA) of 1899 (33 USC 403) and Section 404 of the Clean Water Act (CWA) (33 USC 1344).

Based on the information you submitted on behalf of the applicant, Pacific Rim Land Incorporated, it appears the proposed construction of a 4-unit condominium would not involve the discharge of dredge or fill material into waters of the United States, including wetlands. Based on this understanding, I have tentatively determined that a DA permit is not required. A final determination of permit requirements can be provided when project plans are developed and delineated with respect to any such water bodies that may be present. Please send us a copy of the DEA when it is available.

If you have questions regarding this preliminary jurisdictional determination, please contact Mr. Peter Galloway by phone at 468-8416, by fax at 438-0460, or by e-mail at [peter.c.galloway@usace.army.mil](mailto:peter.c.galloway@usace.army.mil). Please reference the above file number in future correspondence regarding this project.

Sincerely,

George P. Young, P.E.  
Chief, Regulatory Branch



December 1, 2005

George Young, P.E., Chief  
Regulatory Branch  
Department of the Army  
Building 230  
Fort Shafter, Hawaii 96858-5440

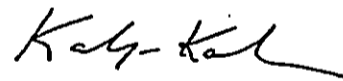
**SUBJECT:** Early Consultation for Draft Environmental Assessment for Proposed  
4-Unit Single-Family Condominium, TMK 2-1-07:066, Makena, Maui,  
Hawaii; File No. POH-2005-35-3

Dear Mr. Young:

We are in receipt of your comment letter dated November 2, 2005 on the subject project. On behalf of the applicant, Pacific Rim Land, Inc. (PRL), we would like to acknowledge your comment with the tentative determination that no DA permit will be required for the proposed project. A copy of the Draft Environmental Assessment will be sent to you for review upon completion.

Thank you for your comments. Should you have any further questions, please do not hesitate to call me at (808)244-2015.

Very truly yours,

  
Karlynn Kawahara, Planner

KK:lfm

cc: John Maloney, Pacific Rim Land, Inc.  
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OCT 21 2005

PHONE (808) 594-1888

FAX (808) 594-1865



**STATE OF HAWAII**  
**OFFICE OF HAWAIIAN AFFAIRS**  
711 KAPI'OLANI BOULEVARD, SUITE 500  
HONOLULU, HAWAII 96813

HRD05/2082

October 18, 2005

Michael T. Munekiyo  
Munekiyo and Haraga, Inc.  
305 High Street, Suite 104  
Wailuku, Hawaii, 96793

**RE: Proposed 4-Unit Single-Family Condominium, Mākena, Maui, TMK (2) 2-1-07: 66.**

Dear Mr. Munekiyo,

The Office of Hawaiian Affairs (OHA) is in receipt of your October 6, 2005 request for comment on the above listed proposed project, TMK (2) 2-1-07: 66. OHA offers the following comments:

OHA has no comment specific to the above listed pre-consultation request at this time. Please contact Thelma Shimaoka of OHA's Maui office as she may be able to further assist you in your consultation effort.

OHA further requests your assurances that if the project goes forward, should iwi or Native Hawaiian cultural or traditional deposits be found during ground disturbance, work will cease, and the appropriate agencies will be contacted pursuant to applicable law.

Thank you for the opportunity to comment. If you have further questions or concerns, please contact Jesse Yorck at (808) 594-0239 or [jessey@oha.org](mailto:jessey@oha.org).

Aloha,

A handwritten signature in black ink, appearing to read "Clyde W. Nāmu'o".

Clyde W. Nāmu'o  
Administrator



December 1, 2005

Clyde W. Namu`o, Administrator  
Office of Hawaiian Affairs  
711 Kapiolani Boulevard, Suite 500  
Honolulu, Hawaii 96813

**SUBJECT:** Early Consultation for Draft Environmental Assessment for Proposed  
4-Unit Single-Family Condominium, TMK 2-1-07:066, Makena, Maui,  
Hawaii

Dear Mr. Namu`o:

We are in receipt of your comments dated October 18, 2005, on the subject project. On behalf of the applicant, Pacific Rim Land, Inc. (PRL) we would like to offer the following response to your comment. We note your comment with regards to the consultation with the OHA Maui office. A cultural impact assessment is being prepared for the subject project. Ms. Shimaoka's contact information will be passed on to the cultural consultant. We also note your comment, that if there is a discovery of *iwi* or Native Hawaiian cultural or traditional deposits during ground altering activities, that appropriate agencies be contacted pursuant to applicable law.

Thank you for your comments. A copy of the Draft Environmental Assessment will be sent to you for review upon completion.

Should you have any further questions, please do not hesitate to call me at (808) 244-2015.

Very truly yours,

A handwritten signature in black ink, appearing to read "Kely-kel", is written above the name of the signatory.

Karlynn Kawahara, Planner

KK:yp

cc: John Maloney, Pacific Rim Land, Inc.  
F:\DATA\PacRim\BakNorth\oha.res.wpd



LINDA LINGLE  
GOVERNOR OF HAWAII



STATE OF HAWAII  
DEPARTMENT OF HEALTH  
MAUI DISTRICT HEALTH OFFICE  
54 HIGH STREET  
WAILUKU, MAUI, HAWAII 96793-2102

OCT 21 2005

CHIYOME L. FUKINO, M. D.  
DIRECTOR OF HEALTH  
LORRIN W. PANG, M. D., M. P. H.  
DISTRICT HEALTH OFFICER

October 20, 2005

Mr. Michael T. Munekiyo  
Project Manager  
Munekiyo & Hiraga, Inc.  
305 High Street, Suite 104  
Wailuku, Hawai'i 96793

Dear Mr. Munekiyo:

Subject: **Proposed 4-Unit Single-Family Condominium**  
**TMK: (2) 2-1-07:66**

Thank you for the opportunity to comment on the proposed condominium project. The following comments are offered:

1. National Pollutant Discharge Elimination System (NPDES) permit coverage is required for this project. The Clean Water Branch should be contacted at 808 586-4309.
2. The noise created during the construction phase of the project may exceed the maximum allowable levels set forth in Hawaii Administrative Rules, Chapter 11-46, "Community Noise Control". A noise permit may be required and should be obtained before the commencement of work.
3. HAR, Chapter 11-46 sets maximum allowable sound levels from stationary equipment such as compressors and HVAC equipment. The attenuation of noise from these sources may depend on the location and placement of these types of equipment. This should be taken into consideration during the planning, design, and construction of the building and installation of these types of equipment.
4. Wastewater disposal is a concern and should be adequately addressed.

Should you have any questions, please call me at 808 984-8230.

Sincerely,

A handwritten signature in black ink, appearing to read "Herbert S. Matsubayashi".

Herbert S. Matsubayashi  
District Environmental Health Program Chief



December 1, 2005

Herbert Matsubayashi  
District Environmental Health Program Chief  
Maui District Health Office  
Department of Health  
54 High Street  
Wailuku, Hawaii 96793

**SUBJECT:** Early Consultation for Draft Environmental Assessment for Proposed  
4-Unit Single-Family Condominium, TMK 2-1-07:066, Makena, Maui,  
Hawaii

Dear Mr. Matsubayashi:

We are in receipt of your comments dated October 20, 2005, on the subject project. On behalf of the applicant, Pacific Rim Land, Inc. (PRL) we would like to offer the following responses to your comments.

1. As applicable, a National Pollutant Discharge Elimination System (NPDES) permit will be sought for the project.
2. We note your comment regarding the possible need for a noise permit during construction. PRL will insure that all applicable permits are secured, prior to the start of construction.
3. We note your comment with regards to maximum sound levels for stationary equipment. Your comment has been forwarded to the architect for their information in the planning and design of the residential units.
4. We acknowledge your comment with regards to wastewater disposal. As proposed, each unit will be served by an individual wastewater system (IWS). The systems will be designed by an engineer licensed in the State of Hawaii, and plans will be submitted to the Department of Health for review and approval.

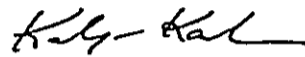
Thank you for your comments. A copy of the Draft Environmental Assessment will be sent to you for review upon completion.

environment  
planning

Herbert Matsubayashi  
December 1, 2005  
Page 2

Should you have any further questions, please do not hesitate to call me at 244-2015.

Very truly yours,



Karlynn Kawahara, Planner

KK:yp

cc: John Maloney, Pacific Rim Land, Inc.

F:\DATA\PacRim\BakNorth\dohmaui.res.wpd

10/20/2005

lori

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**From:** Jiakai Liu [JLiu@eha.health.state.hi.us]  
**Sent:** Thursday, October 20, 2005 2:29 PM  
**To:** planning@mhinonline.com  
**Subject:** Pre-Assessment Consultation Regarding Proposed 4-Unit Single-Family Condominium at Tax Map Key 2-1-07:66, Makena, Maui, Hawaii

Dear Mr. Munekiyo:

Thank you for allowing us to review the subject project. We offer Standard Comments at: <http://www.state.hi.us/health/environmental/env-planning/landuse/landuse.html> or clicking (Standard Comments) for pre-assessment consultation. We are looking forward to seeing the DEA and please send the document to our office at:

*Environmental Planning Office*  
Department of Health  
919 Ala Moana Blvd., Room 312  
Honolulu, Hawaii 96814

Thank you.

Jiakai Liu  
Land Use Review Coordinator  
Environmental Planning Office /DOH  
(808) 586-4346

10/20/2005

## Environmental Planning Office Standard Comments / Areas of Concern

Updated 9/15/05

The Environmental Planning Office (EPO) is responsible for several surface water quality management programs mandated by the federal Clean Water Act or dictated by State policy. (<http://www.state.hi.us/doh/eh/epo/wqm/wqm.htm>). Among these responsibilities, EPO:

- maintains the *List of Impaired Waters in Hawaii Prepared under Clean Water Act §303(d)* (<http://www.state.hi.us/doh/eh/epo/wqm/303dpcfinal.pdf>);
- develops and establishes Total Maximum Daily Loads (TMDLs) for listed waters (suggesting how much existing pollutant loads should be reduced in order to attain water quality standards, please see <http://www.epa.gov/owow/tmdl/intro.html>);
- writes TMDL Implementation Plans describing how suggested pollutant load reductions can be achieved; and
- conducts assessments of stream habitat quality and biological integrity.

### Standard Comments / Areas of Concern

To facilitate TMDL development and implementation, and to assist with our assessment of the potential impact of proposed actions upon water quality, pollutant loading, and biological resources in receiving waters, we suggest that environmental review documents, permit applications, and related submittals include the following standard information and analyses:

#### **Waterbody type and class**

1. Identify the waterbody type and class, as defined in Hawaii Administrative Rules Chapter 11-54 (<http://www.state.hi.us/health/about/rules/11-54.pdf>), of all potentially affected water bodies<sup>1</sup>.

#### **Existing water quality management actions**

2. Identify any existing National Pollutant Discharge Elimination System (NPDES) permits and related connection permits (issued by permittees) that will govern the management of water that runs off or is discharged from the proposed project site or facility. Please include NPDES and other permit numbers; names of permittees, permitted facilities, and receiving waters (including waterbody type and class as in 1. above); diagrams showing drainage/discharge pathways and outfall locations; and note any permit conditions that may specifically apply to the proposed project.
3. Identify any planning documents, groups, and projects that include specific prescriptions for water quality management at the proposed project site and in the potentially affected waterbodies. Please note those prescriptions that may specifically apply to the proposed project.

#### **Pending water quality management actions**

4. Identify all potentially affected water bodies that appear on the current *List of Impaired Waters in Hawaii Prepared under Clean Water Act §303(d)* including the listed waterbody, geographic scope of listing, and pollutant(s) (See Table 5 at <http://www.hawaii.gov/health/environmental/env-planning/wqm/303dpcfinal.pdf>).
5. If the proposed project involves potentially affected water bodies that appear on the current *List of Impaired Waters in Hawaii Prepared under Clean Water Act §303(d)*, identify and quantify expected changes in the following site and watershed conditions and characteristics:
  - surface permeability
  - hydrologic response of surface (timing, magnitude, and pathways)
  - receiving water hydrology
  - runoff and discharge constituents
  - pollutant concentrations and loads in receiving waters
  - aquatic habitat quality and the integrity of aquatic biota

Where TMDLs are already established they include pollutant load allocations for the surrounding lands and point source discharges. In these cases, we suggest that the submittal specify how the proposed project would contribute to achieving the applicable load reductions.

Where TMDLs are yet to be established and implemented, a first step in achieving TMDL objectives is to prevent any project-related increases in pollutant loads. This is generally accomplished through the proper application of suitable best management practices in all phases of the project and adherence to any applicable ordinances, standards, and permit conditions. In these cases we suggest that the submittal specify how the proposed project would contribute to reducing the polluted discharge and runoff entering the receiving waters, including plans for additional pollutant load reduction practices in future management of the surrounding lands and drainage/discharge systems.

#### **Proposed Action and Alternatives Considered**

We suggest that each submittal identify and analyze potential project impacts at a watershed scale by considering the potential contribution of the proposed project to cumulative, multi-project watershed effects on hydrology, water quality, and aquatic and riparian ecosystems.

We also suggest that each submittal broadly evaluate project alternatives by identifying more than one engineering solution for proposed projects. In particular, we suggest the consideration of "alternative," "soft," and "green" engineering solutions for channel modifications that would provide a more environmentally friendly and aesthetically pleasing channel environment and minimize the destruction of natural landscapes.

If you have any questions about these comments or EPO programs, please contact Jiakai Liu at 586-4346.

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<sup>1</sup>"Potentially affected waterbodies" means those in which proposed project activity would take place and any others that could receive water discharged by the proposed project activity or water flowing down from the proposed project site. These waterbodies can be presented as a chain of receiving waters whose top link is at the project site upslope and whose bottom link is in Pacific Ocean "oceanic waters," with all receiving waters named according to conventions established by Chapter 11-54 and the *List of Impaired Waters in Hawaii Prepared under Clean Water Act §303(d)*. For example, a recent project proposed for Nuhelewai Stream, Oahu (a tributary of Kapalama Canal) might potentially affect Nuhelewai Stream, Kapalama Canal, Honolulu Harbor and Shore Areas, and the Pacific Ocean.



December 1, 2005

Jiacai Liu, Land Use Review Coordinator  
Environmental Planning Office  
Department of Health  
919 Ala Moana Boulevard, Room 312  
Honolulu, Hawaii 96814

**SUBJECT:** Early Consultation for Draft Environmental Assessment for Proposed  
4-Unit Single-Family Condominium, TMK 2-1-07:066, Makena, Maui,  
Hawaii

Dear Mr. Liu:

We are in receipt of your comments dated October 20, 2005, on the subject project. On behalf of the applicant, Pacific Rim Land, Inc. (PRL) we would like to offer the following response to your comments. We note your standard comments with regards to water bodies and water quality management in the project area. Your comments will be incorporated into the Draft Environmental Assessment (DEA), as applicable to the project.

Thank you for your comments. A copy of the DEA will be sent to you for review upon completion.

Should you have any further questions, please do not hesitate to call me at (808)244-2015.

Very truly yours,

Karlynn Kawahara, Planner

KK:yp

cc: John Maloney, Pacific Rim Land, Inc.

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LINDA LINGLE  
GOVERNOR OF HAWAII



STATE OF HAWAII  
DEPARTMENT OF HEALTH  
P.O. BOX 3378  
HONOLULU, HAWAII 96801-3378

OCT 26 2005

CHIYOME L. FUKINO, M.D.  
DIRECTOR OF HEALTH

In reply, please refer to  
EMD / CWB

10085PKP.05

October 24, 2005

Mr. Michael T. Munekiyo, A.I.C.P.  
Project Manager  
Munekiyo & Hiraga, Inc.  
305 High Street, Suite 104  
Wailuku, Hawaii 96793

Dear Mr. Munekiyo:

**Subject: Proposed 4-Unit Single-Family Condominium at TMK: 2-1-007:066  
Makena, Maui, Hawaii**

The Department of Health (DOH), Clean Water Branch (CWB), acknowledges receipt of the subject document, dated October 3, 2005. The CWB has reviewed the limited information contained in the subject document and offers the following comments:

1. The Army Corps of Engineers should be contacted at (808) 438-9258 for this project. Pursuant to Federal Water Pollution Control Act (commonly known as the "Clean Water Act" (CWA) Paragraph 401(a)(1), a Section 401 Water Quality Certification (WQC) is required for "[a]ny applicant for Federal license or permit to conduct any activity including, but not limited to, the construction or operation of facilities, which may **result** in any discharge into the navigable waters..." (emphasis added). The term "discharge" is defined in CWA, Subsections 502(16), 502(12), and 502(6); Title 40, Code of Federal Regulations (CFR), Section 122.2; and Hawaii Administrative Rules (HAR), Chapter 11-54.
2. In accordance with HAR, Sections 11-55-04 and 11-55-34.05, the Director of Health may require the submittal of an individual permit application or a Notice of Intent (NOI) for general permit coverage authorized under the National Pollutant Discharge Elimination System (NPDES).
  - a. An application for an NPDES individual permit is to be submitted at least 180 days before the commencement of the respective activities. The NPDES application forms may also be picked up at our office or downloaded from our website at <http://www.hawaii.gov/health/environmental/water/cleanwater/forms/indiv-index.html>.

Mr. Michael T. Munekiyo, A.I.C.P.  
October 24, 2005  
Page 2

- b. An NOI to be covered by an NPDES general permit is to be submitted at least 30 days before the commencement of the respective activity. A separate NOI is needed for coverage under each NPDES general permit. The NOI forms may be picked up at our office or downloaded from our website at:  
<http://www.hawaii.gov/health/environmental/water/cleanwater/forms/genl-index.html>.
- i. Storm water associated with industrial activities, as defined in Title 40, CFR, Sections 122.26(b)(14)(i) through 122.26(b)(14)(ix) and 122.26(b)(14)(xi). [HAR, Chapter 11-55, Appendix B]
  - ii. Construction activities, including clearing, grading, and excavation, that result in the disturbance of equal to or greater than one (1) acre of total land area. The total land area includes a contiguous area where multiple separate and distinct construction activities may be taking place at different times on different schedules under a larger common plan of development or sale. **An NPDES permit is required before the commencement of the construction activities.** [HAR, Chapter 11-55, Appendix C]
  - iii. Discharges of treated effluent from leaking underground storage tank remedial activities. [HAR, Chapter 11-55, Appendix D]
  - iv. Discharges of once through cooling water less than one (1) million gallons per day. [HAR, Chapter 11-55, Appendix E]
  - v. Discharges of hydrotesting water. [HAR, Chapter 11-55, Appendix F]
  - vi. Discharges of construction dewatering effluent. [HAR, Chapter 11-55, Appendix G]
  - vii. Discharges of treated effluent from petroleum bulk stations and terminals. [HAR, Chapter 11-55, Appendix H]
  - viii. Discharges of treated effluent from well drilling activities. [HAR, Chapter 11-55, Appendix I]
  - ix. Discharges of treated effluent from recycled water distribution systems. [HAR, Chapter 11-55, Appendix J]
  - x. Discharges of storm water from a small municipal separate storm sewer system. [HAR, Chapter 11-55, Appendix K]
  - xi. Discharges of circulation water from decorative ponds or tanks. [HAR, Chapter 11-55, Appendix L]

Mr. Michael T. Munekiyo, A.I.C.P.  
October 24, 2005  
Page 3

3. In accordance with HAR, Section 11-55-38, the applicant for an NPDES permit is required to either submit a copy of the new NOI or NPDES permit application to the State Department of Land and Natural Resources, State Historic Preservation Division (SHPD), or demonstrate to the satisfaction of the DOH that the project, activity, or site covered by the NOI or application has been or is being reviewed by SHPD. If applicable, please submit a copy of the request for review by SHPD or SHPD's determination letter for the project.
4. Any discharges related to project construction or operation activities, with or without a Section 401 WQC or NPDES permit coverage, shall comply with the applicable State Water Quality Standards as specified in HAR, Chapter 11-54.

The Hawaii Revised Statutes, Subsection 342D-50(a), requires that "[n]o person, including any public body, shall discharge any water pollutants into state waters, or cause or allow any water pollutant to enter state waters except in compliance with this chapter, rules adopted pursuant to this Chapter, or a permit or variance issued by the director."

If you have any questions, please contact Mr. Alec Wong, Supervisor of the Engineering Section, CWB, at (808) 586-4309.

Sincerely,

  
DENIS R. LAU, P.E., CHIEF  
Clean Water Branch

KP:np



December 1, 2005

Denis Lau, Chief  
Clean Water Branch  
Department of Health  
P. O. Box 3378  
Honolulu, Hawaii 96801-3378

**SUBJECT:** Early Consultation for Draft Environmental Assessment for Proposed  
4-Unit Single-Family Condominium, TMK 2-1-07:066, Makena, Maui,  
Hawaii

Dear Mr. Lau:

We are in receipt of your comments dated October 24, 2005, on the subject project. On behalf of the applicant, Pacific Rim Land, Inc. (PRL) we would like to offer the following responses to your comments.

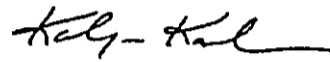
1. Early consultation comments were sought from the Army Corps of Engineers. In their early consultation comments, the Army Corps comments that preliminarily, no Department of Army permit would be needed for the project. Please see attached comment letter from the Army Corps.
2. We note your comment regarding the possible need for a National Pollutant Discharge Elimination System permit for the project. PRL will insure that all applicable permits are secured, prior to the start of construction.
3. We note your comment with regards to review of the project by the State Department of Land and Natural Resources' State Historic Preservation Division (SHPD). Early consultation comments were sought by SHPD. A copy of the SHPD determination letter can be submitted to your office for the project file.
4. We acknowledge your comment with regards to discharges from the project site. PRL will comply with the applicable State Water Quality Standards as specified in Hawaii Administrative Rules (HAR), Chapter 11-54.

Thank you for your comments. A copy of the Draft Environmental Assessment will be sent to you for review upon completion.

Denis Lau, Chief  
December 1, 2005  
Page 2

Should you have any further questions, please do not hesitate to call me at (808)244-2015.

Very truly yours,



Karlynn Kawahara, Planner

KK:yp  
Enclosure

cc: John Maloney, Pacific Rim Land, Inc. (w/enclosure)  
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NOV 04 2005



DEPARTMENT OF THE ARMY  
U. S. ARMY ENGINEER DISTRICT, HONOLULU  
FT. SHAFTER, HAWAII 96858-6440

REPLY TO  
ATTENTION OF

November 2, 2005

Regulatory Branch

File No. POH-2005-35-3

Mr. Michael T. Munekiyo  
Munekio & Hiraga, Inc.  
305 High Street, Suite 104  
Wailuku, Hawaii 96793

Dear Mr. Munekiyo:

This responds to your written request dated October 6, 2005 for comments on your draft environmental assessment (EA) preparation for a 4-unit single-family condominium at Makena, Maui Island, Hawaii (TMK: (2) 4-1-07: 066). We have reviewed the preliminary project information you submitted with respect to the Corps' authority to issue Department of the Army (DA) permits pursuant to Section 10 of the Rivers and Harbors Act (RHA) of 1899 (33 USC 403) and Section 404 of the Clean Water Act (CWA) (33 USC 1344).

Based on the information you submitted on behalf of the applicant, Pacific Rim Land Incorporated, it appears the proposed construction of a 4-unit condominium would not involve the discharge of dredge or fill material into waters of the United States, including wetlands. Based on this understanding, I have tentatively determined that a DA permit is not required. A final determination of permit requirements can be provided when project plans are developed and delineated with respect to any such water bodies that may be present. Please send us a copy of the DEA when it is available.

If you have questions regarding this preliminary jurisdictional determination, please contact Mr. Peter Galloway by phone at 468-8416, by fax at 438-0460, or by e-mail at [peter.c.galloway@usace.army.mil](mailto:peter.c.galloway@usace.army.mil). Please reference the above file number in future correspondence regarding this project.

Sincerely,

A handwritten signature in black ink, appearing to read "George P. Young".

George P. Young, P.E.  
Chief, Regulatory Branch

LINDA LINGLE  
GOVERNOR

OCT 26 2005  
PATRICIA HAMAMOTO  
SUPERINTENDENT



STATE OF HAWAII  
DEPARTMENT OF EDUCATION  
P.O. BOX 2360  
HONOLULU, HAWAII 96804

OFFICE OF THE SUPERINTENDENT

October 25, 2005

Mr. Michael T. Munekiyo, Project Manager  
Munekiyo & Hiraga Inc.  
305 High Street, Suite 104  
Wailuku, Hawai'i 96793

Dear Mr. Munekiyo:

SUBJECT: Early Consultation for a Four-Unit Condominium, Makena, Maui

The Department of Education has no comment to offer on the early consultation for the proposed four-unit, single-family condominium project at Makena, Maui.

If you have any questions, please call Rae Loui, Assistant Superintendent of the Office of Business Services, at 586-3444 or Heidi Meeker of the Facilities Development Branch at 733-4862.

Very truly yours,

A handwritten signature in cursive script that reads "Patricia Hamamoto".

Patricia Hamamoto  
Superintendent

PH:ly

cc: Rae Loui, Asst. Supt., OBS  
Kenneth Nomura, CAS, Baldwin/Kekaulike/Maui Complex Areas

OCT 24 2005

ALAN M. ARAKAWA  
Mayor

MICHAEL W. FOLEY  
Director

WAYNE A. BOTEILHO  
Deputy Director



COUNTY OF MAUI  
**DEPARTMENT OF PLANNING**

October 19, 2005

Mr. Michael Munekiyo  
Munekiyo & Hiraga, Inc.  
305 High Street, Suite 104  
Wailuku, HI 96793

Dear Mr. Munekiyo:

RE: Preconsultation Comments for the Proposed 4-Unit Single-Family  
Condominium located at Tax Map No. 2-1-007: 066, Makena,  
Island of Maui, Hawaii (LTR 2005/2722)

The Maui Planning Department (Department) is in receipt of your request for preconsultation comments in preparation of a Draft Environmental Assessment (DEA) for the proposed 4-unit, single-family condominium project located along Makena-Keoneoio Road on approximately 1.552-acre parcel identified as TMK No. 2-1-007: 066. The Department has no comments at this time.

Thank you for the opportunity to comment. Should you require further clarification, please contact Ms. Kivette Caigoy, Environmental Planner, at 270-7735.

Sincerely,

A handwritten signature in black ink, appearing to read "Mike Foley", is written over a faint, larger version of the signature.

MICHAEL W. FOLEY  
Planning Director

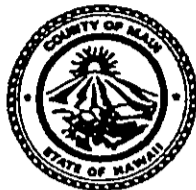
MWF:KAC:bv

c: Wayne A. Boteilho, Deputy Planning Director  
Clayton I. Yoshida, Planning Program Administrator  
Kivette A. Caigoy, Environmental Planner  
Colleen M. Suyama, Staff Planner  
Project File  
General File  
K:\WP\_DOCS\PLANNING\EA\PreConComments\2005\2722\_Makena4UnitSFCPA.wpd



OCT 31 2005

ALAN M. ARAKAWA  
Mayor



GLENN T. CORREA  
Director

JOHN L. BUCK III  
Deputy Director

**DEPARTMENT OF PARKS AND RECREATION**  
**Planning & Development Division**  
700 Hali'a Nakoa Street, Unit 2, Wailuku, Hawaii 96793

(808) 270-7931  
Fax (808) 270-7162

October 24, 2005

Michael T. Munekiyo, Project Manager  
Munekiyo & Hiraga, Inc.  
305 High Street Suite 104  
Wailuku, Hawaii 96793

**RE: Proposed 4-Unit Single Family Condominium**  
**TMK: (2) 2-1-007:066**  
**Makena, Maui, Hawaii**

Dear Mr. Munekiyo:

Thank you for the opportunity to review and provide early comment concerning the draft environmental assessment preparation for the above reference action.

After review of the documents, received October 13, 2005, we have no comment to offer at this time. Should you have any questions, or need of additional information, please call me or Patrick Matsui, Chief of Parks Planning & Development, at 808-270-7387.

Sincerely,

A handwritten signature in black ink, appearing to read "Glenn T. Correa", is written over a horizontal line.

Glenn T. Correa  
Director

c: Patrick Matsui, Chief of Parks Planning & Development  
Mary Kielty, South Maui Parks District Supervisor



**ALAN M. ARAKAWA**  
MAYOR

OUR REFERENCE  
||  
YOUR REFERENCE

**POLICE DEPARTMENT**  
COUNTY OF MAUI

55 MAHALANI STREET  
WAILUKU, HAWAII 96793  
(808) 244-6400  
FAX (808) 244-6411



**THOMAS M. PHILLIPS**  
CHIEF OF POLICE

**KEKUHAUPIO R. AKANA**  
DEPUTY CHIEF OF POLICE

November 10, 2005

Mr. Michael T. Munekiyo, AICP  
Munekiyo & Hiraga, Inc.  
305 High Street, Suite 104  
Wailuku, HI 96793

Dear Mr. Munekiyo:

**SUBJECT: Proposed 4-Unit Single-Family Condominium at TMK 2-1-07:66  
Makena, Maui, Hawaii**

Thank you for your letter of October 6, 2005, requesting comments on the above subject.

We have reviewed the information submitted for this project and have enclosed a copy of our comments. As always, thank you for giving us the opportunity to comment on this project.

Very truly yours,

Assistant Chief Sydney Kikuchi  
for: Thomas M. Phillips  
Chief of Police

c: Michael Foley, Planning Department

Enclosure

11-10-05 10:00 AM

DOCUMENT CAPTURED AS RECEIVED

*Small development.  
No significant comment  
at this time.*

*Calvin  
11/14/05*

TO : THOMAS PHILLIPS, CHIEF OF POLICE, COUNTY OF MAUI  
VIA : CHANNELS *FD -> 11/04/05*  
FROM : BRAD HICKLE, POLICE OFFICER III, DISTRICT VI KIHEI  
SUBJECT : PROPOSED 4 UNIT SINGLE-FAMILY CONDOMINIUM @  
TMK: 2-1-07:66

Sirs, on 10/19/05 this Officer received information on the Proposed 4-Unit Single-Family Condominium.

**APPLICANT INFORMATION:**

The applicant, Pacific Rim Incorporated, proposes a 4-unit Single-Family condominium project at Makena. The subject property is located along Makena-Keoneoio Road on approximately 1.552-acre parcel identified as TMK 2-1-07:66.

**REQUEST FOR COMMENTS:**

The applicant is requesting early comments from interested parties who may wish to provide input in the formulation of the Draft Environmental Assessment (EA).

**COMMENTS:**

After reviewing the information provided we have no concerns or comments relating to an early Draft Environmental Assessment (EA).

I will however reserve my comments for the future Special Management Area (SMA) permit which relates to this project and Police emergency services in the area of south Maui.

Respectfully Submitted,

Officer Brad Hickle  
10/25/05

*BH*

E-9966  
11:00 hours

*POTENTIAL FOR  
DENSES CONDS  
& TRAFFIC CONC  
TAKEN INTO  
CONSID.*

*ht. Hickle  
11.2.5*

# **Chapter X**

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***Letters Received During the Draft  
Environmental Assessment Public  
Comment Period and Responses  
to Substantive Comments***

**X. LETTERS RECEIVED DURING THE DRAFT ENVIRONMENTAL ASSESSMENT PUBLIC COMMENT PERIOD AND RESPONSES TO SUBSTANTIVE COMMENTS**

A Draft Environmental Assessment for the subject project was filed and published in the Office of Environmental Quality Control's The Environmental Notice on February 23, 2006.

Comments on the Draft EA were received during the 30-day public comment period. Comments, as well as responses to substantive comments are included in this chapter. In addition to agency comments, the Draft EA was reviewed and discussed by the Maui Planning Commission at its meeting of March 28, 2006. The Planning Commission's comments and the applicant's response to those comments are also incorporated in this chapter.



DEPARTMENT OF THE ARMY  
U.S. ARMY ENGINEER DISTRICT, HONOLULU  
BUILDING 223  
FORT SHAFTER, HAWAII 96858-5440

REPLY TO  
ATTENTION OF: CEPOH-EC-T

06 MAR 10 P1:03

March 8, 2006

DEPT OF PLANNING,  
COUNTY OF MAUI  
RECEIVED

Civil Works Technical Branch

Mr. Kivette A. Caigoy, Staff Planner  
County of Maui  
Department of Planning  
250 South High Street  
Wailuku, Maui, Hawaii 96793

Dear Mr. Caigoy:

Thank you for the opportunity to review and comment on the Draft Environmental Assessment (DEA) and accompanying documentation for the 4-Unit, Single-Family Condominium Project, Makena, Maui (TMK 2-1-7: 66). The following comments are provided in accordance with Corps of Engineers authorities to provide flood hazard information and to issue Department of the Army (DA) permits.

- a. Based on the information provided, a DA permit will not be required.
- b. We concur with the flood information provided on page 16 of the DEA.

Should you have any questions, please call Ms. Jessie Dobinchick of my staff at 438-8876.

Sincerely,

*James Pennaz*  
James Pennaz, P.E.  
Chief, Civil Works  
Technical Branch

United States Department of Agriculture

 Natural Resources  
Conservation Service

210 Iml Kala Street, Suite #209, Wailuku, HI 96793-2100

USDA  
06 MAR 14 12:34

DEPT OF PLANNING  
COUNTY OF MAUI  
RECEIVED

March 13, 2006

Ms Kivette Caigoy, Staff Planner  
County of Maui  
Department of Planning  
250 South High Street  
Wailuku, Hawaii 96793

Dear Ms Caigoy,

SUBJECT.: I.D.: EA 2006/0001; DBA 2001/0003; CPA 2001/0005; CIZ 2001/0011; 2006/0002  
SM1 2001/0017

TMK: (2)-1-007:066  
PROJECT NAME: 4-Unit, Single-Family Condominium at Makena, Maui  
APPLICANT: Pacific Rim Land, Inc. c/o Munekiyo & Hiraga, Inc.

We recommend an erosion and drainage control plan with possible temporary and final BMP's be noted on the construction plan. An operation and maintenance plan needs to be developed and implemented for the grated catch basins and underground subsurface drainage system.

Maintenance of temporary erosion control measures should be maintained and grubbing materials needs to be discarded correctly to reduce the impact of run off to the ocean

Native plants and groundcovers are highly recommended for this area to reduce water usage. Landscaping should be incorporated and coordinated with construction activities so that vegetated areas will be planted and irrigated as soon as possible.

Thank you for the opportunity to comment.

Sincerely,

  
Ranae Ganske-Cerizo  
District Conservationist



MICHAEL T. MUNEKIYO  
GWEN OHASHI HIRAGA  
MITSURU "MICH" HIRANO

KARLYNN KAWAHARA

May 4, 2006

Ms. Ranae Ganske-Cerizo  
District Conservationist  
**Natural Resources Conservation Service**  
210 Imi Kala Street, Suite #209  
Wailuku, Hawaii 96793

**SUBJECT: Draft Environmental Assessment for Proposed 4-Unit Single-Family Condominium TMK: (2) 2-1-07:66, Makena, Maui, Hawaii**

Dear Ms. Ganske-Cerizo:

We are in receipt of your comments dated March 13, 2006 on the subject project. On behalf of the applicant, Pacific Rim Land, Inc. (PRL) we would like to offer the following responses to your comments.

1. We note your comment with regards to the development of an erosion and drainage control plan with Best Management Practices (BMPs). PRL will be submitting a BMPs plan to the Department of Public Works and Environmental Management for review and approval. A copy of the approved plan can be submitted to your office for your files. An operation and maintenance plan for the proposed drainage system will be developed and utilized by the future homeowners association.
2. We concur with your comment regarding maintaining temporary erosion control measures to insure that grubbing materials are discarded correctly to reduce the impact of runoff to the ocean.
3. We note your comment with regards to the use of native plants and groundcover to reduce water usage and the installation of landscaping and irrigation during construction. PRL will work with its landscape architect to review possible native plants for incorporation into the project's landscaping. PRL will also examine the feasibility of installing landscaping and irrigation during construction.



Ranae Ganske-Cerizo  
May 4, 2006  
Page 2

Thank you for your comments. Should you have any further questions, please do not hesitate to call me at 244-2015.

Very truly yours,

  
Karlynn Kawahara  
Project Manager

KK:lh  
cc: John Maloney, Pacific Rim Land, Inc.  
Stacy Otomo, Otomo Engineering, Inc.  
Bryan Maxwell, Maxwell Design Group  
Michael Foley, Department of Planning

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LINDA LINGLE  
GOVERNOR



ANTHONY J.H. CHING  
EXECUTIVE OFFICER

STATE OF HAWAII  
DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM  
LAND USE COMMISSION  
P.O. Box 2359  
Honolulu, Hawaii 96804-2359  
Telephone: 808-587-3822  
Fax: 808-587-3827

06 FEB 27 12:40

DEPT OF PLANNING  
COUNTY OF MAUI  
RECEIVED

February 23, 2006

Mr. Michael W. Foley, Planning Director  
County of Maui Department of Planning  
250 South High Street  
Wailuku, Hawaii 96793

Dear Mr. Foley:

Subject: EA 2006-0001; DBA 2001/0003; CPA 2001/0005; CIZ 2001/0011; SM1 2001/0017  
TMK: (2) 2-1-007:066  
4-Unit, Single-Family Condominium at Makena, Maui  
Pacific Rim Land, Inc., c/o Munekiyo & Hiraga, Inc.

We acknowledge receipt of your letter dated February 7, 2006, regarding the above subject project.

Given the location, scope, and nature of the proposed activity, the State Land Use Commission defers to the judgment of the County of Maui in this matter. We have no comments to offer at this time.

Thank you for the opportunity to comment on the subject project. Please feel free to contact me at 587-3822, should you require clarification or any further assistance.

Sincerely,

Handwritten signature of Anthony J. H. Ching in black ink.  
ANTHONY J. H. CHING  
Executive Officer

LINDA LINGLE  
GOVERNOR



STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
869 PUNCHBOWL STREET  
HONOLULU, HAWAII 96813-5097

RODNEY K. HARAGA  
DIRECTOR

Deputy Directors  
BRUCE Y. MATSUI  
BARRY FUKUNAGA  
BRENNON T. MORIOKA  
BRIAN H. SEKIGUCHI

IN REPLY REFER TO:

STP 8.2065

February 28, 2006

Mr. Michael W. Foley  
Director  
Department of Planning  
County of Maui  
250 South High Street  
Wailuku, Hawaii 96793

06 MAR -6 P1:43  
DEPT OF PLANNING  
COUNTY OF MAUI  
RECEIVED

Dear Mr. Foley:

Subject: Pacific Rim Land, Inc. 4-Unit, Single-Family Condominium at Makena, Maui  
Draft Environmental Assessment (EA 2006/0001),  
District Boundary Amendment (DBA 2001/0003),  
Community Plan Amendment (CPA 2001/0005),  
Change in Zone (CIZ 2001/0011), and  
Special Management Area Use Permit (SM1 2001/0017)  
TMK: (2) 2-1-007: 066

Thank you for your transmittal requesting our review of the subject permit applications.

It is our understanding that the proposed zoning category change from Hotel to Residential will be at a lower density and intensity and, while it appears there are some design and layout changes made to the early plans submitted in August 2001, the project remains as a four-unit condominium.

Therefore, our prior comment on the minimal impact from the proposed project in our letter STP 8.0041 dated September 28, 2001 (copy attached) are still valid and applicable to the project, except for a need to update or reconfirm the occupancy and vehicle capacity on the project site, due to the project's now proposed number of rooms, guest parking and driveway space. Since 2001, other land development projects in the Wailea-Makena area have come forth or been renewed and are moving forward. To assist us in our review of the anticipated and projected cumulative traffic from the Wailea-Makena area, we would like to request that we be apprised of the maximum number of occupants and vehicles the project may have so we may add the numbers to the total build-out and collective traffic from this area as part of our analysis.

Mr. Michael W. Foley  
Page 2  
February 28, 2006

STP 8.2065

We appreciate the opportunity to provide our comments.

Very truly yours,

  
RODNEY K. HARAGA  
Director of Transportation

Attach.

STP 8.0041

September 28, 2001

Mr. John E. Min  
Director  
Department of Planning  
County of Maui  
250 South High Street  
Wailuku, Hawaii 96793

Dear Mr. Min:

Subject: Makena Single Family Condominium  
District Boundary Amendment (DBA),  
Change in Zone (CIZ) and  
Special Management Area Use Permit (SMA)  
TMK: 2-1-07: 066

Thank you for your transmittal requesting our review of the subject project.

The proposed development will not impact our State transportation facilities.

We appreciate the opportunity to provide comments.

Very truly yours,

  
BRIAN K. MINAAI  
Director of Transportation



MICHAEL T. MUNEKIYO  
GWEN OHASHI HIRAGA  
MITSURU "MICH" HIRANO

KARLYNN KAWAHARA

May 4, 2006

Rodney Haraga, Director  
State of Hawaii  
Department of Transportation  
869 Punchbowl Street  
Honolulu, Hawaii 96813-5097

**SUBJECT: Draft Environmental Assessment for Proposed 4-Unit Single-Family Condominium, TMK 2-1-07:066, Makena, Maui, Hawaii (STP 8.2065)**

Dear Mr. Haraga:

We are in receipt of your comments dated February 28, 2006 on the subject project. On behalf of the applicant, Pacific Rim Land, Inc. (PRL) we would like to offer the following response to your comment. The maximum number of occupants for the proposed 4-unit condominium project is estimated to be 12 people. The maximum number of vehicles anticipated by the project are eight (8) vehicles total.

Thank you for your comments. Should you have any further questions, please do not hesitate to call me at (808)244-2015.

Very truly yours,

Karlynn Kawahara  
Project Manager

KK:yp

cc: John Maloney, Pacific Rim Land, Inc.  
Michael Foley, Department of Planning

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LINDA LINGLE  
GOVERNOR OF HAWAII



STATE OF HAWAII  
DEPARTMENT OF HEALTH  
MAUI DISTRICT HEALTH OFFICE  
54 HIGH STREET  
WAILUKU, MAUI, HAWAII 96793-2102

CHUYOME L. FUKINO, M. D.  
DIRECTOR OF HEALTH

LORRIN W. PANCI, M. D., M. P. H.  
DISTRICT HEALTH OFFICER

March 6, 2006

Mr. Michael W. Foley  
Director  
Department of Planning  
County of Maui  
250 South High Street  
Wailuku, Hawai'i 96793

06 MAR -8 09:45  
DEPT OF PLANNING  
COUNTY OF MAUI  
RECEIVED

Attention: Kivette A. Caigoy

Dear Mr. Foley:

Subject: 4-Unit, Single-Family Condominium at Makena, Maui  
TMK: (2) 2 -1-007:066  
EA 2006/0001, DBA 2001/0003, CPA 2001/0005, CIZ2001/0011,  
SM1 2001/0017

Thank you for the opportunity to comment on the proposed Single-Family Condominium Project. Other than the comments made during the early consultation process of the Environmental Assessment process, we have no further comments to offer.

Should you have any questions, please call me at 808 984-8230.

Sincerely,

A handwritten signature in black ink, appearing to read "Herbert S. Matsubayashi".

Herbert S. Matsubayashi  
District Environmental Health Program Chief

c: EPO

LINDA LINGLE  
GOVERNOR OF HAWAII



STATE OF HAWAII  
OFFICE OF ENVIRONMENTAL QUALITY CONTROL

235 SOUTH BERETANIA STREET  
SUITE 702  
HONOLULU, HAWAII 96813  
TELEPHONE (808) 586-4185  
FACSIMILE (808) 586-4188  
E-mail: oeqc@health.state.hi.us

MAR 24 2006

GENEVIEVE SALMONSON  
DIRECTOR

March 17, 2006

Mr. Michael Foley  
County of Maui  
Department of Planning  
250 South High Street  
Wailuku, Hawaii 96793

Dear Mr. Foley:


Subject: Draft EA for the Makena 4 unit single family condominium, Maui

Thank you for the opportunity to review the subject document. We have the following comment.

1. The site was used as a dump in the 1900's and by the military in the 1940's. Please investigate whether hazardous materials are present on the property.

Should you have any questions, please call Jeyan Thirugnanam at 586-4185.

Sincerely,

  
Genevieve Salmonson  
Director

c: Munekiyo & Associates  
Pac Rim





MICHAEL T. MUNEKIYO  
GWEN OHASHI HIRAGA  
MITSURU "MICH" HIRANO

KARLYNN KAWAHARA

May 5, 2006

Genevieve Salmonson, Director  
State of Hawaii  
Office of Environmental Quality Control  
235 South Beretania Street, Suite 702  
Honolulu, Hawaii 96813

SUBJECT: Draft Environmental Assessment for Proposed 4-Unit Single-Family  
Condominium TMK: (2) 2-1-07:66, Makena, Maui, Hawaii

Dear Ms. Salmonson:

Thank you for your letter dated March 17, 2006, providing us with your comments on the subject project. On behalf of our client, Pacific Rim Land, Inc. (PRL), we would like to offer the following response to your comment.

Based upon a telephone conference with Jeyan Thirugnanam of your office, we understand that your comment regarding the property's use as a dump was based on the background information provided in the archaeological inventory survey report. Upon further review of the archaeological report, the report makes reference in its "Discussion and Conclusions" that, "*Historic bottles recovered from the surface of Feature 2, the earliest date for which is 1900-1908, indicates that a portion of the project area could possibly have been used as a rubbish depository as early as this time period,*" (emphasis added). Additionally, in our review of the Cultural Impact Assessment that was prepared for the project, we note that there was a reference to the Makena area being utilized for military activity. However, the archaeological inventory survey did not find any major evidence of military activities occurring on the site. As such, it seems unlikely that there would be a presence of hazardous materials on the site.

Genevieve Salmonson, Director  
May 5, 2006  
Page 2

Should you have any further questions, please feel free to contact me at (808)244-2015.

Very truly yours,

  
Karlynn Kawahara  
Project Manager

KK:lh  
cc: John Maloney, Pacific Rim Land, Inc.  
Michael Foley, Department of Planning  
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FEB 24 2006

ALAN M. ARAKAWA  
Mayor

MILTON M. ARAKAWA, A.I.C.P.  
Director

MICHAEL M. MIYAMOTO  
Deputy Director

Telephone: (808) 270-7845  
Fax: (808) 270-7955



COUNTY OF MAUI  
**DEPARTMENT OF PUBLIC WORKS  
AND ENVIRONMENTAL MANAGEMENT**  
200 SOUTH HIGH STREET, ROOM 322  
WAILUKU, MAUI, HAWAII 96793

RALPH NAGAMINE, L.S., P.E.  
Development Services Administration

DAVID TAYLOR, P.E.  
Wastewater Reclamation Division

CARY YAMASHITA, P.E.  
Engineering Division

BRIAN HASHIRO, P.E.  
Highways Division

TRACY TAKAMINE, P.E.  
Solid Waste Division

February 21, 2006

Mr. Michael Munekiyo, A.I.C.P.  
MUNEKIYO & HIRAGA, INC.  
305 High Street, Suite 104  
Wailuku, Maui, Hawaii 96793

Dear Mr. Munekiyo:

**SUBJECT: EARLY CONSULTATION FOR DRAFT ENVIRONMENTAL  
ASSESSMENT  
PROPOSED 4-UNIT SINGLE-FAMILY CONDOMINIUM - MAKENA  
PACIFIC RIM LAND, INCORPORATED  
TMK: (2) 2-1-007:066**

We reviewed the subject application and have the following comments:

1. A road-widening lot shall be provided for the adjoining half of Makena-Keoneoio Road to provide for future, ultimate right-of-way to be determined upon a more detailed plan submittal and improved to County standards. Improvements may include, but not be limited to pavement widening, construction of curb, gutter and sidewalk, street lights, and relocation of utilities underground. Said lot shall be dedicated to the County upon completion of the improvements.
2. The architect and owner are advised that the project is subject to possible tsunami and flood inundation. As such, said project must conform to Ordinance No. 1145, pertaining to flood hazard districts.
3. All structures such as walls, trees, etc., shall be removed or relocated from the road-widening strip. The rear boundaries of the road-widening strip shall be clearly marked to determine if said structures have been properly removed and relocated.

4. A verification shall be provided by a Registered Civil Engineer that the grading and runoff water generated by the project will not have an adverse effect on the adjacent and downstream properties.
5. A detailed and final drainage report and a Best Management Practices (BMP) Plan shall be submitted with the grading plans for review and approval prior to issuance of grading permits. The drainage report shall include hydrologic and hydraulic calculations and the schemes for disposal of runoff waters. It must comply with the provisions of the "Rules and Design of Storm Drainage Facilities in the County of Maui" and must provide verification that the grading and runoff water generated by the project will not have an adverse effect on adjacent and downstream properties. The BMP plan shall show the location and details of structural and non-structural measures to control erosion and sedimentation to the maximum extent practicable.
6. All existing features such as structures, driveways, drainage ways, edge of the pavement, etc. shall be shown on the project plat plan.
7. A site plan and a sight distance report to determine required sight distance and available sight distance at existing and proposed street intersections shall be provided for our review and approval.
8. A detailed final Traffic Impact Assessment Report for the entire development shall be submitted for our review and approval. The report shall also address regional traffic impacts and include assessments from the local community police officer.
9. For all infrastructure that may be dedicated to the County, preliminary construction plan submittal shall include a completed technical assistance review performed by the Disability and Communication Access Board (DCAB) for compliance with the Americans with Disabilities Act Accessibility Guidelines (ADAAG) for all facilities. All technical and structural infeasible assessments shall be the responsibility of the developer and an agreement waiving the County of Maui of any future liability, including redesign and reconstruction, for said facility shall be recorded with the State Bureau of Conveyances.
10. The project shall comply with Section 16.26.3304 (Improvements to Public Streets) of the Maui County Code.


Mr. Michael Munekiyo, A.I.C.P.  
February 21, 2006  
Page 3

11. The project shall comply with Section 18.04.470 (Subdivision) of the Maui County Code which states, in part:

"... the construction of four or more dwelling units on a lot, parcel, or site shall be subject to the provisions of this title."

Please call Michael Miyamoto at 270-7845 if you have any questions regarding this letter.

Sincerely,



MILTON M. ARAKAWA, A.I.C.P.  
Director

MMA:MMM:da  
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ALAN M. ARAKAWA  
Mayor

MILTON M. ARAKAWA, A.I.C.P.  
Director

MICHAEL M. MIYAMOTO  
Deputy Director

Telephone: (808) 270-7845  
Fax: (808) 270-7955



COUNTY OF MAUI  
**DEPARTMENT OF PUBLIC WORKS  
AND ENVIRONMENTAL MANAGEMENT**  
200 SOUTH HIGH STREET, ROOM 322  
WAILUKU, MAUI, HAWAII 96793

MAR 15 2006

RALPH NAGAMINE, L.S., P.E.  
Development Services Administration

DAVID TAYLOR, P.E.  
Wastewater Reclamation Division

CARY YAMASHITA, P.E.  
Engineering Division

BRIAN HASHIRO, P.E.  
Highways Division

TRACY TAKAMINE, P.E.  
Solid Waste Division

March 8, 2006

Mr. Michael Munekiyo, A.I.C.P.  
MUNEKIYO & HIRAGA, INC.  
305 High Street, Suite 104  
Wailuku, Maui, Hawaii 96793

Dear Mr. Munekiyo:

**SUBJECT: EARLY CONSULTATION FOR DRAFT ENVIRONMENTAL  
ASSESSMENT  
PROPOSED FOUR-UNIT SINGLE-FAMILY CONDOMINIUM -  
MAKENA  
PACIFIC RIM LAND, INCORPORATED  
TMK: (2) 2-1-007:066**

We reviewed the subject application and have the following comments:

1. A road-widening lot shall be provided for the adjoining half of Makena-Keoneoio Road to provide for future, ultimate right-of-way to be determined upon a more detailed plan submittal and improved to County standards. Improvements may include, but not be limited to pavement widening, construction of curb, gutter and sidewalk, street lights, and relocation of utilities underground. Said lot shall be dedicated to the County upon completion of the improvements.
2. The architect and owner are advised that the project is subject to possible tsunami and flood inundation. As such, said project must conform to Ordinance No. 1145, pertaining to flood hazard districts.
3. All structures such as walls, trees, etc., shall be removed or relocated from the road-widening strip. The rear boundaries of the road-widening strip shall be clearly marked to determine if said structures have been properly removed and relocated.

Mr. Michael Munekiyo, A.I.C.P.  
March 8, 2006  
Page 2

4. A verification shall be provided by a Registered Civil Engineer that the grading and runoff water generated by the project will not have an adverse effect on the adjacent and downstream properties.
5. A detailed and final drainage report and a Best Management Practices (BMP) Plan shall be submitted with the grading plans for review and approval prior to issuance of grading permits. The drainage report shall include hydrologic and hydraulic calculations and the schemes for disposal of runoff waters. It must comply with the provisions of the "Rules and Design of Storm Drainage Facilities in the County of Maui" and must provide verification that the grading and runoff water generated by the project will not have an adverse effect on adjacent and downstream properties. The BMP plan shall show the location and details of structural and non-structural measures to control erosion and sedimentation to the maximum extent practicable.
6. All existing features such as structures, driveways, drainage ways, edge of the pavement, etc. shall be shown on the project plat plan.
7. A site plan and a sight distance report to determine required sight distance and available sight distance at existing and proposed street intersections shall be provided for our review and approval.
8. A detailed final Traffic Impact Assessment Report for the entire development shall be submitted for our review and approval. The report shall also address regional traffic impacts and include assessments from the local community police officer.
9. For all infrastructure that may be dedicated to the County, preliminary construction plan submittal shall include a completed technical assistance review performed by the Disability and Communication Access Board (DCAB) for compliance with the Americans with Disabilities Act Accessibility Guidelines (ADAAG) for all facilities. All technical and structural infeasible assessments shall be the responsibility of the developer and an agreement waiving the County of Maui of any future liability including redesign and reconstruction for said facility, shall be recorded with the State Bureau of Conveyances.
10. The project shall comply with Section 16.26.3304 (Improvements to Public Streets) of the Maui County Code.

Mr. Michael Munekiyo, A.I.C.P.  
March 8, 2006  
Page 3


11. The project shall comply with Section 18.04.470 (Subdivision) of the Maui County Code which states in part:

"... the construction of four or more dwelling units on a lot, parcel, or site shall be subject to the provisions of this title."

12. Need to include a construction waste recycling/disposal plan.

Please call Michael Miyamoto at 270-7845 if you have any questions regarding this letter.

Sincerely,



MILTON M. ARAKAWA, A.I.C.P.  
Director

MMA:MMM:da

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MICHAEL T. MUNEKIYO  
GWEN OHASHI HIRAGA  
MITSURU "MICH" HIRANO

KARLYNN KAWAHARA

May 5, 2006

Milton Arakawa, Director  
County of Maui  
Department of Public Works and  
Environmental Management  
200 South High Street  
Wailuku, Hawaii 96793

SUBJECT: Draft Environmental Assessment for Proposed 4-Unit Single-Family  
Condominium, TMK 2-1-07:066, Makena, Maui, Hawaii

Dear Mr. Arakawa:

We are in receipt of your comments dated February 21, 2006, on the subject project. On behalf of the applicant, Pacific Rim Land, Inc. (PRL) we would like to offer the following responses to your comments.

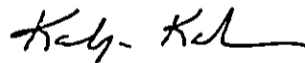
1. We note your comment with regards to the road-widening lot. PRL has met with the Engineering Division and it is our understanding that there is concurrence on a typical road section whereby a 4-foot wide grassed walkway would be provided on the mauka side of Makena - Keoneoio Road and an 11-foot wide grassed shoulder would be provided on the makai side of the road. Please see attached typical section.
2. We acknowledge your comment and the project will conform with Ordinance No. 1145, pertaining to flood hazard districts, as applicable.
3. We note your comment with regards to improvements in the road-widening strip. PRL will insure that there are no structures located within the road-widening strip.
4. We concur with your comment.
5. We concur with your comment with regards to the submission and approval of a Best Management Practices plan for the project.
6. We note your comment with regards to the inclusion of items for the project's plat plan. Your comments have been forwarded to the project's civil engineer for review and inclusion, as applicable.

Milton Arakawa, Director  
May 5, 2006  
Page 2

7. We note your comment with regard to sight distances for the project intersections with streets. A copy of the sight distance report will be submitted to your department for review and approval.
8. We note your comment with regards to the Traffic Impact Assessment Report for the project. Please note that there are four (4) units proposed for the project, which is anticipated to have a maximum of eight (8) vehicles total. Additionally, it is anticipated that these residences will be used on occasion by the residents and no short-term vacation rentals will be allowed for the residences.
9. We acknowledge your comment with regards to the review by the Disability and Communication Access Board for any improvements that will be dedicated to the County of Maui.
10. PRL intends to comply with Section 16.26.3304 (Improvement to Public Streets) of the Maui County Code (MCC), as applicable.
11. We acknowledge your comment with regards to compliance with Section 18.04.470 (Subdivision) of the MCC. PRL will comply with this Section, as applicable.

Thank you for your comments. Should you have any further questions, please do not hesitate to call me at 244-2015.

Very truly yours,



Karlynn Kawahara  
Project Manager

KK:yp

Attachment

cc: John Maloney, Pacific Rim Land, Inc. (w/attachment)  
Stacy Otomo, Otomo Engineering, Inc. (w/attachment)  
Michael Foley, Department of Planning (w/attachment)

F:\DATA\PacRim\BakNorth\dpwem.deares.wpd

ALAN M. ARAKAWA  
Mayor



GLENN T. CORREA  
Director

JOHN L. BUCK III  
Deputy Director

(808) 270-7230  
Fax (808) 270-7934

**DEPARTMENT OF PARKS & RECREATION**

700 Hall'a Nakoia Street, Unit 2, Wailuku, Hawaii 96793

February 23, 2006

MEMO TO: Michael W. Foley, Director of Planning

FROM:  GLENN T. CORREA, Director

SUBJECT: 4-UNIT, SINGLE-FAMILY CONDOMINIUM AT MAKENA, MAUI  
TMK: (2) 2-1-007:066  
EA 2006/0001; DBA 2001/0003; CPA 2001/0005; CIZ 2001/0011;  
SM1 2001/0017

06 FEB 27 P2:06  
DEPT OF PLANNING  
COUNTY OF MAUI  
RECEIVED

Thank you for the opportunity to review and comment on the subject project. Pursuant to Section 18.16.320, Maui County Code, the project will be subject to park assessment requirements. Our Department will be requiring the applicant to satisfy these requirements with a cash contribution in lieu of land.

If there are any questions, please contact Mr. Patrick Matsui, Chief of Parks Planning and Development, at 270-7387.

c: Patrick Matsui, Chief of Parks Planning and Development



MICHAEL T. MUNEKIYO  
GWEN OHASHI HIRAGA  
MITSURU "MICH" HIRANO

KARLYNN KAWAHARA

May 4, 2006

Glenn Correa, Director  
County of Maui  
Department of Parks and Recreation  
700 Hali'a Nakoia Street, Unit 2  
Wailuku, Hawaii 96793

**SUBJECT: Draft Environmental Assessment for Proposed 4-Unit Single-Family Condominium, TMK 2-1-07:066, Makena, Maui, Hawaii**

Dear Mr. Correa:

We are in receipt of your comments dated February 23, 2006 on the subject project. On behalf of the applicant, Pacific Rim Land, Inc. (PRL), we would like to offer the following response to your comment. Please note that the proposed project received preliminary subdivision approval on February 11, 2002. PRL received confirmation of its fourth dwelling subdivision by letter from the Development Services Administration on October 19, 2004. Please see attached. As such, we believe that the applicant will be subject to the previous park assessment requirements. Coordination will be sought with the Parks Department to calculate the assessment requirements for the project.

Thank you for your comments. Should you have any further questions, please do not hesitate to call me at 244-2015.

Very truly yours,

Karlynn Kawahara  
Project Manager

KK:yp

Enclosures

cc: John Maloney, Pacific Rim Land, Inc.  
Michael Foley, Department of Planning

F:\DATA\PacRim\BakNorth\dpr.deares.wpd

305 High Street, Suite 104 • Wailuku, Hawaii 96793 • ph: (808)244-2015 • fax: (808)244-8729 • [planning@mhincollinc.com](mailto:planning@mhincollinc.com)

environment  
planning  
government

JAMES "KIMO" APANA  
Mayor

DAVID C. GOODE  
Director

MILTON M. ARAKAWA, A.I.C.P.  
Deputy Director



**COUNTY OF MAUI**  
**DEPARTMENT OF PUBLIC WORKS**  
**AND WASTE MANAGEMENT**  
LAND USE AND CODES ADMINISTRATION  
250 SOUTH HIGH STREET  
WAILUKU, MAUI, HAWAII 96793

RALPH M. NAGAMINE, L.S., P.E.  
Land Use and Codes Administration

Wastewater Reclamation Division

LLOYD P.C.W. LEE, P.E.  
Engineering Division

JOHN D. HARDER  
Solid Waste Division

BRIAN HASHIRO, P.E.  
Highways Division

February 11, 2002

Mr. Stacy A. Otomo, P.E.  
**OTOMO ENGINEERING, INC.**  
305 South High Street, Suite 103  
Wailuku, Hawaii 96793

**RECEIVED**  
FEB 13 2002

**SUBJECT: 4-UNIT CONDOMINIUM PROJECT**  
**4<sup>TH</sup> DWELLING SUBDIVISION**  
**TMK: (2) 2-1-007:066**  
**LUCA FILE NO. 2.2700**

**OTOMO ENGINEERING, INC.**

Dear Mr. Otomo:

Preliminary approval was granted to the subject subdivision on February 11, 2002. In accordance with Section 18.04.470 of the Maui County Code (MCC), the following conditions shall be complied with prior to the issuance of the subject building permit applications:

1. Comply with requirements/comments from the State of Hawaii, Department of Land and Natural Resources, Historic Preservation Division (SHPD). SHPD has advised our office that a preservation plan may be required. A copy of the site plan has been forwarded to SHPD for review and comment. For further information, please contact Ms. Cathleen Dagher at (808) 692-8023.
2. Requirements/comments from the Department of Planning:
  - a. A Change in Zoning, Community Plan Amendment, District Boundary Amendment and Special Management Area Permit are being processed for the subject development. Upon the approvals of above, please provide evidence that all required conditions have been met.
  - b. The project is located within Flood zone C. A flood development permit may be required if any work is done within any drainageways.

If you have any questions, please contact Mr. Francis Cerizo at 270-7253.

Mr. Stacy A. Otomo, P.E.  
SUBJECT: 4-UNIT CONDOMINIUM PROJECT  
LUCA FILE NO. 2.2700

February 11, 2002  
Page 2 of 2

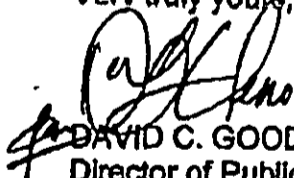
3. Comply with Ordinance No. 2981, Bill No. 63, amending Section 18.16.320 (Parks and Playgrounds) of the Maui County Code. The Department of Parks and Recreation has requested a cash assessment in lieu of land. The cash assessment shall be based on the certified real property tax assessment in effect at the time of final subdivision approval. For assessment information, please contact Patrick Matsui of the Department of Parks and Recreation at 270-7931.
4. In accordance with Section 18.12.040(C) MCC, submit a tax clearance certificate (issued by Department of Finance, Real Property Tax Division) to show written proof that all taxes and assessments on the tract are paid to date. An "Application for Tax Clearance" form is enclosed for your use. **NOTE:** The tax clearance certificate shall be valid at the time of final subdivision approval.

Within one (1) year from the date of preliminary approval of the subdivision, all requirements shall be completed, unless an extension of time is granted.

**Please be forewarned that applications for an extension of time shall be made in writing to the Department of Public Works and Waste Management at least fifteen days before the expiration date. Therefore, an application for an extension of time shall be submitted by January 27, 2003. In addition, a "good cause" reason shall be stated in your application. Applications for an extension of time which are not in compliance with these two requirements, will result in the subdivision being deemed null and void.**

If you have any questions regarding this letter, please call Mr. Lance Nakamura of our Land Use and Codes Administration at 270-7252.

Very truly yours,

  
DAVID C. GOODE  
Director of Public Works  
And Waste Management

Enclosure: Application For Tax Clearance  
LSH/GAU 8:LUCAVALLSUBDLUCASUBDPFR02122700-1.ppt

xc: LUCA Engineering (Bert Ratte)  
Dept. of Planning

ALAN M. ARAKAWA  
Mayor

GILBERT S. COLOMA-AGARAN  
Director

MILTON M. ARAKAWA, A.I.C.P.  
Deputy Director



COUNTY OF MAUI  
DEPARTMENT OF PUBLIC WORKS  
AND ENVIRONMENTAL MANAGEMENT  
**DEVELOPMENT SERVICES ADMINISTRATION**  
250 SOUTH HIGH STREET  
WAILUKU, MAUI, HAWAII 96793

RALPH M. NAGAMINE, L.S., P.E.  
Development Services Administration

TRACY TAKAMINE, P.E.  
Wastewater Reclamation Division

LLOYD P.C.W. LEE, P.E.  
Engineering Division

BRIAN HASHIRO, P.E.  
Highways Division

JOHN D. HARDER  
Solid Waste Division

October 19, 2004

Mr. Stacy A. Otomo, P.E.  
**OTOMO ENGINEERING, INC.**  
305 South High Street, Suite 103  
Wailuku, Hawaii 96793

**RECEIVED**  
OCT 25 2004

**OTOMO ENGINEERING, INC.**

**SUBJECT: 4-UNIT CONDOMINIUM PROJECT  
4<sup>TH</sup> DWELLING SUBDIVISION  
TMK: (2) 2-1-007:066  
LUCA FILE NO. 2.2700**


Dear Mr. Otomo:

Recently, our Department has reviewed our procedures for processing 4<sup>th</sup> Dwelling Subdivisions. Based upon our current processing guidelines, the following items are required prior to the issuance of any new dwelling building permit applications:

1. Submit approval from the Department of Parks and Recreation. If you have any questions, please contact Mr. Patrick Matsui at 270-7387.
2. In accordance with Section 18.12.040(C) MCC, submit a tax clearance certificate (issued by Department of Finance, Real Property Tax Division) to show written proof that all taxes and assessments on the tract are paid to date. **NOTE:** The tax clearance certificate shall be valid at the time of building permit approval.

If you have any questions regarding this letter, please call Ms. Lesli Otani of our Land Use and Codes Administration at 270-7252.

Very truly yours,

  
GILBERT S. COLOMA-AGARAN  
Director of Public Works  
and Environmental Management

LLOQAU 8:08A1SubdReg202#2700-1.Jr.mpd

c: Department of Planning



ALAN M. ARAKAWA  
MAYOR

OUR REFERENCE  
YOUR REFERENCE

**POLICE DEPARTMENT**  
COUNTY OF MAUI

55 MAHALANI STREET  
WAILUKU, HAWAII 96793  
(808) 244-6400  
FAX (808) 244-6411



THOMAS M. PHILLIPS  
CHIEF OF POLICE

KEKUHAUPIO R. AKANA  
DEPUTY CHIEF OF POLICE

March 24, 2006

**MEMORANDUM**

TO : MICHAEL W. FOLEY, PLANNING DIRECTOR  
FROM : THOMAS M. PHILLIPS, CHIEF OF POLICE  
SUBJECT : I.D. : EA 2006/0001; DBA 2001/0003; CPA  
2001/0005; CIZ 2001/0011; SM1 2001/0017  
TMK : (2) 2-1-007:066  
Project  
Name : 4-Unit, Single-Family Condominium at Makena  
Applicant : Pacific Rim Land, Inc. c/o MuneKlyo & Hiraga

- No recommendation or comment to offer.  
 Refer to enclosed comments and/or recommendations.

As always, thank you for giving us the opportunity to comment on this project.

Assistant Chief Sydney Kikuchi  
For: THOMAS M. PHILLIPS  
Chief of Police

Enclosure



TO : THOMAS PHILLIPS, CHIEF OF POLICE, COUNTY OF MAUI  
VIA : CHANNELS *TE* ... *03/23/06*  
FROM : BRAD HICKLE, POLICE OFFICER III, DISTRICT VI KIHUI  
SUBJECT : ENVIRONMENTAL ASSESSMENT (EA 2006/0001) DISTRICT  
BOUNDARY AMENDMENT (DBA 2001/0003) COMMUNITY  
PLAN AMENDMENT (CPA 2001/0005) CHANGE IN ZONING  
(CIZ 2001/0011) SPECIAL MANAGEMENT AREA PERMIT  
(SMA I 2001/0017) FOR A 4-UNIT, SINGLE FAMILY CONDO  
AT TMK: 2-1-007:066, MAKENA, MAUI

Sirs, on 02/24/06 this Officer received a copy of the above application for EA 2006/0001, DBA 2001/0003, CPA 2001/0005, CIZ 2001/0011 and SM I 2001/0017 for the 4-unit, Single-Family Condominiums at Makena, Maui.

**APPLICATION INFORMATION:**

The application was prepared by Munekiyo & Hiraga, Inc. for the applicant Pacific Rim Land, Inc.

The applicant is proposing the development of a four-unit single-family condominium with related site improvements. The subject parcel of land is approximately 1.552 acres in size and was formerly occupied by a single-family dwelling, as well as two storage sheds and a temporary garage which have all been removed. The subject property is located off Makena-Keoneoio Road in Makena.

**IMPACT ON POLICE:**

With the development of any new property there will also be increased opportunity for criminal activities to occur. Newly developed properties are statistically more prone to crime and criminal activities.

Although I do not believe that any one property or new development will have a great impact on Police services. This one development combined with the many other newly developed properties will.

Along with any new development we can expect to see an increase in motor vehicle accidents, incidents of domestic violence, burglaries and Police response to home alarms. These cases are only a few examples of Police calls for service which require two officers to respond to at one time. This will leave only two to three officers available to respond to additional cases from Maalaea to La Perouse. In reality, "properties in south Maui are being developed for housing faster than officers are being hired and trained to handle the needs of the community"! All developments will have some impact on Police services.

# CORRECTION

THE PRECEDING DOCUMENT(S) HAS  
BEEN REPHOTOGRAPHED TO ASSURE  
LEGIBILITY  
SEE FRAME(S)  
IMMEDIATELY FOLLOWING

DOCUMENT CAPTURED AS RECEIVED

TO : THOMAS PHILLIPS, CHIEF OF POLICE, COUNTY OF MAUI  
VIA : CHANNELS *CH* 03/23/06  
FROM : BRAD HICKLE, POLICE OFFICER III, DISTRICT VI KIHEI  
SUBJECT : ENVIRONMENTAL ASSESSMENT (EA 2006/0001) DISTRICT  
BOUNDARY AMENDMENT (DBA 2001/0003) COMMUNITY  
PLAN AMENDMENT (CPA 2001/0005) CHANGE IN ZONING  
(CIZ 2001/0011) SPECIAL MANAGEMENT AREA PERMIT  
(SMA 1 2001/0017) FOR A 4-UNIT, SINGLE FAMILY CONDO  
AT TMK: 2-1-007:066, MAKENA, MAUI

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DOCUMENT CAPTURED AS RECEIVED

COMMUNITY SAFETY CONCERNS:

Page 3

With the growing awareness and concerns for Public Safety we are suggesting the applicant include in this application a Community Evacuation Plan.

This information can then be added to the existing County Community Evacuation Plans which will be used to support the safe evacuation of future residents.

The information in the Community Evacuation plan should include a map indicating the most direct routes to State Highways and County roadways and a safe route out of the area.

CRIME PREVENTION RECOMMENDATIONS:

In an attempt to be more proactive towards crime prevention we are recommending the applicant use "Best Practices" in Crime Prevention Through Environmental Design "CPTED" when designing and developing this property.

CPTED is the framework whereby the design of buildings, placement of lighting and foliage are interwoven to discourage crime and criminal activities from occurring upon a property.

Studies have shown that the likelihood of criminals activities are greatly impacted by a criminal's perception of the entire environmental design of his/her prospective target.

To find out more about the CPTED principal on crime prevention you can refer to the National Criminal Justice Reference Service web site at, "http:www.ncjrs.org".

Respectfully Submitted,

Officer Brad Hickie

03/21/06

11:00 hours

Note: I concur with Ofc. B. HICKLE's assessment on the new proposed housing development that a slight impact on police services will occur. Recommend that developer take into consideration the use of "CPTED", as this would alleviate part of the impact that police would receive from the new development. Also recommend that a evacuation plan be submitted by the applicant.

A/T/c. Wade ANZAS #9243  
03/22/06 at 1550 hours.

*Wade*  
*at least 2 pages*  
*03/22/06 @ 0930 hours*



MICHAEL T. MUNEKIYO  
GWEN HASHI HIRAGA  
MITSURU "MICH" HIRANO

KARLYNN KAWAHARA

May 4, 2006

Thomas M. Phillips, Chief of Police  
Maui Police Department  
County of Maui  
55 Mahalani Street  
Wailuku, Hawaii 96793

SUBJECT: Draft Environmental Assessment for 4-Unit Single-Family  
Condominium, TMK 2-1-007:066, Makena, Maui, Hawaii

Dear Chief Phillips:

Thank you for your memorandum dated March 24, 2006 to Michael Foley, Planning Director, providing comments on the subject application. On behalf of the applicant, Pacific Rim Land, Inc., we wish to provide the following information in response to your comments.

1. **Response to comments on cumulative impacts**

The Kihei-Makena Community Plan reflects current and projected conditions in South Maui and sets forth goals, objectives, policies, and recommendations to guide the development of the region, as well as enhance its overall living environment. In developing the community plan, requirements for public services and facilities, such as police, fire, health, recreation, education and solid waste disposal, and the adequacy of infrastructure, such as water, wastewater, drainage and roadway systems, were considered. Conformance with the Kihei-Makena Community Plan, as well as other State and County land use policies, plans, and controls involves the appropriate and adequate mitigation of impacts relating to the proposed action. Public services and facilities which serve the South Maui community must be expanded over time to accommodate the anticipated regional population growth. From this standpoint, additional tax revenues generated by the long-term regional and island wide development will need to be applied for the provision of public services and facilities.

2. **Response to comments on Community Safety Concerns**

The comments regarding the development of a Community Evacuation Plan (CEP) are noted. The applicant will have discussions with the Makena Community Association (MCA) about the need for the development of a CEP. The project site

Thomas M. Phillips, Chief of Police  
May 4, 2006  
Page 2

also has two (2) vehicle access points to Makena-Keoneoio Road, a tsunami evacuation route.

3. **Response to comments on the use of CPTED**

The comments regarding use of Crime Prevention Through Environmental Design (CPTED) are noted. The applicant has forwarded your comments to the project's architect and landscape architect, who will review possible CPTED features, as appropriate.

Again, thank you for your review of the application and comments provided.

Very truly yours,

  
Karynn Kawahara  
Project Manager

KK:lh

cc: John Maloney, Pacific Rim Land, Inc.  
Greg Bayless, Farrington Bayless Architects, Inc.  
Bryan Maxwell, Maxwell Design Group  
Michael W. Foley, Department of Planning

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ALAN M. ARAKAWA  
Mayor



**DEPARTMENT OF WATER SUPPLY**  
COUNTY OF MAUI  
200 SOUTH HIGH STREET  
WAILUKU, MAUI, HAWAII 96793-2155  
www.mauiwater.org

APR 04 2008

GEORGE Y. TENGAN  
Director

ERIC H. YAMASHIGE, P.E., L.S.  
Deputy Director

March 28, 2006

Mr. Michael W. Foley, Director  
Planning Department  
250 South Street  
Wailuku, HI 96793  
Attn: Ms. Kivette A. Caigoy

SUBJECT: ID: EA 2006/0001, DBA 2001/0003, CPA 2001/0005, CIZ 2001/0011  
TMK: (2) 2-1-007:066  
Project Name: 4-Unit, Single Family Condominium at Makena

Dear Mr. Foley:

This letter supplements our comment letter of October 1, 2001, a copy of which is included in the application material.

**Source Availability and Consumption**

The project site is served by the Central Maui System. The main sources of water for this system are the designated Iao aquifer, Waihee aquifer, the Iao tunnel and the Iao-Waikapu Ditch. DWS will not issue reservations for future meters until new sources are brought on-line. New source development projects include Kupaa well and expansion of the Iao Treatment Plant. Water for new projects may not be available until these sources are on-line.

Anticipated consumption for the project build-out is estimated at 8,300 gallons per day.

**System Infrastructure**

The project site is served by an 8-inch waterline which runs along Makena -Keoneoio Road and 2 fire hydrants situated within 350 feet of the property. The applicant stated that there are four 5/8-inch water meters on the property. Our records indicate that there are four 3/4-inch and one 1-inch meters installed on the subject parcel which show no consumption at this time.

**Pollution Prevention**

The project overlies the Kamaole aquifer with has an estimated sustainable yield of 11 MGD. In order to protect ground and surface water resources, we recommend that the applicant utilize Best Management Practices (BMPs) designed to minimize infiltration and runoff from construction and vehicle operations.

*"By Water All Things Find Life"*

(2)

Page 2

4-Unit Single Family Condominium at Makena

Mr. Michael W. Foley

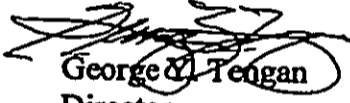
March 28, 2006

We have attached sample BMPs for principle operations for reference. Additional mitigation measures are enumerated below and should be implemented during construction:

1. Prevent cement products, oil, fuel and other toxic substances from falling or leaching into the water.
2. Properly and promptly dispose of all loosened and excavated soil and debris material from drainage structure work.
3. Retain ground cover until the last possible date.
4. Stabilize denuded areas by sodding or planting as soon as possible. Replanting should include soil amendments, fertilizers and temporary irrigation. Use high seeding rates to ensure rapid stand establishment.
5. Avoid fertilizers and biocides, or apply only during periods of low rainfall to minimize chemical run-off.
6. Keep run-off on site.

Should you have any questions regarding system infrastructure and requirements, please call our Engineering Division at 270-7835 and any questions on source availability or conservation and resource matters, please contact our Water Resources and Planning Division at 244-8550.

Sincerely,

  
George W. Tengan  
Director  
eam

c: engineering division  
applicant, with attachment:  
Selected BMP's from "Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters"-EPA

C:\Documents and Settings\County Employee\Local Settings\Temp\SF Condominium at Makena.wpd



United States  
Environmental Protection  
Agency

Office of Water  
Washington, DC 20460

840-8-92-002  
January 1993



# Guidance Specifying Management Measures For Sources Of Nonpoint Pollution In Coastal Waters

Issued Under the Authority of  
Section 6217(g) of the Coastal Zone Act  
Reauthorization Amendments of 1990

### III. CONSTRUCTION ACTIVITIES

#### A. Construction Site Erosion and Sediment Control Management Measure

- (1) Reduce erosion and, to the extent practicable, retain sediment onsite during and after construction, and
- (2) Prior to land disturbance, prepare and implement an approved erosion and sediment control plan or similar administrative document that contains erosion and sediment control provisions.

#### 1. Applicability

This management measure is intended to be applied by States to all construction activities on sites less than 5 acres in areas that do not have an NPDES permit<sup>3</sup> in order to control erosion and sediment loss from those sites. This management measure does not apply to: (1) construction of a detached single family home on a site of 1/2 acre or more or (2) construction that does not disturb over 5,000 square feet of land on a site. (NOTE: All construction activities, including clearing, grading, and excavation, that result in the disturbance of areas greater than or equal to 5 acres or are a part of a larger development plan are covered by the NPDES regulations and are thus excluded from these requirements.) Under the Coastal Zone Act Reauthorization Amendments of 1990, States are subject to a number of requirements as they develop coastal NPS programs in conformity with this management measure and will have flexibility in doing so. The application of management measures by States is described more fully in *Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance*, published jointly by the U.S. Environmental Protection Agency (EPA) and the National Oceanic and Atmospheric Administration (NOAA) of the U.S. Department of Commerce.

#### 2. Description

The goal of this management measure is to reduce the sediment loadings from construction sites in coastal areas that enter surface waterbodies. This measure requires that coastal States establish new or enhance existing State erosion and sediment control (ESC) programs and/or require ESC programs at the local level. It is intended to be part of a comprehensive land use or watershed management program, as previously detailed in the Watershed and Site Development Management Measures. It is expected that State and local programs will establish criteria determined by local conditions (e.g., soil types, climate, meteorology) that reduce erosion and sediment transport from construction sites.

Runoff from construction sites is by far the largest source of sediment in urban areas under development (York County Soil and Water Conservation District, 1990). Soil erosion removes over 90 percent of sediment by tonnage in urbanizing areas where most construction activities occur (Canning, 1988). Table 4-14 illustrates some of the

<sup>3</sup> On May 27, 1992, the United States Court of Appeals for the Ninth Circuit invalidated EPA's exemption of construction sites smaller than 5 acres from the storm water permit program in *Natural Resources Defense Council v. EPA*, 965 F.2d 759 (9th Cir. 1992). EPA is conducting further rulemaking proceedings on this issue and will not require permit applications for construction activities under 5 acres until further rulemaking has been completed.

measured sediment loading rates associated with construction activities found across the United States. As seen in Table 4-14, erosion rates from natural areas such as undisturbed forested lands are typically less than one ton/acre/year, while erosion from construction sites ranges from 7.2 to over 1,000 tons/acre/year.

Table 4-14. Erosion and Sediment Problems Associated With Construction

Location	Problem	Reference
United States	Sediment loading rates vary from 36.5 to 1,000 ton/ac/yr. These are 5 to 500 times greater than those from undeveloped land. Approximately 600 million tons of soil erodes from developed sites each year. Construction site sediment in runoff can be 10 to 20 times greater than that from agricultural lands.	York County Soil and Water Conservation District, 1990
Franklin County, FL	Sediment yield (ton/ac/yr): forest < 0.5 rangeland < 0.5 tilled 1.4 construction site 30 established urban < 0.5	Franklin County, FL
Wisconsin	Erosion rates range from 30 to 200 ton/ac/yr (10 to 20 times those of cropland).	Wisconsin Legislative Council, 1991
Washington, DC	Erosion rates range from 35 to 45 ton/ac/yr (10 to 100 times greater than agriculture and stabilized urban land uses).	MWCOG, 1987
Anacostia River Basin, VA, MD, DC	Sediment yields from portions of the Anacostia Basin have been estimated at 75,000 to 132,000 ton/yr.	U.S. Army Corps of Engineers, 1990
Washington	Erosion rates range from 50 to 500 ton/ac/yr. Natural erosion rates from forests or well-sodded prairies are 0.01 to 1.0 ton/ac/yr.	Washington Department of Ecology, 1989
Anacostia River Basin, VA, MD, DC	Erosion rates range from 7.2 to 100.8 ton/ac/yr.	USGS, 1978
Alabama North Carolina Louisiana Oklahoma Georgia Texas Tennessee Pennsylvania Ohio Kentucky	1.4 million tons eroded per year. 6.7 million tons eroded per year. 5.1 million tons eroded per year. 4.2 million tons eroded per year. 3.8 million tons eroded per year. 3.5 million tons eroded per year. 3.3 million tons eroded per year. 3.1 million tons eroded per year. 3.0 million tons eroded per year. 3.0 million tons eroded per year.	Woodward-Clyde, 1991

Eroded sediment from construction sites creates many problems in coastal areas including adverse impacts on water quality, critical habitats, submerged aquatic vegetation (SAV) beds, recreational activities, and navigation (APWA, 1991). For example, the Miami River in Florida has been severely affected by pollution associated with upland erosion. This watershed has undergone extensive urbanization, which has included the construction of many commercial and residential buildings over the past 50 years. Sediment deposited in the Miami River channel contributes to the severe water quality and navigation problems of this once-thriving waterway, as well as Biscayne Bay (SFWMD, 1988).

ESC plans are important for controlling the adverse impacts of construction and land development and have been required by many State and local governments, as shown in Table 4-13 (in the Site Development section of this chapter). An ESC plan is a document that explains and illustrates the measures to be taken to control erosion and sediment problems on construction sites (Connecticut Council on Soil and Water Conservation, 1988). It is intended that existing State and local erosion and sediment control plans may be used to fulfill the requirements of this management measure. Where existing ESC plans do not meet the management measure criteria, inadequate plans may be enhanced to meet the management measure guidelines.

Typically, an ESC plan is part of a larger site plan and includes the following elements:

- Description of predominant soil types;
- Details of site grading including existing and proposed contours;
- Design details and locations for structural controls;
- Provisions to preserve topsoil and limit disturbance;
- Details of temporary and permanent stabilization measures; and
- Description of the sequence of construction.

ESC plans ensure that provisions for control measures are incorporated into the site planning stage of development and provide for the reduction of erosion and sediment problems and accountability if a problem occurs (York County Soil and Water Conservation District, 1990). An effective plan for urban runoff management on construction sites will control erosion, retain sediments on site, to the extent practicable, and reduce the adverse effects of runoff. Climate, topography, soils, drainage patterns, and vegetation will affect how erosion and sediment should be controlled on a site (Washington State Department of Ecology, 1989). An effective ESC plan includes both structural and nonstructural controls. Nonstructural controls address erosion control by decreasing erosion potential, whereas structural controls are both preventive and mitigative because they control both erosion and sediment movement.

Typical nonstructural erosion controls include (APWA, 1991; York County Soil and Water Conservation District, 1990):

- Planning and designing the development within the natural constraints of the site;
- Minimizing the area of bare soil exposed at one time (phased grading);
- Providing for stream crossing areas for natural and man-made areas; and
- Stabilizing cut-and-fill slopes caused by construction activities.

Structural controls include:

- Perimeter controls;
- Mulching and seeding exposed areas;
- Sediment basins and traps; and
- Filter fabric, or silt fences.

Some erosion and soil loss are unavoidable during land-disturbing activities. While proper siting and design will help prevent areas prone to erosion from being developed, construction activities will invariably produce conditions where erosion may occur. To reduce the adverse impacts associated with construction, the construction management measure suggests a system of nonstructural and structural erosion and sediment controls for incorporation into an

ESC plan. Erosion controls have distinct advantages over sediment controls. Erosion controls reduce the amount of sediment transported off-site, thereby reducing the need for sediment controls. When erosion controls are used in conjunction with sediment controls, the size of the sediment control structures and associated maintenance may be reduced, decreasing the overall treatment costs (SWRPC, 1991).

### 3. Management Measure Selection

This management measure was selected to minimize sediment being transported outside the perimeter of a construction site through two broad performance goals: (1) reduce erosion and (2) retain sediment onsite, to the extent practicable. These performance goals were chosen to allow States and local governments flexibility in specifying practices appropriate for local conditions.

While several commentors responding to the draft (May 1991) guidance expressed the need to define "more measurable, enforceable ways" to control sediment loadings, other commentors stressed the need to draft management measures that do not conflict with existing State programs and allow States and local governments to determine appropriate practices and design standards for their communities. These management measures were selected because virtually all coastal States control construction activities to prevent erosion and sediment loss.

The measures were specifically written for the following reasons:

- (1) Predevelopment loadings may vary greatly, and some sediment loss is usually inevitable;
- (2) Current practice is built on the use of systems of practices selected based on site-specific conditions; and
- (3) The combined effectiveness of erosion and sediment controls in systems is not easily quantified.

### 4. Erosion Control Practices

As discussed more fully at the beginning of this chapter and in Chapter 1, the following practices are described for illustrative purposes only. State programs need not require implementation of these practices. However, as a practical matter, EPA anticipates that the management measure set forth above generally will be implemented by applying one or more management practices appropriate to the source, location, and climate. The practices set forth below have been found by EPA to be representative of the types of practices that can be applied successfully to achieve the management measure described above.

Erosion controls are used to reduce the amount of sediment that is detached during construction and to prevent sediment from entering runoff. Erosion control is based on two main concepts: (1) disturb the smallest area of land possible for the shortest period of time, and (2) stabilize disturbed soils to prevent erosion from occurring.

#### **a.** *Schedule projects so clearing and grading are done during the time of minimum erosion potential.*

Often a project can be scheduled during the time of year that the erosion potential of the site is relatively low. In many parts of the country, there is a certain period of the year when erosion potential is relatively low and construction scheduling could be very effective. For example, in the Pacific region if construction can be completed during the 6-month dry season (May 1 - October 31), temporary erosion and sediment controls may not be needed. In addition, in some parts of the country erosion potential is very high during certain parts of the year such as the spring thaw in northern areas. During this time of year, melting snowfall generates a constant runoff that can erode soil. In addition, construction vehicles can easily turn the soft, wet ground into mud, which is more easily washed offsite. Therefore, in the north, limitations should be placed on grading during the spring thaw (Goldman et al., 1986).

**■ b. Stage construction.**

Avoid areawide clearance of construction sites. Plan and stage land disturbance activities so that only the area currently under construction is exposed. As soon as the grading and construction in an area are complete, the area should be stabilized.

By clearing only those areas immediately essential for completing site construction, buffer zones are preserved and soil remains undisturbed until construction begins. Physical markers, such as tape, signs, or barriers, indicating the limits of land disturbance, can ensure that equipment operators know the proposed limits of clearing. The area of the watershed that is exposed to construction is important for determining the net amount of erosion. Reducing the extent of the disturbed area will ultimately reduce sediment loads to surface waters. Existing or newly planted vegetation that has been planted to stabilize disturbed areas should be protected by routing construction traffic around and protecting natural vegetation with fencing, tree armoring, retaining walls, or tree wells.

**■ c. Clear only areas essential for construction.**

Often areas of a construction site are unnecessarily cleared. Only those areas essential for completing construction activities should be cleared, and other areas should remain undisturbed. Additionally, the proposed limits of land disturbance should be physically marked off to ensure that only the required land area is cleared. Avoid disturbing vegetation on steep slopes or other critical areas.

**■ d. Locate potential nonpoint pollutant sources away from steep slopes, waterbodies, and critical areas.**

Material stockpiles, borrow areas, access roads, and other land-disturbing activities can often be located away from critical areas such as steep slopes, highly erodible soils, and areas that drain directly into sensitive waterbodies.

**■ e. Route construction traffic to avoid existing or newly planted vegetation.**

Where possible, construction traffic should travel over areas that must be disturbed for other construction activity. This practice will reduce the area that is cleared and susceptible to erosion.

**■ f. Protect natural vegetation with fencing, tree armoring, and retaining walls or tree wells.**

Tree armoring protects tree trunks from being damaged by construction equipment. Fencing can also protect tree trunks, but should be placed at the tree's drip line so that construction equipment is kept away from the tree. The tree drip line is the minimum area around a tree in which the tree's root system should not be disturbed by cut, fill, or soil compaction caused by heavy equipment. When cutting or filling must be done near a tree, a retaining wall or tree well should be used to minimize the cutting of the tree's roots or the quantity of fill placed over the tree's roots.

**■ g. Stockpile topsoil and reapply to revegetate site.**

Because of the high organic content of topsoil, it cannot be used as fill material or under pavement. After a site is cleared, the topsoil is typically removed. Since topsoil is essential to establish new vegetation, it should be stockpiled and then reapplied to the site for revegetation, if appropriate. Although topsoil salvaged from the existing site can often be used, it must meet certain standards and topsoil may need to be imported onto the site if the existing topsoil is not adequate for establishing new vegetation.

**h. Cover or stabilize topsoil stockpiles.**

Unprotected stockpiles are very prone to erosion and therefore stockpiles must be protected. Small stockpiles can be covered with a tarp to prevent erosion. Large stockpiles should be stabilized by erosion blankets, seeding, and/or mulching.

**i. Use wind erosion controls.**

Wind erosion controls limit the movement of dust from disturbed soil surfaces and include many different practices. Wind barriers block air currents and are effective in controlling soil blowing. Many different materials can be used as wind barriers, including solid board fence, snow fences, and bales of hay. Sprinkling moistens the soil surface with water and must be repeated as needed to be effective for preventing wind erosion (Delaware DNREC, 1989); however, applications must be monitored to prevent excessive runoff and erosion.

**j. Intercept runoff above disturbed slopes and convey it to a permanent channel or storm drain.**

Earth dikes, perimeter dikes or swales, or diversions can be used to intercept and convey runoff above disturbed areas. An earth dike is a temporary berm or ridge of compacted soil that channels water to a desired location. A perimeter dike/swale or diversion is a swale with a supporting ridge on the lower side that is constructed from the soil excavated from the adjoining swale (Delaware DNREC, 1989). These practices should be used to intercept flow from denuded areas or newly seeded areas to keep the disturbed areas from being eroded from the uphill runoff. The structures should be stabilized within 14 days of installation. A pipe slope drain, also known as a pipe drop structure, is a temporary pipe placed from the top of a slope to the bottom of the slope to convey concentrated runoff down the slope without causing erosion (Delaware DNREC, 1989).

**k. On long or steep, disturbed, or man-made slopes, construct benches, terraces, or ditches at regular intervals to intercept runoff.**

Benches, terraces, or ditches break up a slope by providing areas of low slope in the reverse direction. This keeps water from proceeding down the slope at increasing volume and velocity. Instead, the flow is directed to a suitable outlet, such as a sediment basin or trap. The frequency of benches, terraces, or ditches will depend on the erodibility of the soils, steepness and length of the slope, and rock outcrops. This practice should be used if there is a potential for erosion along the slope.

**l. Use retaining walls.**

Often retaining walls can be used to decrease the steepness of a slope. If the steepness of a slope is reduced, the runoff velocity is decreased and, therefore, the erosion potential is decreased.

**m. Provide linings for urban runoff conveyance channels.**

Often construction increases the velocity and volume of runoff, which causes erosion in newly constructed or existing urban runoff conveyance channels. If the runoff during or after construction will cause erosion in a channel, the channel should be lined or flow control BMPs installed. The first choice of lining should be grass or sod since this reduces runoff velocities and provides water quality benefits through filtration and infiltration. If the velocity in the channel would erode the grass or sod, then riprap, concrete, or gabions can be used.

**n. Use check dams.**

Check dams are small, temporary dams constructed across a swale or channel. They can be constructed using gravel or straw bales. They are used to reduce the velocity of concentrated flow and, therefore, to reduce the erosion in

a swale or channel. Check dams should be used when a swale or channel will be used for a short time and therefore it is not feasible or practical to line the channel or implement flow control BMPs (Delaware DNREC, 1989).

■ o. *Seed and fertilize.*

Seeding establishes a vegetative cover on disturbed areas. Seeding is very effective in controlling soil erosion once a dense vegetative cover has been established. However, often seeding and fertilizing do not produce as thick a vegetative cover as do seed and mulch or netting. Newly established vegetation does not have as extensive a root system as existing vegetation and therefore is more prone to erosion, especially on steep slopes. Care should be taken when fertilizing to avoid untimely or excessive application. Since the practice of seeding and fertilizing does not provide any protection during the time of vegetative establishment, it should be used only on favorable soils in very flat areas and not in sensitive areas.

■ p. *Use seeding and mulch/mats.*

Seeding establishes a vegetative cover on disturbed areas. Seeding is very effective in controlling soil erosion once the vegetative cover has been established. The mulching/mats protect the disturbed area while the vegetation becomes established.

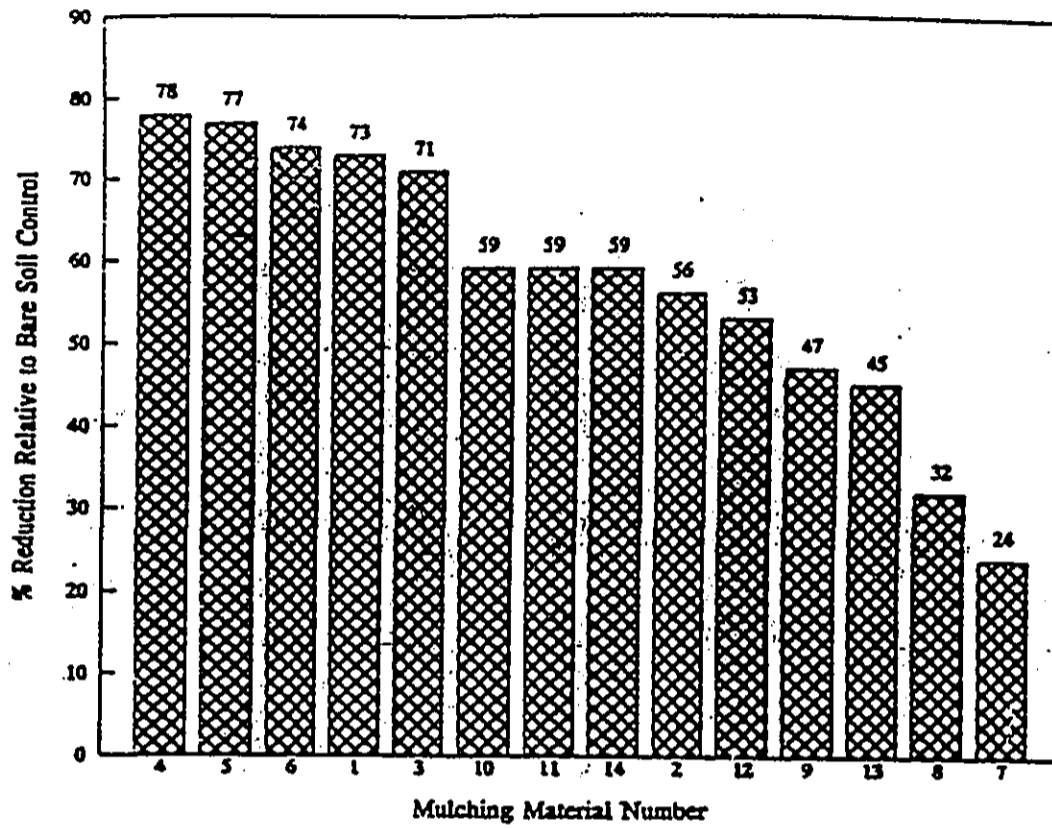
The management of land by using ground cover reduces erosion by reducing the flow rate of runoff and the raindrop impact. Bare soils should be seeded or otherwise stabilized within 15 calendar days after final grading. Denuded areas that are inactive and will be exposed to rain for 30 days or more should also be temporarily stabilized, usually by planting seeds and establishing vegetation during favorable seasons in areas where vegetation can be established. In very flat, non-sensitive areas with favorable soils, stabilization may involve simply seeding and fertilizing. Mulching and/or sodding may be necessary as slopes become moderate to steep, as soils become more erosive, and as areas become more sensitive.

■ q. *Use mulch/mats.*

Mulching involves applying plant residues or other suitable materials on disturbed soil surfaces. Mulchs/mats used include tacked straw, wood chips, and jute netting and are often covered by blankets or netting. Mulching alone should be used only for temporary protection of the soil surface or when permanent seeding is not feasible. The useful life of mulch varies with the material used and the amount of precipitation, but is approximately 2 to 6 months. Figure 4-5 shows water velocity reductions that could be expected using various mulching techniques. Similarly, Figure 4-6 shows reductions in soil loss achievable using various mulching techniques. During times of year when vegetation cannot be established, soil mulching should be applied to moderate slopes and soils that are not highly erodible. On steep slopes or highly erodible soils, multiple mulching treatments should be used. On a high-elevation or desert site where grasses cannot survive the harsh environment, native shrubs may be planted. Interlocking ceramic materials, filter fabric, and netting are available for this purpose. Before stabilizing an area, it is important to have installed all sediment controls and diverted runoff away from the area to be planted. Runoff may be diverted away from denuded areas or newly planted areas using dikes, swales, or pipe slope drains to intercept runoff and convey it to a permanent channel or storm drain. Reserved topsoil may be used to revegetate a site if the stockpile has been covered and stabilized.

Consideration should be given to maintenance when designing mulching and matting schemes. Plastic nets are often used to cover the mulch or mats; however, they can foul lawn mower blades if the area requires mowing.





Mulch Material	Characteristics
1	100% wheat straw/top net
2	100% wheat straw/two nets
3	70% wheat straw/30% coconut fiber
4	70% wheat straw/30% coconut fiber
5	100% coconut fiber
6	Nylon monofilament/two nets
7	Nylon monofilament/rigid/bonded
8	Vinyl monofilament/flexible/bonded
9	Curled wood fibers/top net
10	Curled wood fibers/two nets
11	Antiwash netting (jute)
12	Interwoven paper and thread
13	Uncrimped wheat straw - 2,242 kg/ha
14	Uncrimped wheat straw - 4,484 kg/ha

Figure 4-5. Water velocity reductions for different mulch treatments (adapted from Harding, 1990).

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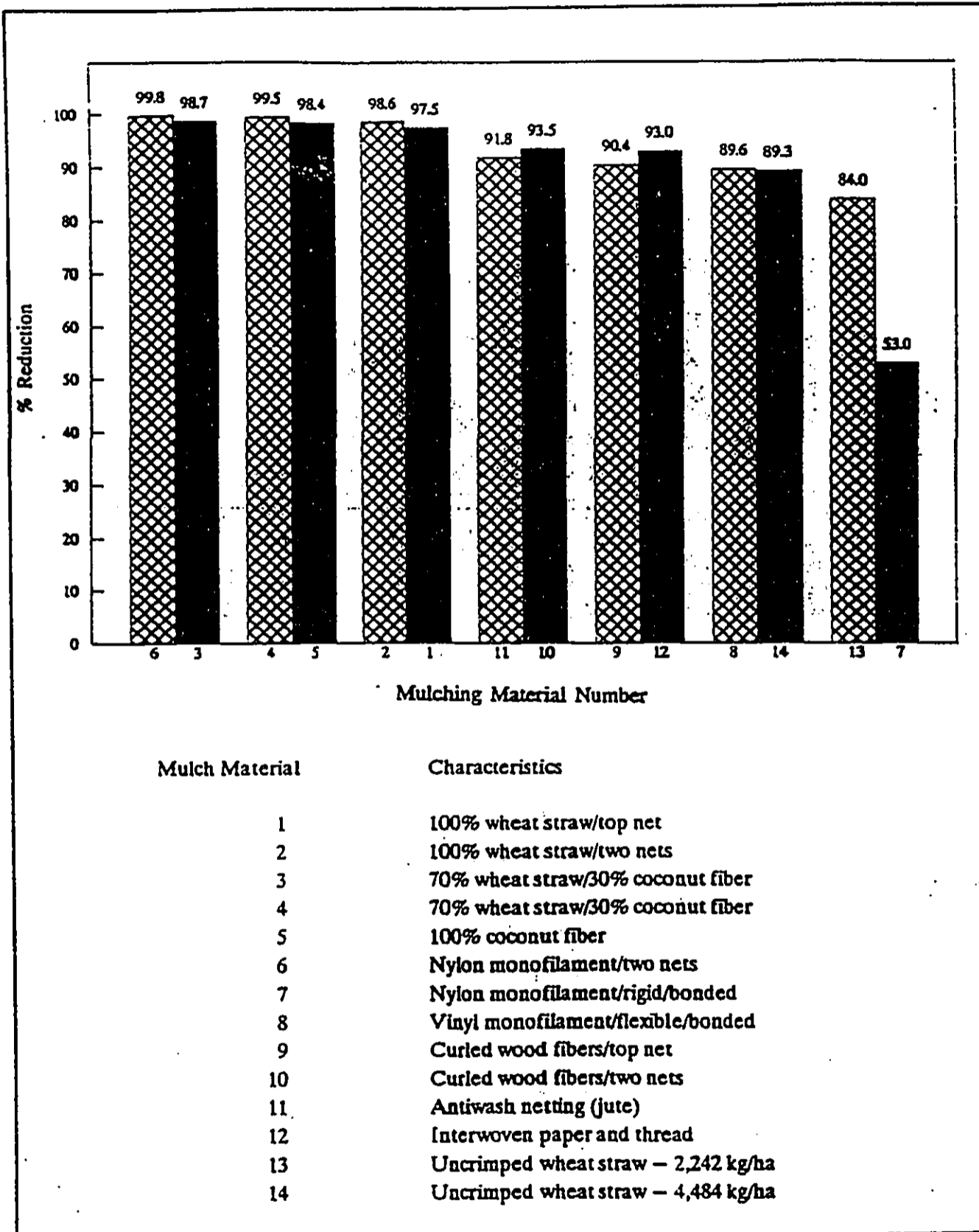


Figure 4-6. Actual soil loss reductions for different mulch treatments (adapted from Harding, 1990).

**r. Use sodding.**

Sodding permanently stabilizes an area. Sodding provides immediate stabilization of an area and should be used in critical areas or where establishment of permanent vegetation by seeding and mulching would be difficult. Sodding is also a preferred option when there is a high erosion potential during the period of vegetative establishment from seeding.

**s. Use wildflower cover.**

Because of the hardy drought-resistant nature of wildflowers, they may be more beneficial as an erosion control practice than turf grass. While not as dense as turfgrass, wildflower thatches and associated grasses are expected to be as effective in erosion control and contaminant absorption. Because thatches of wildflowers do not need fertilizers, pesticides, or herbicides, and watering is minimal, implementation of this practice may result in a cost savings (Brash et al., undated). In 1987, Howard County, Maryland, spent \$690.00 per acre to maintain turfgrass areas, compared to only \$31.00 per acre for wildflower meadows (Wilson, 1990).

A wildflower stand requires several years to become established; maintenance requirements are minimal once the area is established (Brash et al., undated).

## 5. Sediment Control Practices<sup>4</sup>

As discussed more fully at the beginning of this chapter and in Chapter 1, the following practices are described for illustrative purposes only. State programs need not require implementation of these practices. However, as a practical matter, EPA anticipates that the management measure set forth above generally will be implemented by applying one or more management practices appropriate to the source, location, and climate. The practices set forth below have been found by EPA to be representative of the types of practices that can be applied successfully to achieve the management measure described above.

Sediment controls capture sediment that is transported in runoff. Filtration and detention (gravitational settling) are the main processes used to remove sediment from urban runoff.

**a. Sediment Basins**

Sediment basins, also known as silt basins, are engineered impoundment structures that allow sediment to settle out of the urban runoff. They are installed prior to full-scale grading and remain in place until the disturbed portions of the drainage area are fully stabilized. They are generally located at the low point of sites, away from construction traffic, where they will be able to trap sediment-laden runoff.

Sediment basins are typically used for drainage areas between 5 and 100 acres. They can be classified as either temporary or permanent structures, depending on the length of service of the structure. If they are designed to function for less than 36 months, they are classified as "temporary"; otherwise, they are considered permanent structures. Temporary sediment basins can also be converted into permanent urban runoff management ponds. When sediment basins are designed as permanent structures, they must meet all standards for wet ponds.

**b. Sediment Trap**

Sediment traps are small impoundments that allow sediment to settle out of runoff water. Sediment traps are typically installed in a drainageway or other point of discharge from a disturbed area. Temporary diversions can be

<sup>4</sup>Adapted from Goldman (1986).

used to direct runoff to the sediment trap. Sediment traps should not be used for drainage areas greater than 5 acres and typically have a useful life of approximately 18 to 24 months.

#### ■ c. Filter Fabric Fence

Filter fabric fence is available from many manufacturers and in several mesh sizes. Sediment is filtered out as urban runoff flows through the fabric. Such fences should be used only where there is sheet flow (i.e., no concentrated flow), and the maximum drainage area to the fence should be 0.5 acre or less per 100 feet of fence. Filter fabric fences have a useful life of approximately 6 to 12 months.

#### ■ d. Straw Bale Barrier

A straw bale barrier is a row of anchored straw bales that detain and filter urban runoff. Straw bales are less effective than filter fabric, which can usually be used in place of straw bales. However, straw bales have been effectively used as temporary check dams in channels. As with filter fabric fences, straw bale barriers should be used only where there is sheet flow. The maximum drainage area to the barrier should be 0.25 acre or less per 100 feet of barrier. The useful life of straw bales is approximately 3 months.

#### ■ e. Inlet Protection

Inlet protection consists of a barrier placed around a storm drain drop inlet, which traps sediment before it enters the storm sewer system. Filter fabric, straw bales, gravel, or sand bags are often used for inlet protection.

#### ■ f. Construction Entrance

A construction entrance is a pad of gravel over filter cloth located where traffic leaves a construction site. As vehicles drive over the gravel, mud, and sediment are collected from the vehicles' wheels and offsite transport of sediment is reduced.

#### ■ g. Vegetated Filter Strips

Vegetated filter strips are low-gradient vegetated areas that filter overland sheet flow. Runoff must be evenly distributed across the filter strip. Channelized flows decrease the effectiveness of filter strips. Level spreading devices are often used to distribute the runoff evenly across the strip (Dillaha et al., 1989).

Vegetated filter strips should have relatively low slopes and adequate length and should be planted with erosion-resistant plant species. The main factors that influence the removal efficiency are the vegetation type, soil infiltration rate, and flow depth and travel time. These factors are dependent on the contributing drainage area, slope of strip, degree and type of vegetative cover, and strip length. Maintenance requirements for vegetated filter strips include sediment removal and inspections to ensure that dense, vigorous vegetation is established and concentrated flows do not occur. Maintenance of these structures is discussed in Section II.A of this chapter.

## 6. Effectiveness and Cost Information

#### ■ a. Erosion Control Practices

The effectiveness of erosion control practices can vary based on land slope, the size of the disturbed area, rainfall frequency and intensity, wind conditions, soil type, use of heavy machinery, length of time soils are exposed and unprotected, and other factors. In general, a system of erosion and sediment control practices can more effectively reduce offsite sediment transport than can a single system. Numerous nonstructural measures such as protecting natural or newly planted vegetation, minimizing the disturbance of vegetation on steep slopes and other highly

erodible areas, maximizing the distance eroded material must travel before reaching the drainage system, and locating roads away from sensitive areas may be used to reduce erosion.

Table 4-15 contains the available cost and effectiveness data for some of the erosion controls listed above. Information on the effectiveness of individual nonstructural controls was not available. All reported effectiveness data assume that controls are properly designed, constructed, and maintained. Costs have been broken down into annual capital costs, annual maintenance costs, and total annual costs (including annualization of the capital costs).

#### ■ b. Sediment Control Practices

Regular inspection and maintenance are needed for most erosion control practices to remain effective. The effectiveness of sediment controls will depend on the size of the construction site and the nature of the runoff flows. Sediment basins are most appropriate for drainage areas of 5 acres or greater. In smaller areas with concentrated flows, silt traps may suffice. Where concentrated flow leaves the site and the drainage area is less than 0.5 ac/100 ft of flow, filter fabric fences may be effective. In areas where sheet flow leaves the site and the drainage area is greater than 0.5 acre/100 ft of flow, perimeter dikes may be used to divert the flow to a sediment trap or sediment basin. Urban runoff inlets may be protected using straw bales or diversions to filter or route runoff away from the inlets.

Table 4-16 describes the general cost and effectiveness of some common sediment control practices.

#### ■ c. Comparisons

Figure 4-7 illustrates the estimated TSS loading reductions from Maryland construction sites possible using a combination of erosion and sediment controls in contrast to using only sediment controls. Figure 4-8 shows a comparison of the cost and effectiveness of various erosion control practices. As can be seen in Figure 4-8, seeding or seeding and mulching provide the highest levels of control at the lowest cost.

Table 4-15. ESC Quantitative Effectiveness and Cost Summary

Practice	Design Constraints or Purpose	Percent Removal of TSS	Useful Life (years) <sup>a</sup>	Construction Cost	Annual Maintenance Cost (as % construction cost)	Total Annual Cost
Sod	Immediate erosion protection where there is high erosion potential during vegetative establishment.	Average: 99% Observed range: 98% - 99% References: Minnesota Pollution Control Agency, 1989; Pennsylvania, 1983 cited in USEPA, 1991	2	Average: \$0.2 per ft <sup>2</sup> (\$11,300 per acre) Range: \$0.1 - \$1.1 References: SWRPC, 1991; Schueler, 1987; Virginia, 1980	Average: 5% Range: 5% Reference: SWRPC, 1991	\$0.20 per ft <sup>2</sup> \$7,500 per acre
Seed	Establish vegetation on disturbed area.	After vegetation established. Average: 80% Observed range: 50% - 100% References: SCS, 1985 cited in EPA, 1991; Minnesota Pollution Control Agency, 1989; Oberlin, 1984 cited in City of Austin, 1988; Delaware Department of Natural Resources, 1989	2	Average: \$400 per acre Range: \$200 - \$1000 per acre References: Wisconsin DOT cited in SWRPC, 1991; SWRPC, 1991; Goldman, 1988; Virginia, 1980	Average: 20% Range: 15% - 25% References: Wisconsin DOT cited in SWRPC, 1991; SWRPC, 1991	\$300 per acre
Seed and Mulch	Establish vegetation on disturbed area.	After vegetation established. Average: 80% Observed range: 50% - 100% References: SCS, 1985 cited in EPA, 1991; Minnesota Pollution Control Agency, 1989; Oberlin, 1984 cited in City of Austin, 1988; Delaware Department of Natural Resources, 1989	2	Average: \$1,500 per acre Range: \$800 - \$3,500 per acre References: Goldman, 1988; Washington DOT, 1990; NC State, 1990; Schueler, 1987; Virginia, 1980; SWRPC, 1991	Average: NA <sup>b</sup> Range: NA References: None	\$1,100 per acre

Table 4-15. (Continued)

Practices	Design Constraints or Purpose	Percent Removal of TSS	Useful Life (years) <sup>a</sup>	Construction Cost	Annual Maintenance Cost (as % construction cost)	Total Annual Cost
Mulch	Temporary stabilization of disturbed area.	Observed range: sand: wood fiber @ 1500 lb/ac wood fiber @ 3000 lb/ac straw @ 3000 lb/ac	Straw mulch: 0.25	Straw mulch: Average: \$1,700 per acre Range: \$500 - \$5,000 per acre References: Wisconsin DOT cited in SWRPC, 1991; Washington DOT, 1990; Virginia, 1980	Average: NA <sup>b</sup> Range: NA References: None	Straw mulch: \$7,500 per acre
		20% slope 50-60% 50-85% 80-100%	50% slope 0-20% 50-70% 85%	Wood fiber mulch: Average: \$1,000 per acre Range: \$100 - \$2,300 per acre References: Washington DOT, 1990; Virginia, 1980		Wood fiber mulch: \$3,500 per acre
		<u>Silt-foam:</u> wood fiber @ 1500 lb/ac wood fiber @ 3000 lb/ac straw @ 3000 lb/ac	Wood fiber mulch: 0.33			
		20% slope 20-60% 60-90% 80-95%	50% slope 40-60% 60-70% 70-90%			
		<u>Silt-clay-foam:</u> wood fiber @ 1500 lb/ac wood fiber @ 3000 lb/ac jute netting straw @ 3000 lb/ac wood chips @ 10,000 lb/ac mulch blanket excelsior blanket multiple treatment (straw and jute)	Jute netting: 0.33	Jute netting: Average: \$3,700 per acre Range: \$3,500-\$4,100 per acre References: Washington DOT, 1990; Virginia, 1980		Jute netting: \$12,500 per acre
		10-30% slope 5% 40% 30-60% 40-70% 60-80%	30-50% slope -- -- 30% 20-40% 50-60%	Straw and jute: Average: \$5,400 per acre Range: \$4,000-\$9,100 per acre References: Washington DOT, 1990; Virginia, 1980		Straw and jute: \$18,000 per acre
		60-80% 60-80% 90%	50-60% 50-80% 90% jute: 0.33			

References: Minnesota Pollution Control Agency, 1988; Kay, 1983 cited in Goldman, 1986

Table 4-15. (Continued)

Practice	Design Constraints or Purpose	Percent Removal of TSS	Useful Life (years) <sup>a</sup>	Construction Cost	Annual Maintenance Cost (as % construction cost)	Total Annual Cost
Terraces	Break up long or steep slopes.	Observed range: <u>Land Slope</u> 1-12% 12-18% 18-24%  <u>Reduction in Erosion</u> 70% 60% 55%	2	Average: \$5 per lin ft Range: \$1 - \$12 References: SWRPC, 1991; Goldman, 1986; Virginia, 1991	Average: 20% Range: 20% Reference: SWRPC, 1991	\$4 per lin ft
All Erosion Controls	Reduce amount of sediment entering runoff.	Additionally, if the slope steepness is halved, while other factors are held constant, the soil loss potential decreases 2-1/2 times. If both the slope and length are halved, the soil loss potential is decreased 4 times. References: Goldman, 1986; Beasley, 1972	--	Varies but typically low	Varies but typically low	Varies but typically low

NA - Not available.

<sup>a</sup> Useful life estimated as length of construction project (assumed to be 2 years).  
<sup>b</sup> For Total Annual Cost, assume Annual Maintenance Cost = 2% of construction cost.



Table 4-16. ESC Quantitative Effectiveness and Cost Summary for Sediment Control Practices

Practice	Design Constraints or Purpose	Percent Removal of TSS	Useful Life (years) <sup>a</sup>	Construction Cost	Annual Maintenance Cost (as % construction cost)	Total Annual Cost
Sediment basin	Minimum drainage area = 5 acres, maximum drainage area = 100 acres	Average: 70%	2	Less than 50,000 ft <sup>3</sup> storage	Average: 25%	Less than 50,000 ft <sup>3</sup> storage
		Observed range: 55% - 100%; References: Schueler, 1990; Engle, BW and Jarrett, AR, 1990; Baumann, 1990		Average: \$0.60 per ft <sup>3</sup> storage (\$1,100 per drainage acre) <sup>b</sup> Range: \$0.20 - \$1.30 per ft <sup>3</sup> storage	Range: 25% References: Denver COG cited in SWRPC, 1991; SWRPC, 1991	\$0.40 per ft <sup>3</sup> storage \$700 per drainage acre <sup>b</sup>
Sediment trap	Maximum drainage area = 5 acres	Average: 60%	1.5	Greater than 50,000 ft <sup>3</sup> storage	Average: 20%	Greater than 50,000 ft <sup>3</sup> storage
		Observed range: (-7%) - 100% References: Schueler, et al., 1990; Tahoe Regional Planning Agency, 1989; Baumann, 1990		Average: \$0.3 per ft <sup>3</sup> storage (\$550 per drainage acre) <sup>c</sup> Range: \$0.10 - \$0.40 per ft <sup>3</sup> storage References: SWRPC, 1991	Range: 20% References: Denver COG cited in SWRPC, 1991; SWRPC, 1991; Goldman, 1988	\$0.20 per ft <sup>3</sup> storage \$900 per drainage acre <sup>c</sup>
Filter Fabric Fence	Maximum drainage area = 0.5 acre per 100 feet of fence. Not to be used in concentrated flow areas.	Average: 70%	0.5	Average: \$0.60 per ft <sup>3</sup> storage (\$1,100 per drainage acre) <sup>d</sup> Range: \$0.20 - \$2.00 per ft <sup>3</sup> storage References: Denver COG cited in SWRPC, 1991; SWRPC, 1991; Goldman, 1988; Virginia, 1991; NC State, 1990	Average: 100%	\$0.70 per ft <sup>3</sup> storage \$1,300 per drainage acre <sup>c</sup>
		Observed range: 0% - 100% sand; 80% - 99% silt-loam; 50% - 80% silt-clay-loam; 0% - 20% References: Munson, 1991; Fisher et al., 1984; Minnesota Pollution Control Agency, 1989		Range: 100% References: SWRPC, 1991	\$7 per lin ft \$850 per drainage acre <sup>c</sup>	

Table 4-16. (Continued)

Practice	Design Constraints or Purpose	Percent Removal of TSS	Useful Life (years) <sup>e</sup>	Construction Cost	Annual Maintenance Cost (as % construction cost)	Total Annual Cost
Straw Bale Barrier	Maximum drainage area = 0.25 acre; per 100 feet of barrier. Not to be used in concentrated flow areas.	Average: 70% Observed Range: 70% References: Virginia, 1980 cited in EPA, 1991	0.25	Average: \$4 per lin ft (\$1,600 per drainage acre <sup>d</sup> ) Range: \$2 - \$6 per lin ft References: Goldman, 1986; Virginia, 1991	Average: 100% Range: 100% References: SWRPC, 1991	\$17 per lin ft \$6,800 per drainage acre <sup>d</sup>
Inlet Protection	Protect storm drain inlet.	Average: NA Observed Range: NA References: None	1	Average: \$100 per inlet Range: \$50 - \$150 References: SWRPC, 1991; Denver COG cited in SWRPC, 1991; Virginia, 1991; EPA cited in SWRPC, 1991	Average: 60% Range: 20% - 100% References: SWRPC, 1991; Denver COG cited in SWRPC, 1991	\$150 per inlet
Construction Entrance	Removes sediment from vehicles wheels.	Average: NA Observed Range: NA References: None	2	Average: \$2,000 each Range: \$1,000 - \$4,000 References: Goldman, 1986; NC State, 1990	Average: NA <sup>e</sup> Range: NA References: None	\$1,500 each
				With washrack: Average: \$3,000 each Range: \$1,000 - \$5,000 References: Virginia, 1991		\$2,200 each

Table 4-16. (Continued)

Practice	Design Constraints or Purpose	Percent Removal of TSS	Useful Life (years) <sup>a</sup>	Construction Cost	Annual Maintenance Cost (as % construction cost)	Total Annual Cost
Vegetative Filter Strip	Must have sheet flow.	Average: 70% Observed Range: 20% - 80% References: Hayes and Halretton, 1983 cited in Casman, 1990; Dittaha et al., 1989, cited in Glick et al., 1991; Virginia Department of Conservation, 1987; Nonpoint Source Control Task Force, 1983 cited in Minnesota PCA, 1988; Schueler, 1987	2	Established from existing vegetation. Average: \$0 Range: \$0 References: Schueler, 1987	Average: NA Range: NA References: None	NA
				Established from sod. Average: \$11,300 per acre Range: \$4,500 - \$48,000 per acre References: Schueler, 1987; SWRPC, 1991		

NA - Not available.

- <sup>a</sup> Useful life estimated as length of construction project (assumed to be 2 years)
- <sup>b</sup> For Total Annual Cost, assume Annual Maintenance Cost=20% of construction cost.
- <sup>c</sup> Assumes trap volume = 1800 cf/ac (0.5 inches runoff per acre).
- <sup>d</sup> Assumes drainage area of 0.5 acre per 100 feet of fence (maximum allowed).
- <sup>e</sup> Assumes drainage area of 0.25 acre per 100 feet of barrier (maximum allowed).

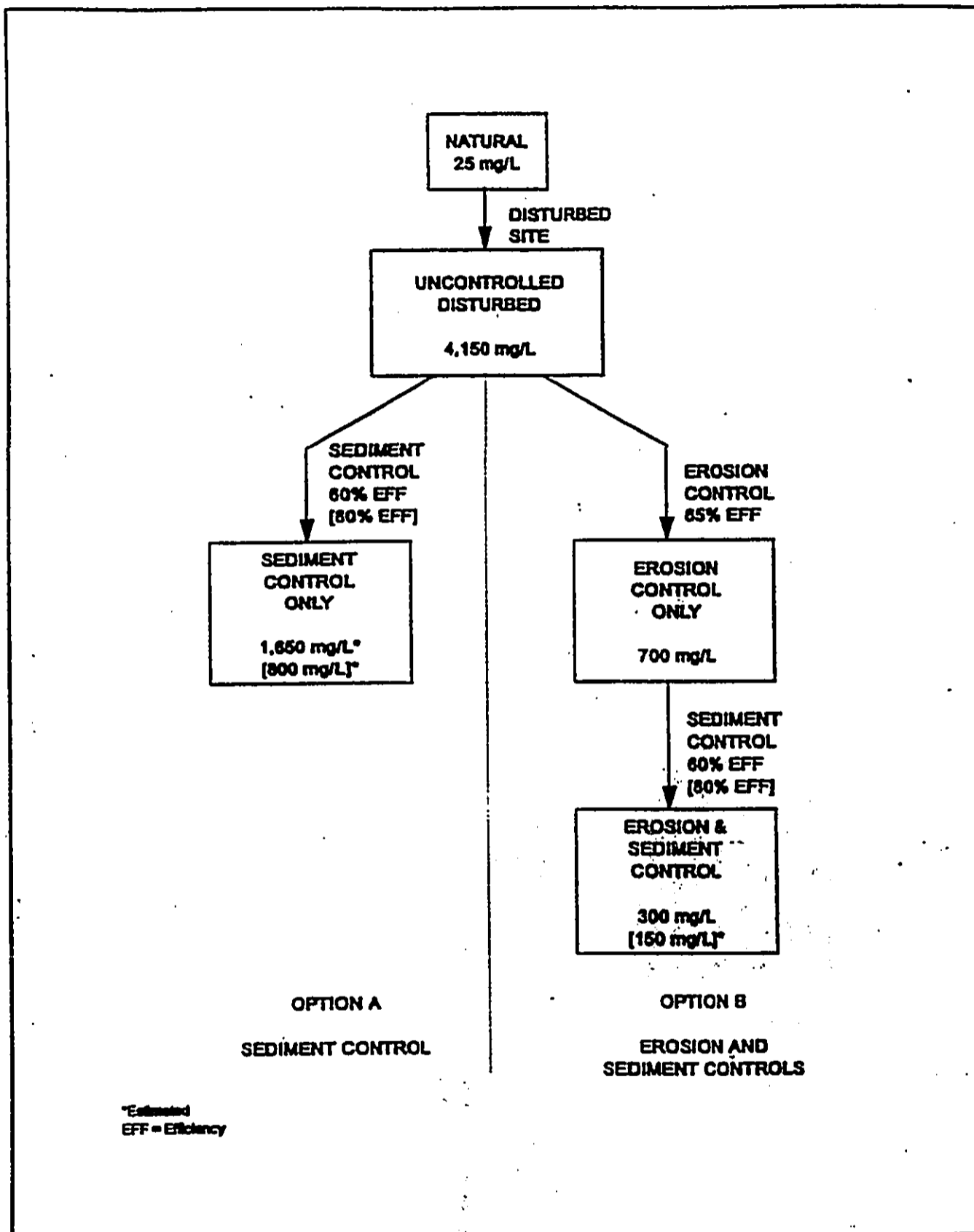


Figure 4-7. TSS concentrations from Maryland construction sites (Schueler, 1987).

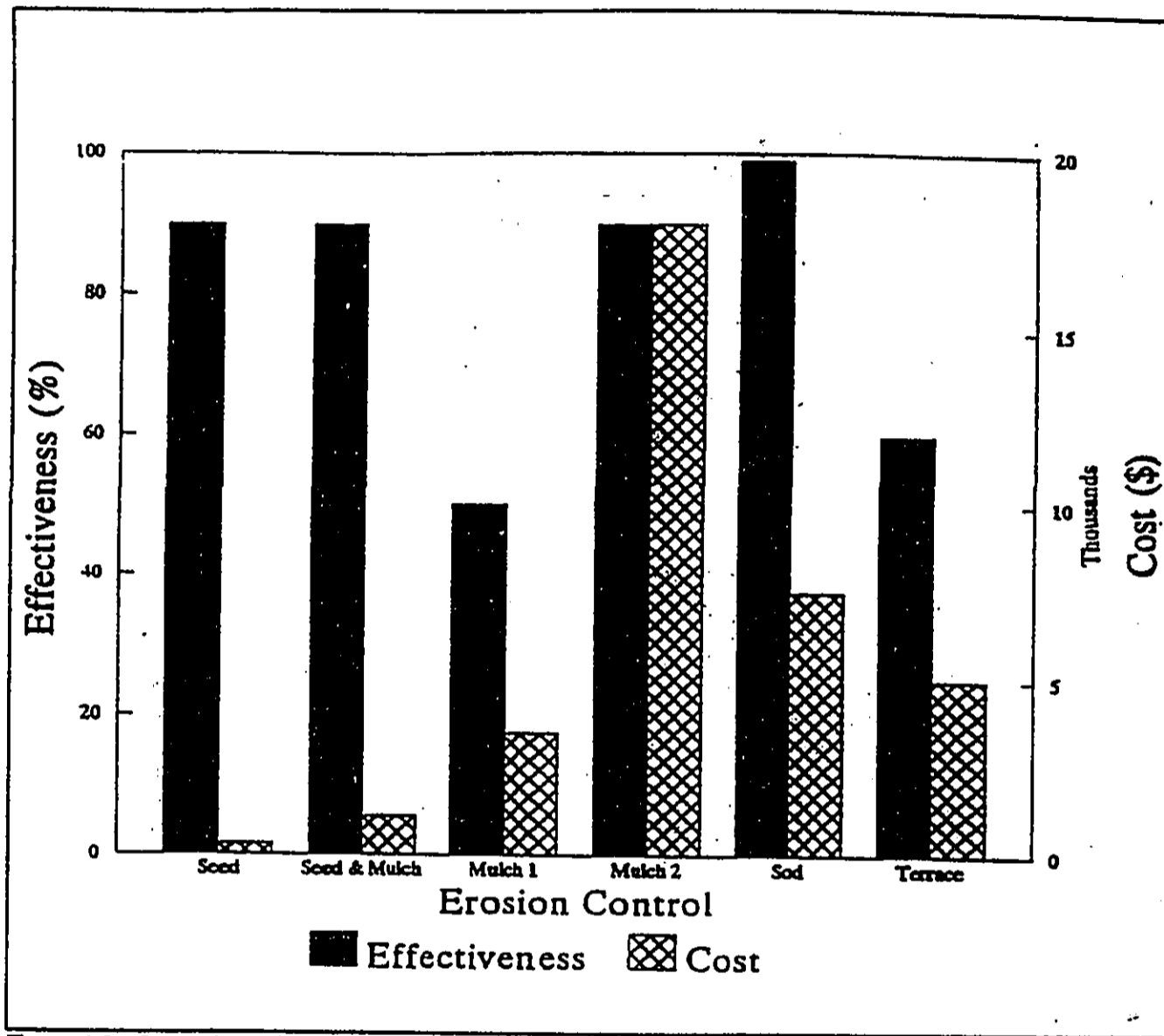


Figure 4-8. Comparison of cost and effectiveness for erosion control practices (based on information in Tables 4-15 and 4-16).

## B. Construction Site Chemical Control Management Measure

- (1) Limit application, generation, and migration of toxic substances;
- (2) Ensure the proper storage and disposal of toxic materials; and
- (3) Apply nutrients at rates necessary to establish and maintain vegetation without causing significant nutrient runoff to surface waters.

### 1. Applicability

This management measure is intended to be applied by States to all construction sites less than 5 acres in area and to new, resurfaced, restored, and reconstructed road, highway, and bridge construction projects. This management measure does not apply to: (1) construction of a detached single family home on a site of 1/2 acre or more or (2) construction that does not disturb over 5,000 square feet of land on a site. (NOTE: All construction activities, including clearing, grading, and excavation, that result in the disturbance of areas greater than or equal to 5 acres or are a part of a larger development plan are covered by the NPDES regulations and are thus excluded from these requirements.) Under the Coastal Zone Act Reauthorization Amendments of 1990, States are subject to a number of requirements as they develop coastal NPS programs in conformance with this management measure and will have flexibility in doing so. The application of management measures by States is described more fully in *Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance*, published jointly by the U.S. Environmental Protection Agency (EPA) and the National Oceanic and Atmospheric Administration (NOAA) of the U.S. Department of Commerce.

### 2. Description

The purpose of this management measure is to prevent the generation of nonpoint source pollution from construction sites due to improper handling and usage of nutrients and toxic substances, and to prevent the movement of toxic substances from the construction site.

Many potential pollutants other than sediment are associated with construction activities. These pollutants include pesticides (insecticides, fungicides, herbicides, and rodenticides); fertilizers used for vegetative stabilization; petrochemicals (oils, gasoline, and asphalt degreasers); construction chemicals such as concrete products, sealers, and paints; wash water associated with these products; paper; wood; garbage; and sanitary wastes (Washington State Department of Ecology, 1991).

The variety of pollutants present and the severity of their effects are dependent on a number of factors:

- (1) The nature of the construction activity. For example, potential pollution associated with fertilizer usage may be greater along a highway or at a housing development than it would be at a shopping center development because highways and housing developments usually have greater landscaping requirements.
- (2) The physical characteristics of the construction site. The majority of all pollutants generated at construction sites are carried to surface waters via runoff. Therefore, the factors affecting runoff volume,

such as the amount, intensity, and frequency of rainfall; soil infiltration rates; surface roughness; slope length and steepness; and area denuded, all contribute to pollutant loadings.

- (3) The proximity of surface waters to the nonpoint pollutant source. As the distance separating pollutant-generating activities from surface waters decreases, the likelihood of water quality impacts increases.

**a. Pesticides**

Insecticides, rodenticides, and herbicides are used on construction sites to provide safe and healthy conditions, reduce maintenance and fire hazards, and curb weeds and woody plants. Rodenticides are also used to control rodents attracted to construction sites. Common insecticides employed include synthetic, relatively water-insoluble chlorinated hydrocarbons, organophosphates, carbamates, and pyrethrins.

**b. Petroleum Products**

Petroleum products used during construction include fuels and lubricants for vehicles, for power tools, and for general equipment maintenance. Specific petroleum pollutants include gasoline, diesel oil, kerosene, lubricating oils, and grease. Asphalt paving also can be particularly harmful since it releases various oils for a considerable time period after application. Asphalt overloads might be dumped and covered without inspection. However, many of these pollutants adhere to soil particles and other surfaces and can therefore be more easily controlled.

**c. Nutrients**

Fertilizers are used on construction sites when revegetating graded or disturbed areas. Fertilizers contain nitrogen and phosphorus, which in large doses can adversely affect surface waters, causing eutrophication.

**d. Solid Wastes**

Solid wastes on construction sites are generated from trees and shrubs removed during land clearing and structure installation. Other wastes include wood and paper from packaging and building materials, scrap metals, sanitary wastes, rubber, plastic and glass, and masonry and asphalt products. Food containers, cigarette packages, leftover food, and aluminum foil also contribute solid wastes to the construction site.

**e. Construction Chemicals**

Chemical pollutants, such as paints, acids for cleaning masonry surfaces, cleaning solvents, asphalt products, soil additives used for stabilization, and concrete-curing compounds, may also be used on construction sites and carried in runoff.

**f. Other Pollutants**

Other pollutants, such as wash water from concrete mixers, acid and alkaline solutions from exposed soil or rock, and alkaline-forming natural elements, may also be present and contribute to nonpoint source pollution.

Revegetation of disturbed areas may require the use of fertilizers and pesticides, which, if not applied properly, may become nonpoint source pollutants. Many pesticides are restricted by Federal and/or State regulations.

Hydroseeding operations, in which seed, fertilizers, and lime are applied to the ground surface in a one-step operation, are more conducive to nutrient pollution than are the conventional seedbed-preparation operations, in which fertilizers and lime are tilled into the soil. Use of fertilizers containing little or no phosphorus may be required by

local authorities if the development is near sensitive waterbodies. The addition of lime can also affect the pH of sensitive waters, making them more alkaline.

Improper fueling and servicing of vehicles can lead to significant quantities of petroleum products being dumped onto the ground. These pollutants can then be washed off site in urban runoff, even when proper erosion and sediment controls are in place. Pollutants carried in solution in runoff water, or fixed with sediment crystalline structures, may not be adequately controlled by erosion and sediment control practices (Washington Department of Ecology, 1991). Oils, waxes, and water-insoluble pesticides can form surface films on water and solid particles. Oil films can also concentrate water-soluble insecticides. These pollutants can be nearly impossible to control once present in runoff other than by the use of very costly water-treatment facilities (Washington Department of Ecology, 1991).

After spill prevention, one of the best methods to control petroleum pollutants is to retain sediments containing oil on the construction site through use of erosion and sediment control practices. Improved maintenance and safe storage facilities will reduce the chance of contaminating a construction site. One of the greatest concerns related to use of petroleum products is the method for waste disposal. The dumping of petroleum product wastes into sewers and other drainage channels is illegal and could result in fines or job shutdown.

The primary control method for solid wastes is to provide adequate disposal facilities. Erosion and sediment control structures usually capture much of the solid waste from construction sites. Periodic removal of litter from these structures will reduce solid waste accumulations. Collected solid waste should be removed and disposed of at authorized disposal areas.

Improperly stored construction materials, such as pressure-treated lumber or solvents, may lead to leaching of toxics to surface water and ground water. Disposal of construction chemicals should follow all applicable State and local laws that may require disposal by a licensed waste management firm.

### 3. Management Measure Selection

This management measure was selected based on the potential for many construction activities to contribute to nutrient and toxic NPS pollution.

This management measure was selected because (1) construction activities have the potential to contribute to increased loadings of toxic substances and nutrients to waterbodies; (2) various States and local governments regulate the control of chemicals on construction sites through spill prevention plans, erosion and sediment control plans, or other administrative devices; (3) the practices described are commonly used and presented in a number of best management practice handbooks and guidance manuals for construction sites; and (4) the practices selected are the most economical and effective.

### 4. Practices

As discussed more fully at the beginning of this chapter and in Chapter 1, the following practices are described for illustrative purposes only. State programs need not require implementation of these practices. However, as a practical matter, EPA anticipates that the management measure set forth above generally will be implemented by applying one or more management practices appropriate to the source, location, and climate. The practices set forth below have been found by EPA to be representative of the types of practices that can be applied successfully to achieve the management measure described above.

#### ■ a. *Properly store, handle, apply, and dispose of pesticides.*

Pesticide storage areas on construction sites should be protected from the elements. Warning signs should be placed in areas recently sprayed or treated. Persons mixing and applying these chemicals should wear suitable protective clothing, in accordance with the law.



Application rates should conform to registered label directions. Disposal of excess pesticides and pesticide-related wastes should conform to registered label directions for the disposal and storage of pesticides and pesticide containers set forth in applicable Federal, State, and local regulations that govern their usage, handling, storage, and disposal. Pesticides and herbicides should be used only in conjunction with Integrated Pest Management (IPM) (see Chapter 2). Pesticides should be the tool of last resort; methods that are the least disruptive to the environment and human health should be used first.

Pesticides should be disposed of through either a licensed waste management firm or a treatment, storage, and disposal (TSD) facility. Containers should be triple-rinsed before disposal, and rinse waters should be reused as product.

Other practices include setting aside a locked storage area, tightly closing lids, storing in a cool, dry place, checking containers periodically for leaks or deterioration, maintaining a list of products in storage, using plastic sheeting to line the storage area, and notifying neighboring property owners prior to spraying.

■ **b. Properly store, handle, use, and dispose of petroleum products.**

When storing petroleum products, follow these guidelines:

- Create a shelter around the area with cover and wind protection;
- Line the storage area with a double layer of plastic sheeting or similar material;
- Create an impervious berm around the perimeter with a capacity 110 percent greater than that of the largest container;
- Clearly label all products;
- Keep tanks off the ground; and
- Keep lids securely fastened.

Oil and oily wastes such as crankcase oil, cans, rags, and paper dropped into oils and lubricants should be disposed of in proper receptacles or recycled. Waste oil for recycling should not be mixed with degreasers, solvents, antifreeze, or brake fluid.

■ **c. Establish fuel and vehicle maintenance staging areas located away from all drainage courses, and design these areas to control runoff.**

Proper maintenance of equipment and installation of proper stream crossings will further reduce pollution of water by these sources. Stream crossings should be minimized through proper planning of access roads. Refer to Chapter 3 for additional information on stream crossings.

■ **d. Provide sanitary facilities for construction workers.**

■ **e. Store, cover, and isolate construction materials, including topsoil and chemicals, to prevent runoff of pollutants and contamination of ground water.**

■ **f. Develop and implement a spill prevention and control plan. Agencies, contractors, and other commercial entities that store, handle, or transport fuel, oil, or hazardous materials should develop a spill response plan.**

Post spill procedure information and have persons trained in spill handling on site or on call at all times. Materials for cleaning up spills should be kept on site and easily available. Spills should be cleaned up immediately and the contaminated material properly disposed of. Spill control plan components should include:

- Stop the source of the spill.
- Contain any liquid.
- Cover the spill with absorbent material such as kitty litter or sawdust, but do not use straw. Dispose of the used absorbent properly.

■ **g. Maintain and wash equipment and machinery in confined areas specifically designed to control runoff.**

Thinners or solvents should not be discharged into sanitary or storm sewer systems when cleaning machinery. Use alternative methods for cleaning larger equipment parts, such as high-pressure, high-temperature water washes, or steam cleaning. Equipment-washing detergents can be used, and wash water may be discharged into sanitary sewers if solids are removed from the solution first. (This practice should be verified with the local sewer authority.) Small parts can be cleaned with degreasing solvents, which can then be reused or recycled. Do not discharge any solvents into sewers.

Washout from concrete trucks should be disposed of into:

- A designated area that will later be backfilled;
- An area where the concrete wash can harden, can be broken up, and then can be placed in a dumpster; or
- A location not subject to urban runoff and more than 50 feet away from a storm drain, open ditch, or surface water.

Never dump washout into a sanitary sewer or storm drain, or onto soil or pavement that carries urban runoff.

■ **h. Develop and implement nutrient management plans.**

Properly time applications, and work fertilizers and liming materials into the soil to depths of 4 to 6 inches. Using soil tests to determine specific nutrient needs at the site can greatly decrease the amount of nutrients applied.

■ **i. Provide adequate disposal facilities for solid waste, including excess asphalt, produced during construction.**

■ **j. Educate construction workers about proper materials handling and spill response procedures. Distribute or post informational material regarding chemical control.**



MICHAEL T. MUNEKIYO  
GWEN OHASHI HIRAGA  
MITSURU "MICH" HIRANO

KARLYNN KAWAHARA

May 4, 2006

George Y. Tengan, Director  
Department of Water Supply  
200 South High Street  
Wailuku, Hawaii 96793

**SUBJECT: Draft Environmental Assessment for Proposed 4-Unit Single-Family Condominium, TMK 2-1-07:066, Makena, Maui, Hawaii**

Dear Mr. Tengan:

We are in receipt of your comment letter dated March 28, 2006 with regards to the subject project. Thank you for your confirmation of the installed water meters for the project. We also note your comments with regards to water conservation and pollution prevention measures the project can implement and will apply them to the project, if applicable.

Should you have any questions, please do not hesitate to call me at 244-2015.

Very truly yours,

Karlynn Kawahara  
Project Manager

KK:lh

cc: John Maloney, Pacific Rim Land, Inc.  
Stacy Otomo, Otomo Engineering, Inc.  
Michael W. Foley, Department of Planning

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ALAN M. ARAKAWA  
Mayor

MICHAEL W. FOLEY  
Director

WAYNE A. BOTEILHO  
Deputy Director



APR 03 2006

COUNTY OF MAUI  
**DEPARTMENT OF PLANNING**

March 29, 2006

Ms. Karlynn Kawahara  
Munekiyo & Hiraga, Inc.  
305 High Street, Suite 104  
Wailuku, Hawaii 96793

Dear Ms. Kawahara:

RE: Maui Planning Commission Comments on the Draft Environmental Assessment (DEA) for the Proposed Four-Unit Single-Family Condominium Located at TMK: 2-1-007:066, Makena, Island of Maui, Hawaii (EA 2006/0001) (DBA 2001/0003) (CPA 2001/0005) (CIZ 2001/0011) (SM1 2001/0017)

At the regular meeting of March 28, 2006 the Maui Planning Commission (Commission) reviewed the above-referenced document and provided the following comments:

1. That the drainage system be designed to ensure that every precaution is taken to eliminate potential pollutants, including but not limited to pesticides (herbicides and pesticides) and fertilizers, from discharging into the nearshore coastal waters.

Should you require further clarification, please contact Ms. Kivette Caigoy, Environmental Planner, at 270-7735.

Sincerely,

Handwritten signature of Michael W. Foley in black ink.

MICHAEL W. FOLEY  
Planning Director

MWF:KAC:sec

c: Wayne A. Boteilho, Deputy Planning Director  
Kivette A. Caigoy, Environmental Planner  
Colleen Suyama, Staff Planner  
EA Project File  
General File  
K:\WP\_DOCS\PLANNING\EA\2006\0001\_4UnitCondoMakena\MPC\_Comments.wpd



MICHAEL T. MUNEKIYO  
GWEN OHASHI HIRAGA  
MITSURU "MICH" HIRANO

KARLYNN KAWAHARA

May 4, 2006

Michael W. Foley, Director  
Department of Planning  
250 South High Street  
Wailuku, Hawaii 96793

**SUBJECT: Draft Environmental Assessment for Proposed 4-Unit Single-Family Condominium, TMK 2-1-07:066, Makena, Maui, Hawaii**

Dear Mr. Foley:

We are in receipt of your comment letter dated March 29, 2006 with regards to the Maui Planning Commission's (Commission) comment on the subject project. On behalf of our client, Pacific Rim Land, Inc., we would like to provide the following response. We note the Commission's comment with regards to the drainage system for the 4-unit single-family residential condominium. The information has been forwarded to the project's civil engineer for review and implementation, as applicable.

Should you have any questions, please do not hesitate to call me at 244-2015.

Very truly yours,

Karlynn Kawahara  
Project Manager

KK:lh

cc: John Maloney, Pacific Rim Land, Inc.  
Stacy Otomo, Otomo Engineering, Inc.

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305 High Street, Suite 104 • Wailuku, Hawaii 96793 • ph: (808)244-2015 • fax: (808)244-8729 • [planning@mhinc.com](mailto:planning@mhinc.com)

environment  
planning  
government

ALAN M. ARAKAWA  
MAYOR



CARL M. KAUPALOLO  
CHIEF

NEAL A. BAL  
DEPUTY CHIEF

**COUNTY OF MAUI**  
DEPARTMENT OF FIRE AND PUBLIC SAFETY

200 DAIRY ROAD  
KAHULUI, MAUI, HAWAII 96732  
(808) 270-7561  
FAX (808) 270-7919

April 6, 2006

DEPT OF PLANNING  
COUNTY OF MAUI  
RECEIVED  
06 APR -7 P2:26

Ms. Kivette Caigoy  
Department of Planning, County of Maui  
250 South High Street  
Wailuku, Hawaii 96793

**Subject: EA 2006/0001; DBA 2001/0003; CPA 2001/0005; CIZ 2001/0011; SM1 2001/0017  
TMK (2)2-1-007:066**

Dear Ms Caigoy,

I have had the opportunity to read the subject application. At this time, our Department does not have any specific concerns regarding the project. We will take a close look at future construction plans regarding this parcel during the permit process. Some of the items that will be addressed include emergency vehicle access and turn arounds. Please feel free to contact Lt. Scott English at 270-7122 if there are any questions or concerns.

Sincerely,

Valeriano F. Martin  
Captain  
Fire Prevention Bureau



06 MAR -8 P12:46

DEPT OF PLANNING  
COUNTY OF MAUI  
RECEIVED

March 6, 2006

Ms. Kivette Caigoy, Staff Planner  
County of Maui – Department of Planning  
250 South High Street  
Wailuku, Hawaii 96793

Dear Ms. Caigoy,

Subject: Draft Environmental Assessment  
4-Unit, Single Family Condominium  
Makena, Maui, Hawaii  
TMK: (2) 2-1-007:066

Thank you for allowing us to comment on the Draft Environmental Assessment for the subject project, which was received on February 16, 2006.

In reviewing our records and the information received, Maui Electric Company (MECO) has no objection to the project at this time. However, we highly encourage the developer's electrical consultant to submit the electrical demand requirements and project time schedule as soon as practical so that service can be provided on a timely basis.

In addition, we suggest that the developer and/or their consultant make contact with Walter Enomoto of our Demand Side Management (DSM) group at 872-3283 to review potential energy conservation and efficiency opportunities for their project.

Should you have any other questions or concerns, please call Kim Kawahara at 871-2345.

Sincerely,

Neal Shinyama  
Manager, Engineering

NS/kk:lh

c: Walter Enomoto – MECO DSM



MICHAEL T. MUNEKIYO  
GWEN HASHI HIRAGA  
MITSURU "MICH" HIRANO

KARLYNN KAWAHARA

May 4, 2006

Neal Shinyama  
Manager, Engineering  
Maui Electric Company, Ltd.  
P.O. Box 398  
Kahului, Hawaii 96733-6898

**SUBJECT: Draft Environmental Assessment for Proposed 4-Unit Single-Family Condominium TMK: 2-1-07:066, Makena, Maui, Hawaii**

Dear Mr. Shinyama:

We are in receipt of your comments dated March 6, 2006 on the subject property. On behalf of the applicant, Pacific Rim Land, Inc. (PRL), we would like to offer the following responses to your comments.

1. The project's electrical consultant, when selected, will submit demand requirements to your office for review.
2. PRL will have its electrical consultant contact the Demand Side Management Group to review potential energy conservation and efficiency opportunities for the project.

Thank you for your comments. Should you have any further questions, please do not hesitate to call me at 244-2015.

Very truly yours,

Karlynn Kawahara  
Project Manager

KK:lh

cc: John Maloney, Pacific Rim Land, Inc.  
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# Appendices

# ***Appendix A***

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## ***Archaeological Inventory Survey***

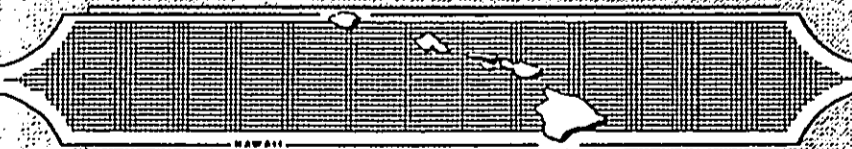
SGS Project No. 236-2

**ARCHAEOLOGICAL INVENTORY SURVEY OF  
1.552 ACRES IN KAEO AHUPUA'A MAKENA,  
MAKAWAO DISTRICT,  
ISLAND OF MAUI, HAWAII  
[TMK 2-1-07:66]**

Prepared by:  
**Leann McGerty, B.A.**  
And  
**Sarah Yeomans, M.A.**  
Revised January, 2001

Prepared For:  
**Pacific Rim Incorporated**  
P.O. Box 220  
Kihei, Maui, Hawaii 96753

**SCIENTIFIC CONSULTANT SERVICES Inc.**



711 Kapiolani Blvd. Suite 1475 Honolulu, Hawaii 96813

### ABSTRACT

At the request of Pacific Rim Incorporated, Scientific Consultant Services, Inc. (SCS) conducted an archaeological Inventory Survey of a 1.552 acre parcel located within the *ahupua`a* of Kaeo in Mākena, Makawao District, Island of Maui (TMK 2-1-07:66). One site designated 50-50-14-4986 was identified in the project area. A pedestrian survey of the entire project area was undertaken and limited subsurface testing was conducted within selected features. Thirteen surface features were documented during survey and consisted of rock pavements, wall remnants, a modified outcrop, and amorphous mounds. The present survey has recovered sufficient data in the form of maps, photos, and excavation so that potential impact has been addressed concerning the walls and rock mounds of this site. However, based on close proximity to Kalani Heiau, the identification of small amounts of midden and charcoal, excavated branch coral and coral cobbles, pre-/early historic activities known to have been present in the area, and the previously documented results of archaeological excavations in the nearby Mākena region, monitoring is recommended for paved sections of the project area.

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## INTRODUCTION

An Archaeological Inventory Survey was conducted by Scientific Consultant Services, Inc. (SCS) on a 1.552 acre parcel located within the *ahupua`a* of Kaeo in Mākena, Makawao District, Island of Maui (TMK 2-1-07:66) (Figures 1 and 2). The fieldwork was conducted July 11 through 14, 2000. The survey crew consisted of Archaeologists, Jenny Pickett and Lauren Morawski. The project was conducted under the overall supervision of Dr. Robert L. Spear (Principle Investigator).

The objective of the project was to investigate the presence/absence of archaeological sites within the parcel and to assess the significance of any sites present within the project area. A single site (State Site No. 50-50-14-4986) consisting of 13 features was identified.

## ENVIRONMENTAL SETTING

### **PROJECT AREA**

The project area occurs within the *ahupua`a* of Kaeo in Mākena, Makawao District, Island of Maui at TMK 2-1-07:66. The western portion of the small parcel lies approximately 20 m from the coastline and is bounded by Mākena-Keone`ō`ioi Road. The northern portion and eastern portions of the parcel are bordered by the Garcia family property (TMK: 2-1-07:67) while the southern flank is bounded by an undeveloped, privately-owned parcel (TMK: 2-1-07:04).

### **CLIMATE**

The project area is located along the Leeward coast of eastern Maui and receives little rainfall. On average, rainfall in this area of Mākena is between 20 and 30 inches annually, most of which occurs during winter months (Price 1983:62). The present, dry leeward environment is generally supportive of a low diversity of vegetation. Documented vegetation within the area included *kiawe* (*Prosopis pallida*), *koa haole* (*Leucaena leucocephala*), finger grass (*Chloris sp.*) and the native pili grass (*Heteropogon contortus*) (Lamoureux 1983:70).

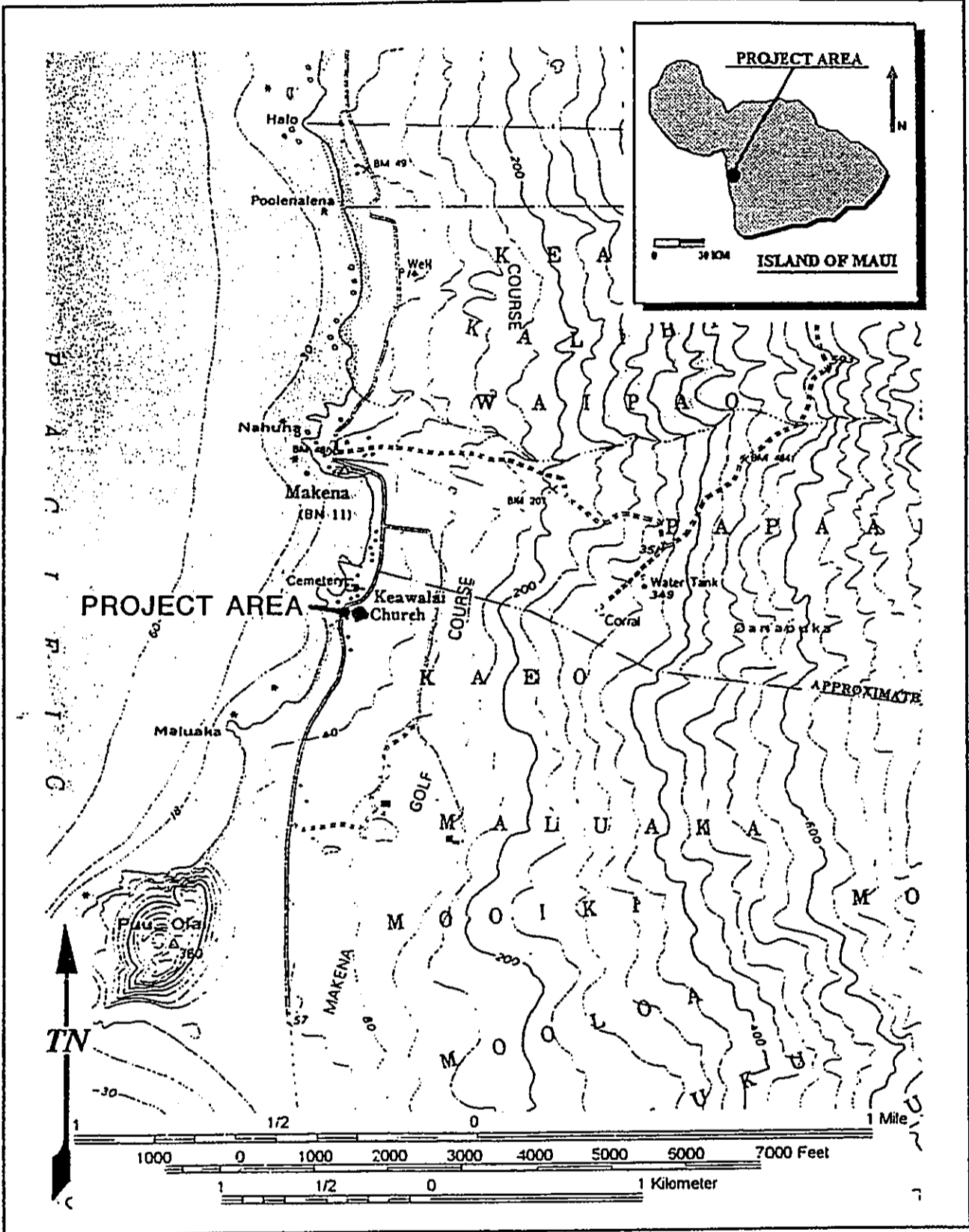


Figure 1: USGS Makena Quadrangle Showing Project Area.

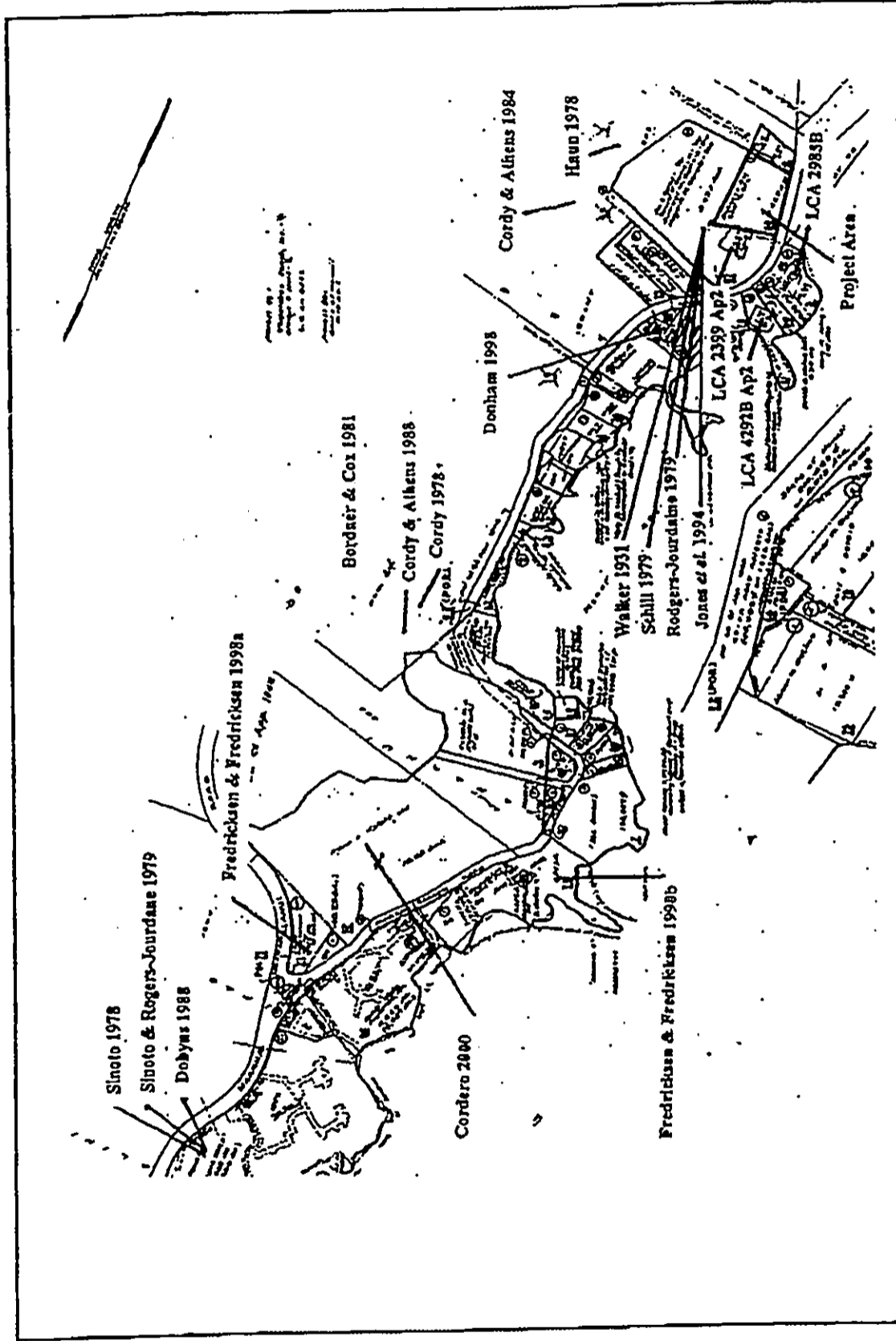


Figure 2: Tax Map Key (TMK) 2-1-07 Showing Project Area and Previous Archaeological Studies Conducted in the Vicinity.

## GEOLOGY

The project area is situated approximately three miles north of the last lava flow known to erupt from Haleakalā. This flow is recorded as having occurred between 1786 and 1793 (Hazlett *et al.* 1996:132). The general project area region contains a substantial amount of pahoehoe, particularly along its southern portion.

## TOPOGRAPHY AND SOILS

Project area elevation ranges from approximately 10 to 70 ft. above mean sea level (amsl). Following the nature topography of the area, higher project area elevations occur toward the *mauka* side. The slope gradient itself is fairly modest c. 5° toward the coastline. The topography has been a partial determinant. As the project area slopes in a westerly fashion (*makaī*), pahoehoe outcropping is evident across the surface. Within the western third of the parcel, the slope flattens. Soil and sediment accumulation is greatest in the western, flat portion of the project area as soil has been accretionary due to gravitational erosion. Bedrock still occurs in the western portion of the project area however.

The predominant soils in the project area are composed of the Mākena Series. These soils develop in volcanic ash and are gently to moderately sloping (3 to 15 percent) (Foote *et al.* 1972:91). This Mākena loam, stony (MXC) soil displays permeability that is slow to medium, and an erosion hazard that is slight to moderate. This complex typically occurs on the lower leeward slopes of Haleakalā, between Mākena and Kama'ole. It consists of Mākena loam and stony land. Stony land occurs on low ridges and composes up to 60 percent of the complex. Mākena loam occurs as gently sloping areas between the low ridges of stony land (see Foote *et al.* 1972:91 and Map 110). These soil series were confirmed during testing across the parcel. In addition, pahoehoe outcrops (bedrock) occurs on the surface across much of the project area. This series occurs from the coastline to the 8,000 ft. level and is associated with water supply, wildlife habitat, and recreation (*ibid.*:80). As stated above, bedrock was common throughout the project area, excluding the southern portion of the parcel in which bedrock was overlain by thicker loam deposits.

## HISTORICAL SETTING

### PRE-CONTACT

Traditionally, it is thought that the division of Maui Island lands into districts (*moku*) and subdistricts (*ahupua`a*) was performed during the time of the *ali`i Kaka`alaneo* by a *kahuna* named Kalaiha`o`hia, (Beckwith 1940:383). Fornander places Kaka`alaneo at the end of the 15<sup>th</sup> century or the beginning of the 16<sup>th</sup> century [Fornander 1916/17, Vol. 6:248]. Mākena was located in the traditional district of Honua`ula. Further land divisions within the *moku* were *ahupua`a*, the latter being a land segment which ideally incorporated all the natural resources necessary for traditional subsistence strategies. Ancient subdivisions of the *ahupua`a* were said to have been established approximately 500 years ago, these divisions having remained, for the most part, unchanged to the present. However, land tenure itself has gone through radical changes, particularly from the mid-1850s during the Māhele times (Sterling 1998:3).

During Proto-historic times, the Hawaiian economy was based on agricultural production and marine exploitation. Raising livestock as well as wild plant and bird collecting were subsets of this economic production. Extended household groups settled in various *ahupua`a*. In these locations, residents were able to harvest from both the land and the sea. Ideally, this allowed each *ahupua`a* to be self-sufficient by supplying needed resources for survival from many different environmental zones (Kirch 1985). Much of this knowledge of traditional land use patterns is based on what was recorded at the time of, and shortly after, Western Contact (1778). Early records, such as journals kept by explorers, travelers and missionaries, Hawaiian traditions that survived long enough to be written down, and archaeological investigations have assisted in understanding the traditional life ways of indigenous residents.

According to an article in the *Honolulu Advertiser*, the bay at Mākena was originally known as Keawalaimau (a little clam bay) (Aug. 2, 1959, 15). Marine resources were plentiful and each of the many reefs at Mākena had a name and was known for a specific type of fish. A fish pond was located south of the harbor at Apuakehau and a fishing *ko`a* was constructed at Nahuna Point (Sterling 1998:231). A *heiau* named Pohakunahaha was also present, "...in back of the store at the bottom of the hill beyond the pig-pen". Located next to the project area was a *luakini* type *heiau* which is reserved for the paramount chief and his delegates, suggesting a large, supporting population during its use (Walker 1931:168).

In 1798, LaPérouse sailed up the leeward coast of Maui. The explorer recorded his impressions of the island while anchored in Keone`ō`io. LaPérouse notes that although the leeward section of the island appeared "hot, dry, and rough, the visitors were offered ...hogs, potatoes, bananas...tarro, with cloth and some other curiosities..." (LaPérouse 1798:345).

## HISTORIC ERA

Missionary activities began as early as 1833 on Maui and records indicate the presence, by 1837, of the first outstation in Mākena which included a native meeting house and a school located across from the present project area (Wailuku Station Reports 1833-1863). Eventually, the region around the project area included native houses, a cemetery, a store, a store house, and a government landing. Reverend Alexander reported the building of Keawala`i Church of stone in 1857 (*ibid.*). Fomander's report to the Inspector General of Schools in 1865-66 describes the facilities at Kaeo. He stated:

Keawakapu [Keawala`i] in Makena Bay, on the premises of the Protestant Church. Four walls of cobble stones and a pandanus leaved roof constitute the school house. Pebbles from the beach make up the floor. The number of scholars about 40, comprising many from Ulupalakua, where I intend to erect a school as soon as the taxes of this year have been collected. (Fomander Ms., as quoted in Barrere).

While many changes occurred between the late 1700s through the mid-1800s, perhaps the most dramatic occurred during the late 1840s. In 1848, the Great Māhele instigated a drastic change in the traditional land tenure of all islands that resulted in a division of island lands and a system of private ownership. The Māhele was based upon the principles of western law. While a complex issue, many scholars believe that in order to protect Hawaiian sovereignty from foreign powers, Kamehameha III was forced to establish laws changing the traditional Hawaiian society to that of a market economy (Daws 1968:111; Kuykendall Vol. I, 1938:145 footnote 47, 152, 165-6, 170; Kame`eleihiwa 1992:169-70, 176).

The dramatic shift from a redistributive economy to one based upon a market economy resulted in drastic changes to land tenure. Among other things, the foreigners demanded private ownership of land to insure their investments (Kuykendall Vol. I, 1938:138, 145, 178, 184, 202, 206, 271; Kame`eleihiwa 1992:178; Kelly 1998:4). Once lands were made available and private



ownership was instituted, native Hawaiians, including the *maka`āinana* (commoners), were able to claim the land plots they had been cultivating and living upon (*kuleana* lands, land commission awards). Such was the case only if they had been made aware of the foreign procedures. These claims could not include any previously cultivated or presently fallow land, *ʻokipu`u*, stream fisheries, or many other natural resources necessary for traditional survival (Kame`eleihiwa 1992:295; Kirch and Sahlins 1992).

In 1845, 50 acres of Mākena sugar-cane and ranch lands, including a portion of Kaeo, were rented by Lonton Torbert from James Nowlein and Solomon Burrow who had received it from the government (Gosser 1993:27-35). There were two landings at either end of Mākena Bay. An ox road extended from a landing on the northern end of the Bay (known as Tolbert Landing) to Torbert's *mauka* plantation and by 1848, he had acquired a license to open a retail store. The Government Landing was located at the southern end of the bay. Land previously leased, was finally purchased by Tolbert from the government in 1849 (Figure 3; Grant 223, Dept. Of Land and Natural Resources 1964:30). As a result of bad luck in 1856, Tobert was forced to sell everything, including 800 cattle and 475 sheep, to pay his debts. Tolbert Plantation estate became the property of James Makee (Rose Ranch) in 1858.

As stated, the land division (Māhele) occurred in 1848. Awarded parcels were labeled as Land Commission Awards (LCA). If occupation could be established through the testimony of witnesses, the petitioners were issued a Royal Patent number and could then take possession of the property. Commoners claiming house lots in Honolulu, Hilo, and Lāhainā were required to pay commutation to the government before obtaining a Royal Patent for their awards (Chinen 1961:16). Twelve land awards were granted by the Land Commission in the *ahupua`a* of Kaeo which included house lots, three sweet potato patches, two taro patches, one Irish potato patch, one cane field, grasslands and *kula*.

Three LCAs were awarded in close proximity to the project area (see Figure 2). Directly abutting the project area was a house lot awarded to Kalili (LCA 2399, *apana* 2). Two LCAs were located *makai* of the government road. LCA 4292-B, *apana* 2 was awarded to Kalama and consisted of a house lot. LCA 2985-B, also *makai* of the government road, could not be located, but LCA 2395 appears to describe the correct location for the property. This piece of land was given to Kaili by Kalama, his neighbor, in 1845, and it consisted of a house lot.

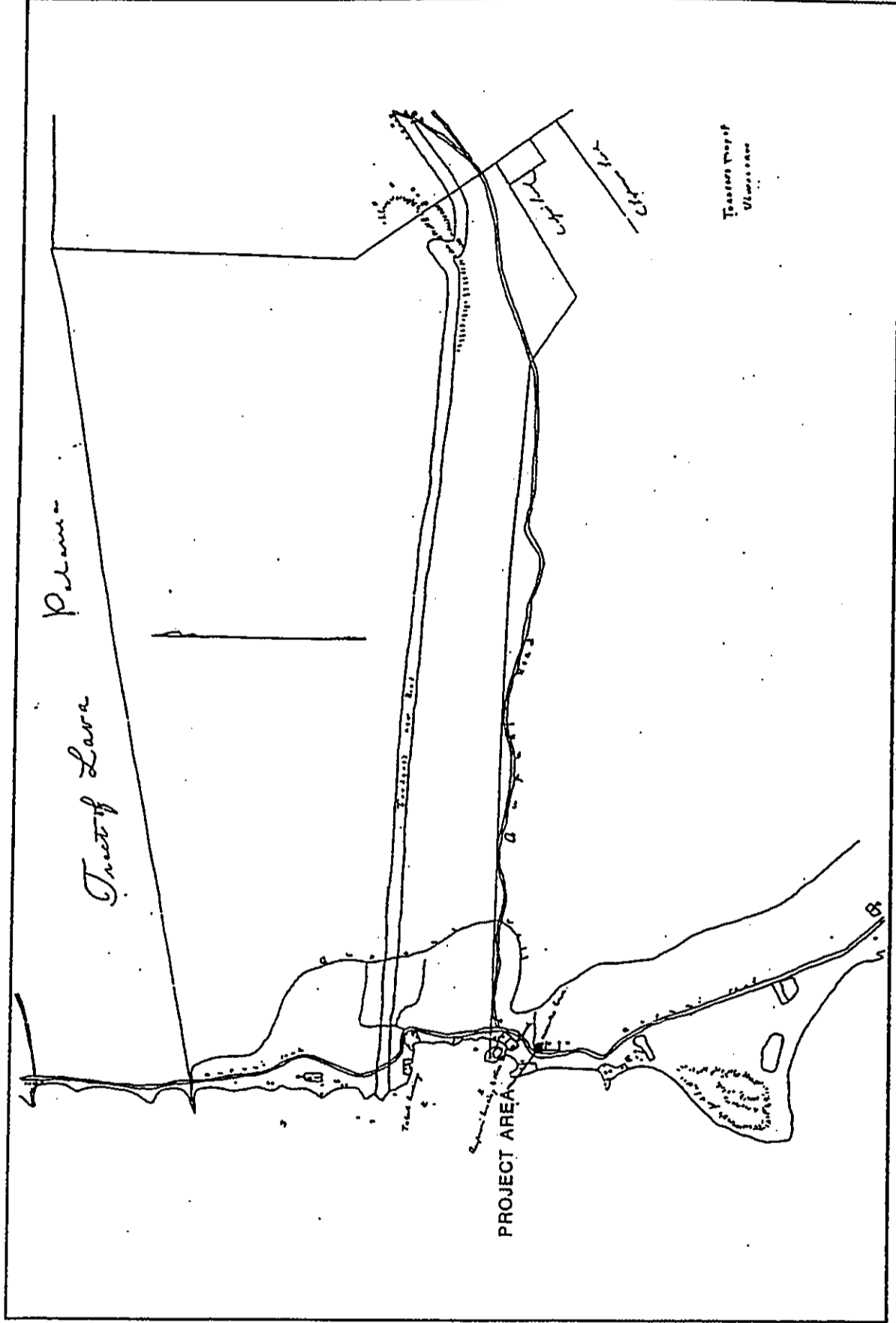


Figure 3: Tolbert's Plantation Map Showing Project Area (Registered Map No. 1202 State Survey Dept.).

In 1852, Mahoe purchased a 514 acre land grant in Kaeo, the boundaries of which followed Tobert's land, and which included the coastal portion, the project area, the fishpond at Apuakehau Point, as well as the government landing and store house (Figure 4). The noting of landmarks in the boundary description of Mahoe's land mentions a kukui tree, an `auwai, and old road, five wiliwili trees, a sand dune, "the house of a full blooded Hawaiian", and 24 rock piles. In 1868, Mahoe and his wife partition a 0.59 acre portion of their grant and conveyed it to the American Board of Commissioners for Foreign Missions (ABCFM Trustees Minute Book 1912:104).

In 1865, residents of Honua`ula were either employed by the Makee Plantation at Ulupalakua or were fishermen living along the coast. The coastal population was described by Fornander as "...a thrifty, handy set of people, to judge from the general appearance of their houses, not a few of which were of wood, and many of the others, especially along the seaboard, being neatly built and looking tidy and clean within. The children seem to be numerous and those that I observed were decently clad and looked bright and healthy" (Fornander in Barrère 1975:58). With the decline of sugarcane in the late 1800s, cattle ranching became the primary focus of the Makee Plantation. Although originally maintaining the cultivation of sugar cane, a drought in 1878 discouraged its expanded production which continued to decline through the late 1800s. The importance of stock-raising and ranching increased during the same time period. Ranching, hog breeding, and subsistence fishing continued in the coastal areas until the 1970s when economic and land use shifted to tourism (Jones *et al.* 1994:8).

The harbor at Mākena, north of the current project area, had become one of the busiest on Maui and was a regular stop on the Honolulu to Hilo run. An interesting anecdote from Makee, the owner of Rose Ranch described the results of a summer hurricane in August of 1871. Makee wrote:

...It was fearful to see the havoc during its duration. Trees were prostrate in every direction; the mill and engine house, the bowling alley, sugar house, cook house, two of the Chinese and one native house were down. One store house at the beach, and all the native houses there had been blown into the sea (*Hawaiian Gazette*, August 16, 1871:2.2).

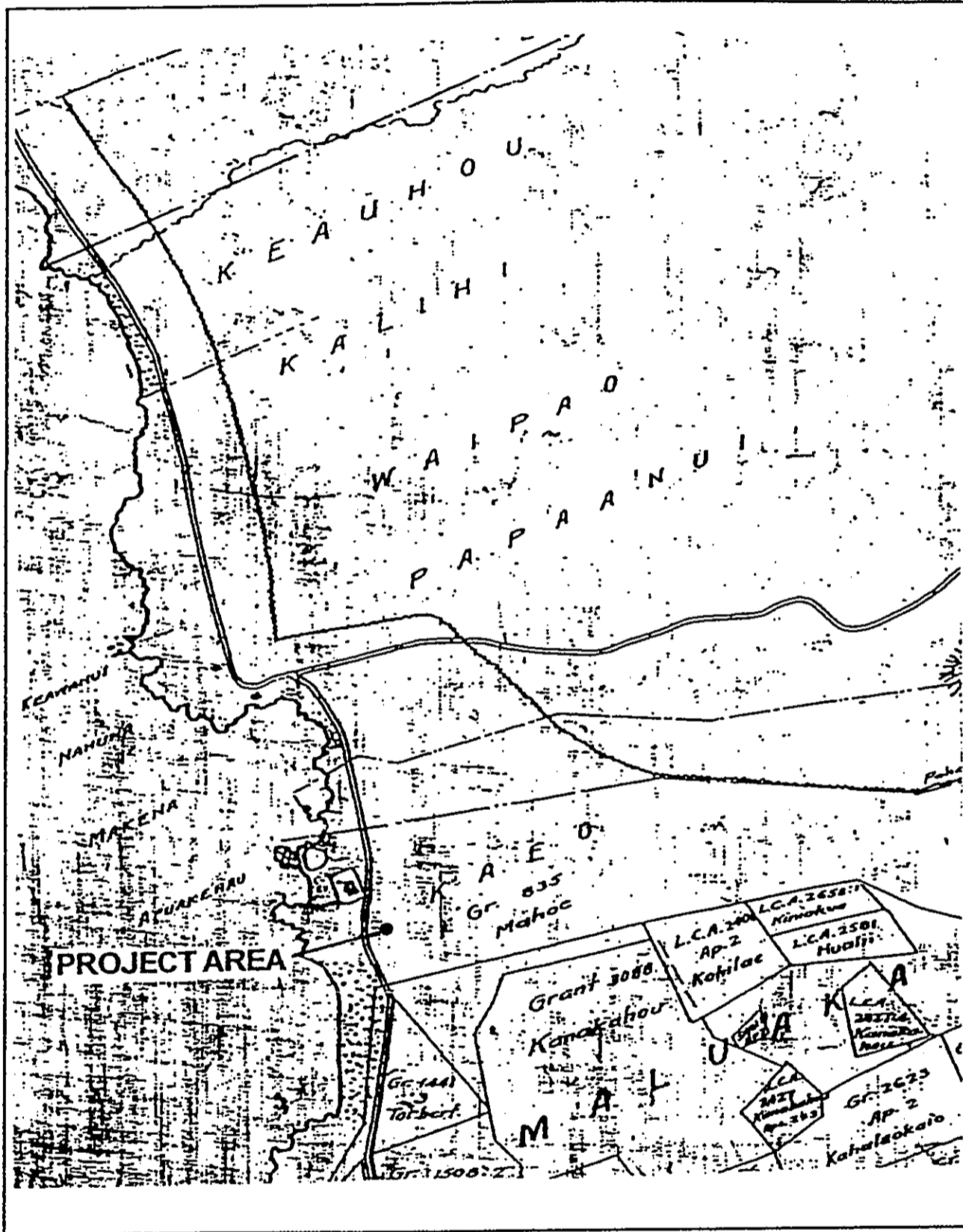


Figure 4: Mahoe Land Grant Map Showing Project Area.

Thrum also reported information concerning the storm:

...a tropical storm or hurricane caused extensive damage to the Ulupalakua Ranch, took the roof off the storehouse at Makena, which was near the church, and swept all the native houses into the sea - all within six hours (Thrum 1926:36).

The harbor served as a loading port for the ranch and, after a breakwater and landing were constructed in 1877, sugarcane and other produce could be transported from the location. By 1885, structures along the bay included the church, cemetery, school, corral, the "old sugar house", a stone wall, and a total of nine houses, one being fashioned from grass (Jackson Map, No. 1337). The development of Kahului Harbor (1920s), which contained cold storage facilities, marked the end of commercial shipping for Mākena Harbor.

From the 1940s through present times, much development has occurred near the project area. Military activities, such as amphibious beach landings, were conducted along coastal areas during World War II. In addition, concrete bunkers were constructed on the beach and other locations near the shoreline. Most recently, activities along the western coast have focused upon the development of large vacation resorts and golf courses. Cattle ranching continues on the upper slopes of the Honua'ula area.

### PREVIOUS ARCHAEOLOGY

Early archaeological investigations in the Mākena area were primarily concentrated in the coastal zone, with much less emphasis having been placed on survey within inland reaches. One of the earliest projects documenting archaeological sites in the Mākena area was a pedestrian survey conducted by Walker in 1931. During the informal reconnaissance, Walker located 266 sites on Maui, most of which were interpreted as religious in function (*heiau*) and located along the Maui coastline. Walker identified six *heiau* along the southwestern and western coastal areas of eastern Maui, one of which was found adjacent to the present project area, Kalani Heiau (Site 196).

Investigations of coastal reaches within the Wailea-Mākena area began in earnest in the early 1970s and 1980s and included small survey and Data Recovery projects such as were conducted by Barrera (1974), Cleghorn (1974, 1975), Dicks and Haun (1987), and Kirch (1969,

1970). Projects conducted by Cordy and Athens in 1988 and Davis and Bordner in 1977 were important additions to the cumulative archaeological record of the area. (see Figure 2; Figure 5).

Radiocarbon age dating of three sites in Wailea, north of the project area, was associated with occupation during late pre-Contact times. Site B10-58 was dated to A.D. 1730-1850 (HRC-1239); Site B10-60 was dated to A.D. 1630-1730 (HRC-1240); and Site B10-59 was dated to A.D. 1650-1750 (HRC-1242) (Gosser and Cleghorn 1990:61). All three were considered habitation sites.

Within the lands of Pāpa`a and Kaeo, an intensive survey of Seibu property was conducted by Haun (1978:8, 10)(Figure 6). This investigation led to the identification of 46 agricultural features that included 14 terraces, 26 low retaining walls, and 6 pits or soil-filled depressions. Haun (1978) notes that these features often cluster near temporary habitations. Volcanic glass hydration dates for two of these clusters returned dates of ca. A.D. 1606-1705 (B8-41) and A.D. 1600s (B8-126).

Cordy (1978) surveyed lands just to the north of Haun's (1978) project area (see Figure 2). Survey revealed that the area was less disturbed than Haun's project area and yielded a larger variety of agricultural sites. Cordy demarcated terraces, small and low-abutted enclosures, faced pits, both small and low free-standing enclosures with mounds, and ill-defined small clearings containing low mounds and walls. Fifty-eight percent of the prehistoric sites identified by Cordy were classified as agricultural sites. Volcanic glass hydration dating revealed that the sites dated "no earlier than A.D. 1602 and no later than A.D. 1743" (Cordy 1978).

Following, in 1981, Bordner and Cox conducted a survey at an area inland from those of Haun and Cordy (see Figure 2). The later survey led to the identification of "Site complexes involving habitation structures such as platforms and C-shape shelters in context with agricultural features, such as cleared areas, near seasonal water, on ridge fronts with good visibility" (Bordner and Cox 1982:12). A 1978 archaeological survey conducted by Sinoto in Papa`anui Ahupua`a, occurring adjacent to the survey area investigated by Cordy, had revealed similar agricultural features (see Figure 2). However, far fewer sites and feature types were recorded within Sinoto's project area, this likely not so much a discrepancy in survey area size

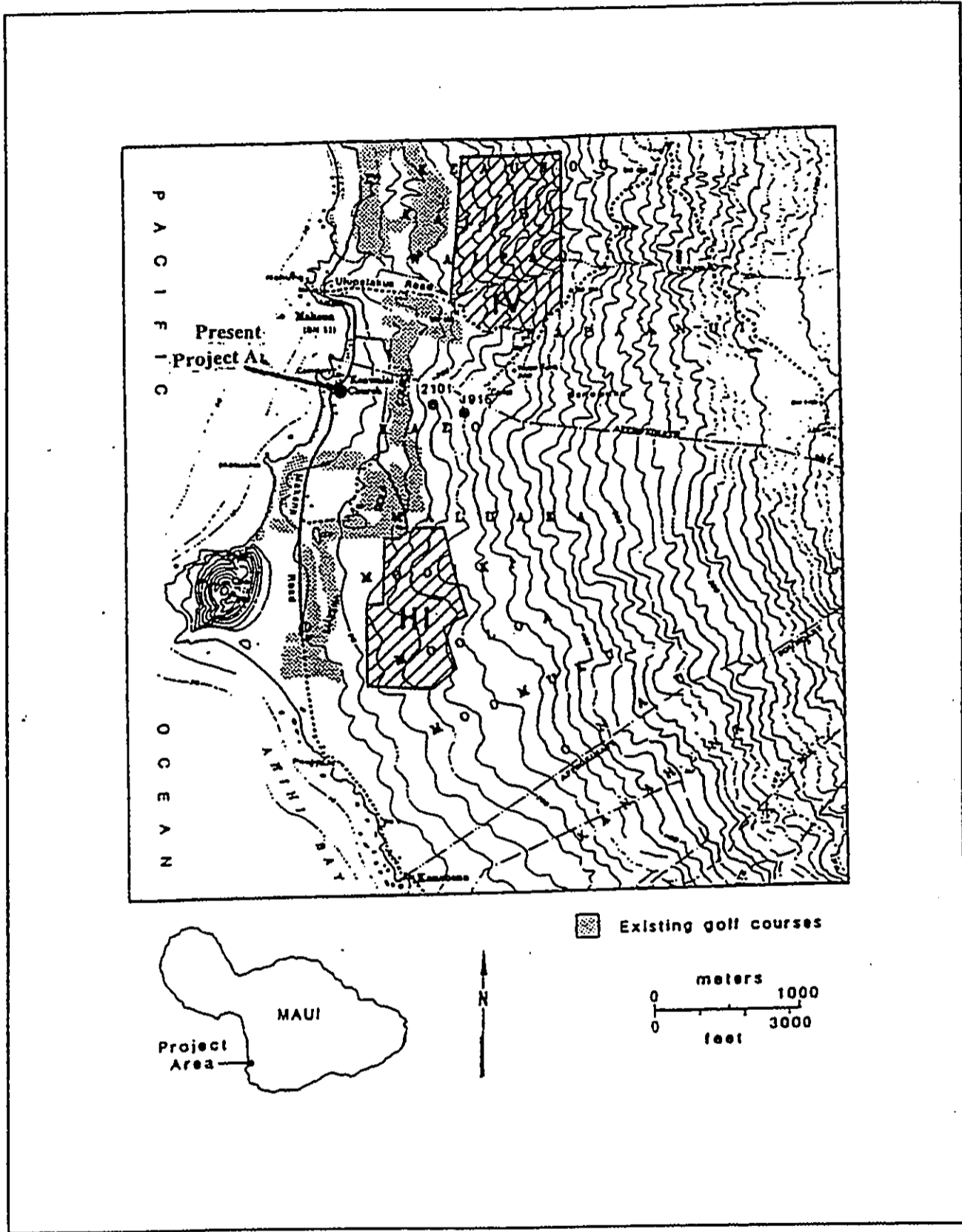


Figure 5: Area of Study, Cordy and Athens 1988.

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

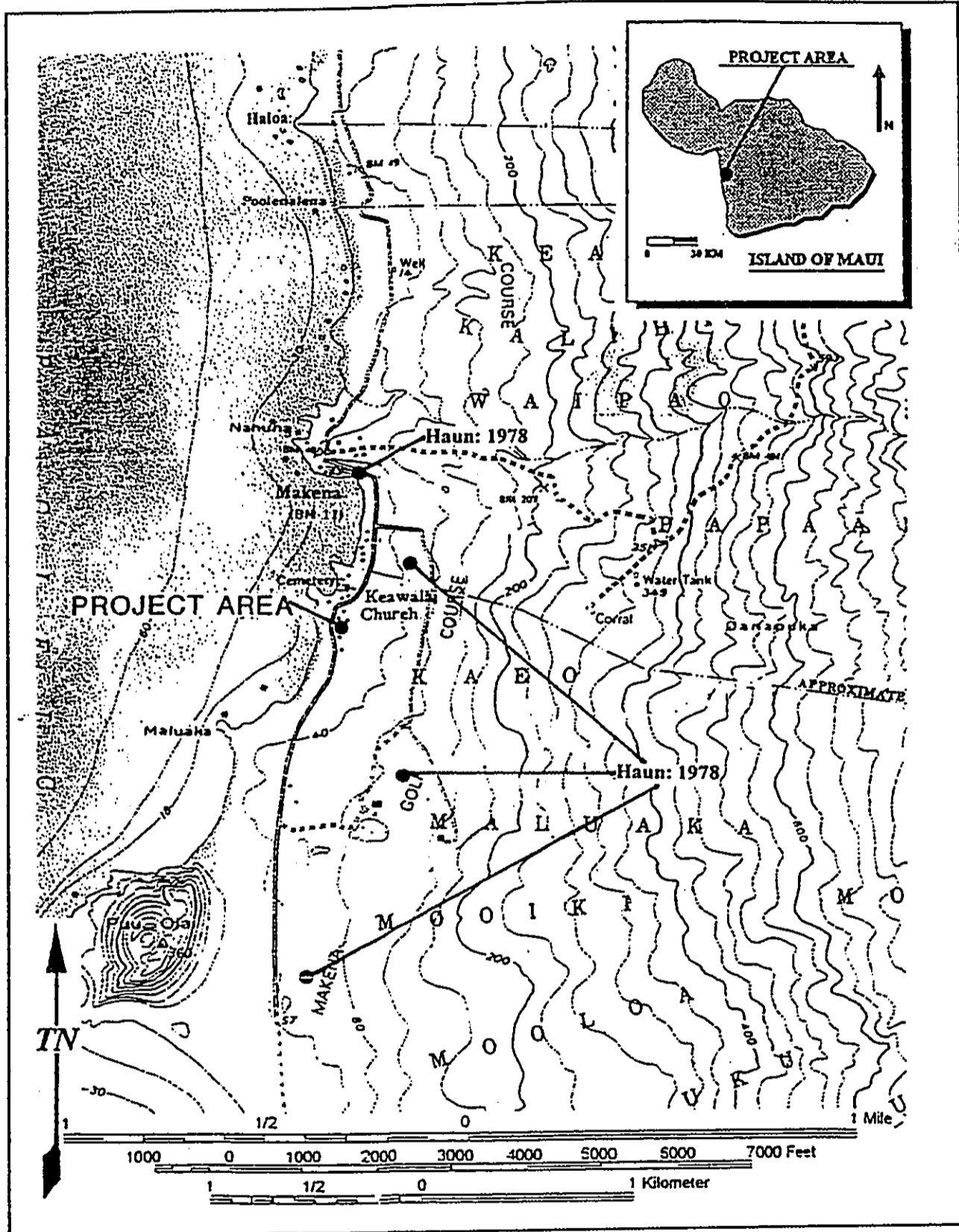


Figure 6: Haun's 1978 Project Area.



but in settlement pattern characteristics (Sinoto 1981:12-13). Additionally, a survey of Seibu Sites 1916 and 2101 by Cordy and Athens revealed archaeological features comparable to other sites in the area, as typified by "clustered groups of agricultural fields with associated field shelters and work areas" (Cordy and Athens 1988:100).

Settlement pattern analysis of the area, offered by Cordy and Athens in 1988, led to the suggestion that the cultivation zone in the Mākena area was located roughly between 80 feet amsl and the edge of the old forest line at the 1200 foot contour line. Agricultural fields were clustered and were usually associated with temporary habitations or field shelters such as small C-shapes, terraces, platforms, and/or caves.

Recently, several studies have taken place north of the present project area. An archaeological inventory survey was conducted across a land parcel (TMK:2-1-07:71) which led to the identification of three previously unrecorded archaeological sites (Fredericksen and Fredericksen 1998a; see Figure 2). The sites consisted of a rock enclosure associated with early historic times as well as an overhang/rock shelter and habitation area both associated with pre-Contact times. Another archaeological Inventory Survey was conducted on a coastal property in Pāpa`anui Ahupua`a (demarcated by TMK:2-1-07:79) and one previously unrecorded site was located. The site was interpreted as a pre-Contact habitation site that was also utilized during historic times (Fredericksen and Fredericksen 1998b).

The site consisted of a rock shelter and an `ili`ili pavement, these features interpreted as habitation and activity areas respectively. An additional archaeological Inventory Survey occurred along a coastal Mākena property (at TMK:2-1-07:99) that led to the recording of four new archaeological sites: a WWII shoreline gun base, two pre-Contact rock shelters, and a pre-Contact habitation site. The shelter features and habitation loci were both thought to reflect temporary habitation while the cement gun base patently reflected historic activities (Fredericksen and Fredericksen 1998c).

Other recent investigations in Mākena have concluded that agricultural field systems, religious features, and permanent habitation sites flourished in the upland field zone between 1,500 to 3,400 ft. amsl (Cordy 1997; Kolb *et al.* 1997). However, only a few scattered permanent habitations were identified among the lowland fields. Agricultural sites were clustered and were usually associated with temporary habitations or field shelters including small C-shapes, terraces, platforms, and/or caves. Manufacturing or activity areas occurred within the agricultural fields, often closely associated with habitation features.

Radiocarbon dates acquired from temporary and permanent habitation sites associated with such agricultural features indicated that cultivation near the coast was established no earlier than the A.D. 1500s-1600s. As Dobyms states, "...The entire Mākena coastline is a continuous archaeological site with surface structures representing only the more recent occupations" (Dobyms 1988:127).

Six parcels were investigated for the Makena Resort Corporation in 1996 (McIntosh and Pantaleo 1998) (Figure 7). Eleven previously unrecorded archaeological sites in parcels two and three consisting of nearly fifty component features were identified, including modified outcrops, rockshelters, terraces, walls, and enclosures. Site 4387, an overhang shelter, yielded a charcoal sample dated to A.D. 1450-1648. Site 4389, interpreted as a long-term, recurrent habitation site yielded radiocarbon date ranges of A.D. 1333-1340 and A.D. 1399-1452. Site 4391, a complex of nine features produced a date range of A.D. 1695 to 1812.

An Archaeological survey and testing was conducted in the north yard of Keawala'i Church, in close proximity to the project area (Donham 1998). Five surface features were identified, including rock mounds, modified outcrops, and walls. Six test units produced a total of 564 traditional Hawaiian artifacts and 790 historic period artifacts. Radiometric date determinations were completed for four charcoal samples ranging from A.D. 1265 into the historic period. Survey results indicated that intact cultural features and midden deposits were present extending to 1.0 meter below surface in some areas.

Data Recovery excavation was undertaken on a six acre parcel to the north of the present project area by SCS in March, 2000. In addition to an agricultural site (Site No. 50-50-14-3514) and a lithic and midden scatter (50-50-14-3516), archaeological investigation revealed a habitation site (Site No. 50-50-14-3513) that had experienced continuous, small-scale occupation over a period of several hundred years. Three radiocarbon dates were obtained from this site, the earliest yielding a date of A.D. 1280-1460 (Cordero *et al.* 2000). The additional date, obtained in stratigraphic order, had calibrated date ranges of A.D. 1630-1890 and A.D. 1800-1940. Habitation at this site was therefore concluded to have occurred from the earliest date range through the early historic period (see Cordero *et al.*, 2000).

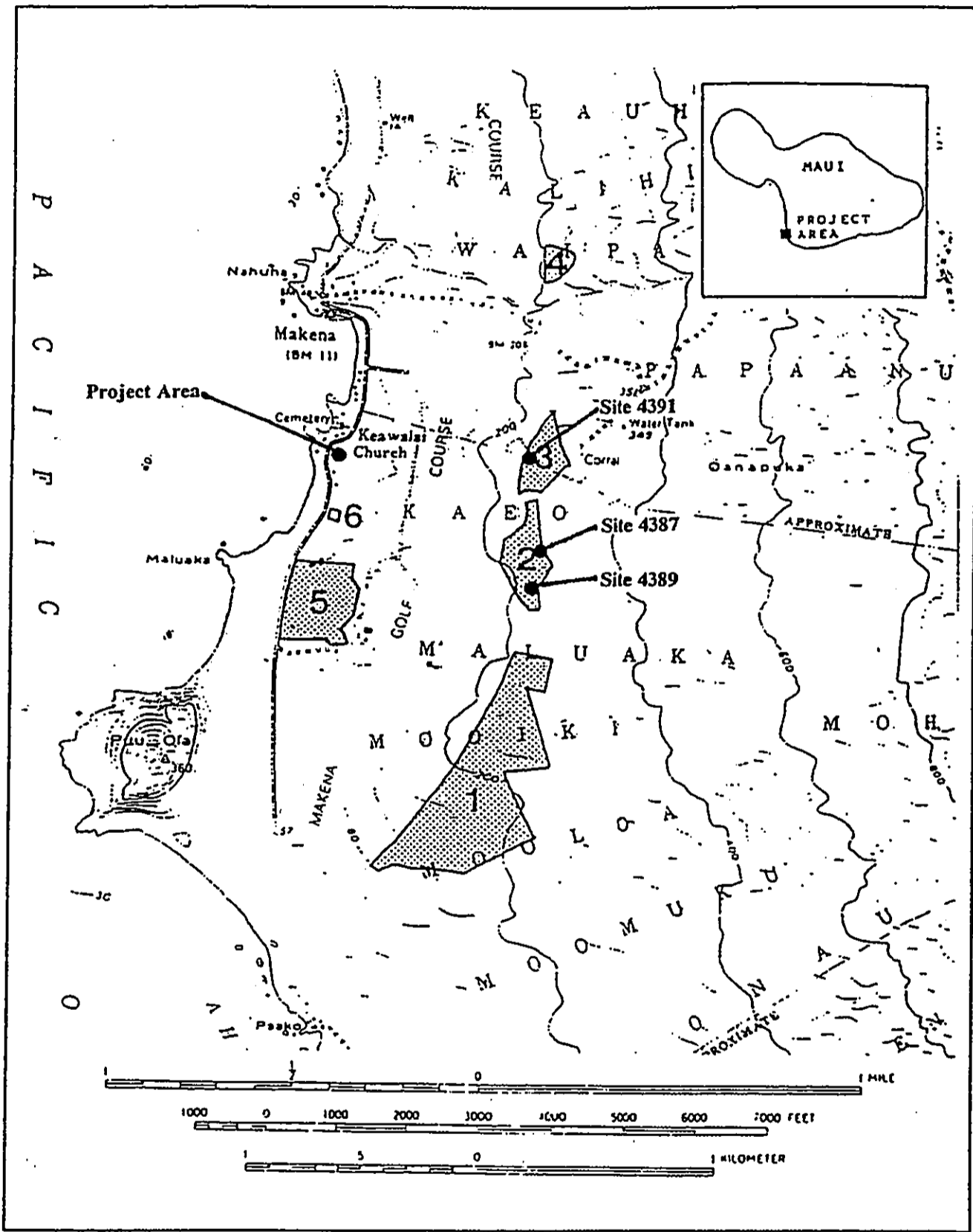


Figure 7: McIntosh and Pantaleo 1998 Project Area.

The northern and eastern boundaries of the present project area were flanked by the Garcia family property (TMK: 2-1-07:67). Archaeological work was originally undertaken on this property in 1979 by A.R. Schilt on behalf of the Bishop Museum. This property is the location of the Kalani Heiau (Site No. 50-14-196), which was initially recorded by Walker in 1931 who stated:

A large heiau said to be of sacrificial class but now reduced largely to a shapeless pile of rocks...No walls are in evidence, it being apparently an open platform 8 feet above the surrounding country built of rough aa blocks with some coral and pebbles on top. Interior structure has been demolished by cattle (Walker 1931:267).

Schilt's description and map of the *heiau* portrays a structure retaining pavements in its northwest and south areas, as well as evidence of a low rubble wall and faced terraces on the east, south and west faces of the southern portion of the feature (1979:7). An early tax map of the area is labeled "Kalili", perhaps an earlier name of the *heiau*. 'Ili'ili, coral, and shell deposits were identified in scattered areas (*ibid.*). Schilt identifies an historic wall bisecting the heiau east to west which abuts the northeast corner of the present project area and extends along its north boundary, *makai*. Although none were specifically identified, it is well known that *heiau* of this class included ancillary structures, such as a *Hale o Papa* for high ranking chiefesses, in close proximity to the main section (Valeri 1985).

A small enclosure, identified by Rogers-Jourdane in 1978 (Rogers-Jourdane 1979), could not be located one year later by Schilt, presumably due to the heavy vegetation cover. However, Schilt identified seven other areas of archaeological remains, including rock mounds paved areas, an abandoned well, remnants of an enclosure, marine midden, modified natural outcrops, a lava-bubble shelter with a paved entrance and marine shell midden, 19<sup>th</sup>-century transfer-printed ceramics and mold-blown bottles with hand-finished, tooled lips, and historic cattle walls. It was also noted that a historical post office was located near the Garcia's house. Archaeological work conducted in Parcel four in 1993 included the identification of Site 3194, a habitation /agricultural site, with a radiocarbon date of A.D. 1410 to 1660, as well as artifacts reflecting occupation in the 1800s (Jones *et al.* 1994).

### SETTLEMENT PATTERN

The district of Honua`ula, composing a portion of the leeward flank of Haleakalā, has a relatively harsh environment (the project area was located in the *ahupua`a* of Kaeo, within the Honua`ula District). In the past, farming was successfully accomplished inland, where rainfall was 30 inches or more. In general, four environmental zones, including coastal, dry-intermediate, upland fields, and forest, reflect archaeological and historic settlement within this leeward environment (see Cordy 1997). The project area falls within the coastal environmental zone.

Before the arrival of cattle and intensive tree clearing programs, the forest zone within Honua`ula (c. 3,400 ft.) extended to much lower elevations and rain occurred frequently within this zone allowing cultivation at lower elevations (Handy 1940:113). The "lower" upland, occurring above more densely inhabited areas, was probably grew typical forest zone plants (bananas, dryland taro, etc.). The upland field zone was located between the 1,500 ft. to 3,400 ft. level and contained agricultural fields, religious structures, and permanent habitation loci (Cordy 1997:11, Kolb *et al.* 1997).

Coastal regions supported the cultivation of sweet potato and dry land taro. Coastal beaches were most frequently utilized for their abundant marine resources however. Handy (1940) notes:

"...according to an old *kamaaina* these *ahupua`a* had in former times a continuous population of fisher folk who cultivated potatoes and exchanged their fish for taro, bananas and sweet potatoes grown by the upland residents of the Ulupalakua section. A few Hawaiians still live here."

Religious structures, including *heiau* and *ko`a*, were located in both coastal and upland regions. However, the small number of *heiau* in the Honua`ula area suggested a limited political presence (Cordy and Athens 1988:9).

It is suggested the initial settlement of Mākena occurred between A.D. 1100-1400 and was well established by A.D. 1400-1650 (Keauhou and Palauea followed approximately 100 to 150 years later), however, it is thought that the formal *kauhale* complexes did not appear in the

region until A.D. 1650-1795 (Gosser *et al.*:1996). It was also during this period that agricultural use of the land intensified and inland expansion occurred. [A few dates reflect an earlier settlement for Palauea and Mo'oiki, north of the project area (Donham 1998:25)]. Some scholars feel that habitation remained relatively intense along the shoreline through time (*ibid.*). Based on the site density it has been suggested that Kaeo was the focal area of settlement in the Mākena region (Sinoto 1981).

Based on the location, elevation, and early land records in the vicinity of the project area, settlement would have consisted of house plots on the shore with dry land agricultural parcels scattered inland around 200 to 400 foot elevation level and another cluster farther inland at 800 to 1200 feet, or where rainfall increased to 30 inches and above (Cordy 1977). Possibly coconut and pandanus trees were cultivated around the house sites at the shore. Archaeologically, remains of traditional temporary and permanent habitation in the form of platforms, enclosures, C-shape structures, and evidence of a limited amount of dryland agriculture would be expected. Subsurface remains of fire features, midden, and traditional artifacts, especially associated with marine activities might be identified. Historic activities would be expected to manifest itself in ranching walls, enclosures, and artifacts belonging to the 19<sup>th</sup> and early 20<sup>th</sup>-centuries.

#### METHODOLOGY

Several methods, relating to both fieldwork and laboratory work, were utilized during the present Inventory Survey. The fieldwork consisted of two persons systematically walking the length and breadth of the project area, spaced approximately 5.00m to 10.00m apart, depending on surface visibility. Though ground surface visibility was obstructed by a great deal of modern rubbish, 13 surface features were identified in this manner (Figure 8; found in sleeve on back cover). The sweeps allowed for the demarcating of areas within the project boundaries that had been previously disturbed by either grading and leveling, as well as vegetation growth. Basic information regarding the landscape and its identifiable features, as well as areas that have been impacted, was gathered at this time.

Following the sweeps, visible surface features were mapped, recorded, and photographed. Ten loci for excavating shovel probes (SP) were demarcated within Features 1, 2, 3, 7, 8, 9, 12, and 13. All ten units were subject to manual excavation by natural layers. With the exception of SP-2, which was subject to 50% screening, sediments from the units were not screened as there was very little cultural material and a great deal of disturbance in the strata of the shovel probes. However, all units were mapped, recorded and photographed, and profile sketches were made for selected units. Identifiable cultural material was collected and returned to the laboratory of the SCS Honolulu office for processing.

Laboratory work included the drafting of site plan view maps and features, as well as the selected profiles. Cultural material was sorted and recorded, the results of which are presented in Appendices A and B of this report. Due to the extensive disturbance of the natural strata, no radiocarbon dates were submitted for specialized analysis.

## FIELD RESULTS

### **SITE NO. 50-50-14-4986**

#### **Feature 1**

This feature was a large enclosure situated in the southern portion of the project area (Figures 9 and 10). The enclosure measured approximately 18.00m by 5.00m, and had a maximum height of 0.85m. Constructed of subangular cobbles and small boulders, the walls were between three to five courses high and were in fair to poor condition, as several portions of the walls had been highly impacted by modern activity. A sparse amount of midden, coral and *'ili 'ili* stones were scattered throughout wall construction, though none was observed within the enclosure itself as it was largely covered with modern trash. A shovel probe was placed directly to the west of the enclosure's west wall.

#### Shovel Probe 1

This probe measured 0.50m by 0.50m, and extended to a depth of 0.35mbs (Figure 11). Layer I (0-0.28mbs) consisted of a topsoil containing modern rubbish, gray (5Y6/1) silt and some charcoal. This layer appeared to be quite disturbed by modern activity, as a cinder block was recovered at 0.20mbs. Layer II (0.28-0.35mbs) consisted of a dark brown (7.5YR3/4) fine silt with interspersed charcoal fragments. Some echinoderm fragments and a cinder block were recovered at 0.20mbs.



Figure 9: Photograph of Feature 1, North Portion. View to North.



Figure 10: Photograph of Feature 1, South Portion. View to West.



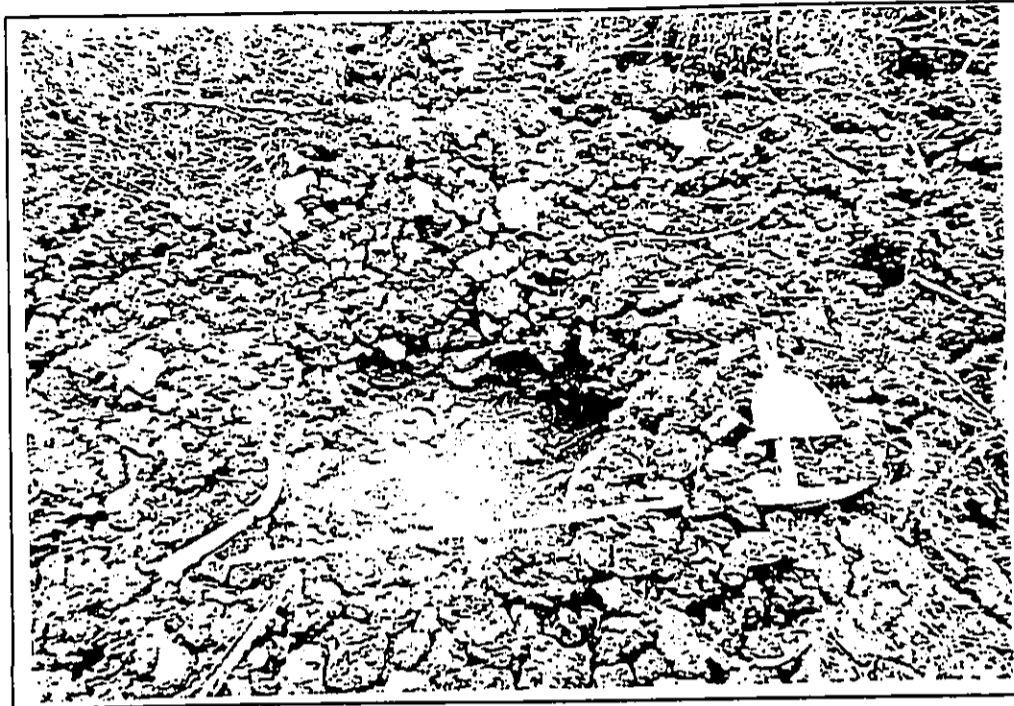


Figure 11: Photograph of SP-1. View to South.

#### Feature 2

This feature consisted of two small, attached enclosures which were situated adjacent to the southern wall of Feature 1 (Figure 12). Its exterior dimensions were 19.60m by 6.00m (E/W), a wall width of 0.60m to 0.80m. The walls were stacked approximately seven courses high and were constructed of subangular cobbles and boulders. The northern wall also contained a large concentration of small gravel fill mixed with coral. Opihi shells were observed in the northwest corner of the enclosure. Some cut bovine bone was observed in the southeast corner of the feature. To the east, abutting a portion of Feature 1 south wall and Feature 2 east wall, was a pavement of a'a covered with glass and bottles. This section was not tested. One shovel probe was conducted within the western enclosure.

#### Shovel Probe 2

This probe measured 1.00m by 1.50m and extended to a depth of 0.48m (Figures 13 and 14). A modern trash pit was encountered in the western portion of the unit, and this disturbed layer was present from the surface to the base of excavation (BOE). A total of four layers were identified in the southern portion of the shovel probe, beneath the southern wall of the enclosure. This wall was revealed as extending 0.15mbs. Layer I was a thick layer (0-0.14mbs) of overburden consisted of dead grass and brown (7.5YR5/4) silt. Layer II was a fine, dark grey (10YR4/4) silt which extended from 0.14mbs to a maximum of 0.40mbs. This layer contained a large quantity of small

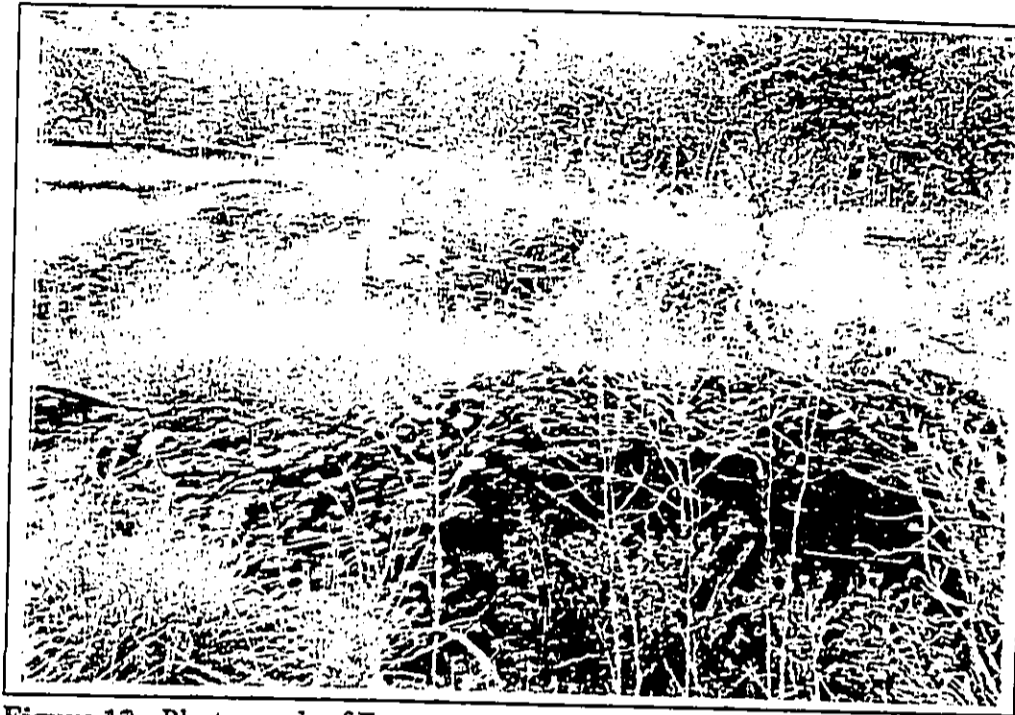


Figure 12: Photograph of Feature 2, Overview. View to East.

rootlets throughout, as well as decomposing a`a and some gravel. Layer III was a red (10YR4/6) silt with tightly compacted a`a cobbles. This layer extended to a maximum depth of 0.48mbs. Layer IV was comprised of bedrock and some oxidizing a`a pebbles and cobbles. The excavation was terminated when this layer was encountered, and no cultural material was recovered from this unit.

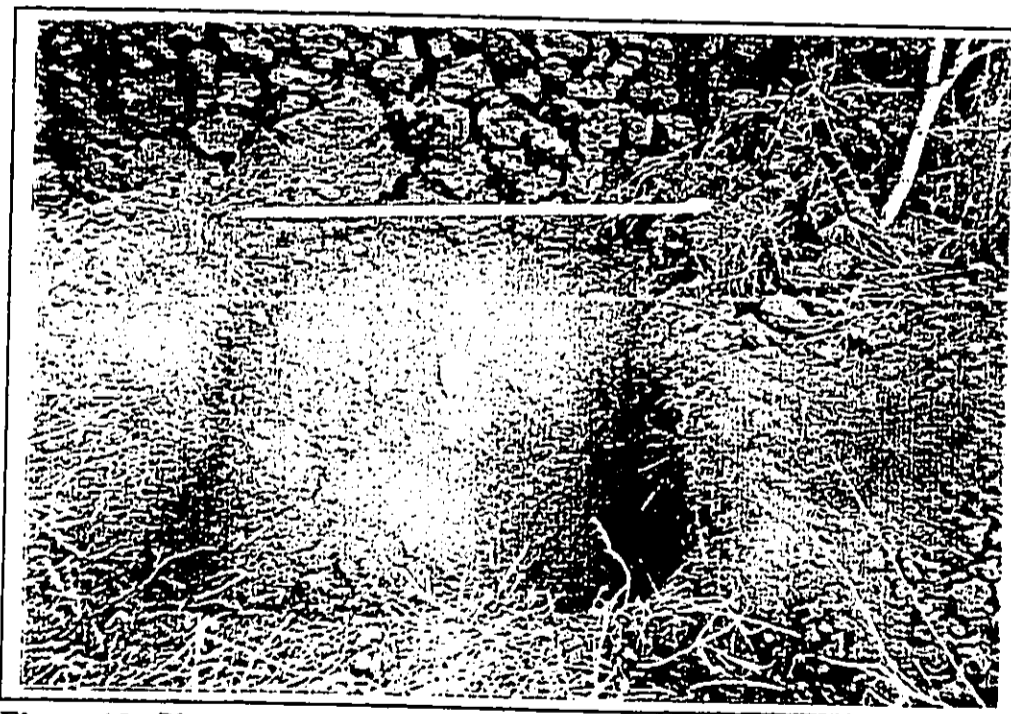


Figure 13: Photograph of Feature 2, SP-2. View to South.

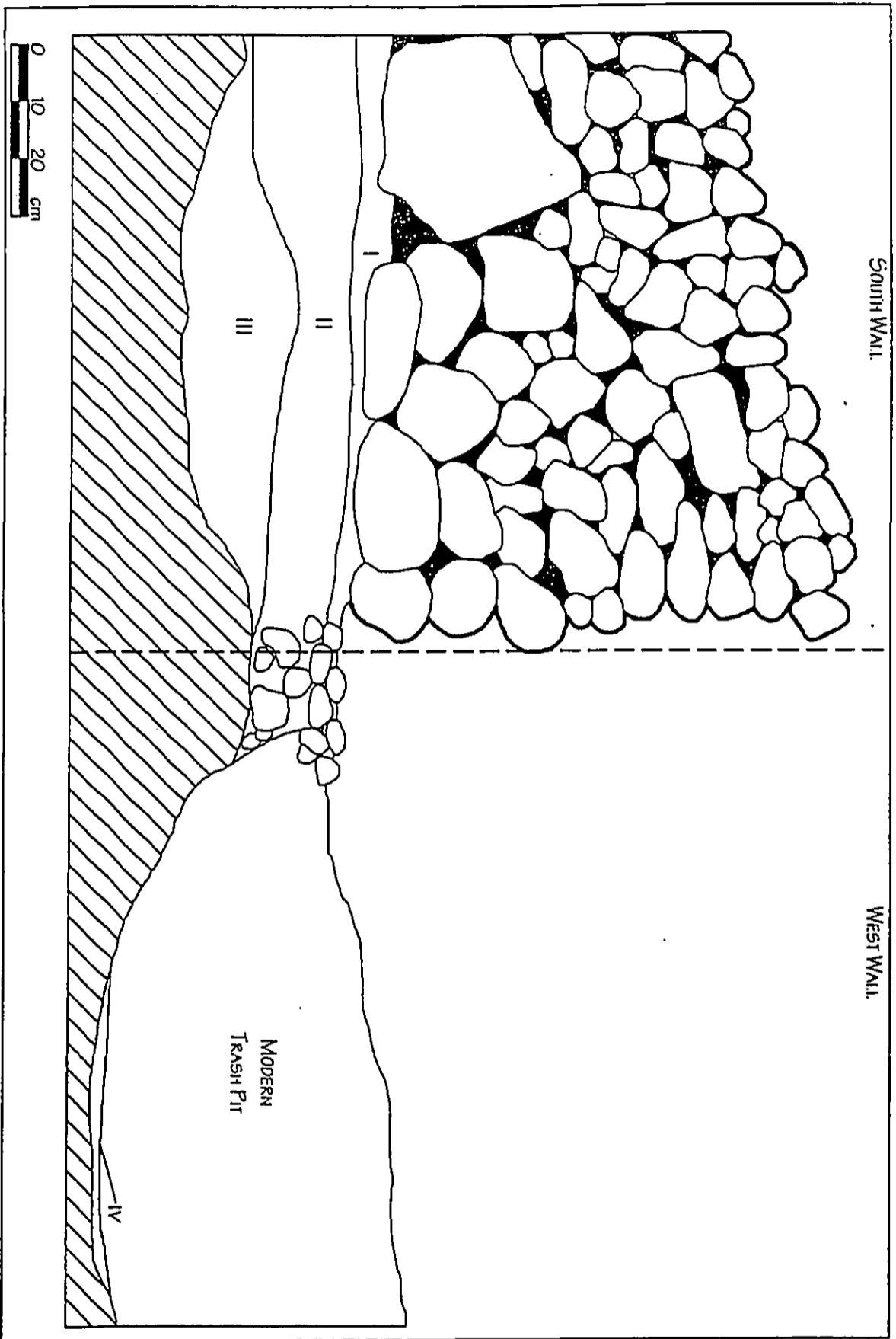


Figure 14: South and West Wall Profiles of Feature 2, SP-2.

### Feature 3

This feature consisted of a modified outcrop with two pavement areas (Figures 15 and 16). It measured approximately 6.50m by 8.80m (N/S). The northeast corner of the outcrop was modified with a paving of small to medium subangular a`a cobbles and a scattering of coral and midden throughout the pavement. The second paving area was situated on the southern portion of the outcrop, and also consisted of small to medium subangular a`a cobbles with a scattering of coral and midden. Three shovel probes were conducted within this feature, one located in each paving area and one that was placed on the outcrop in between the two paved areas.

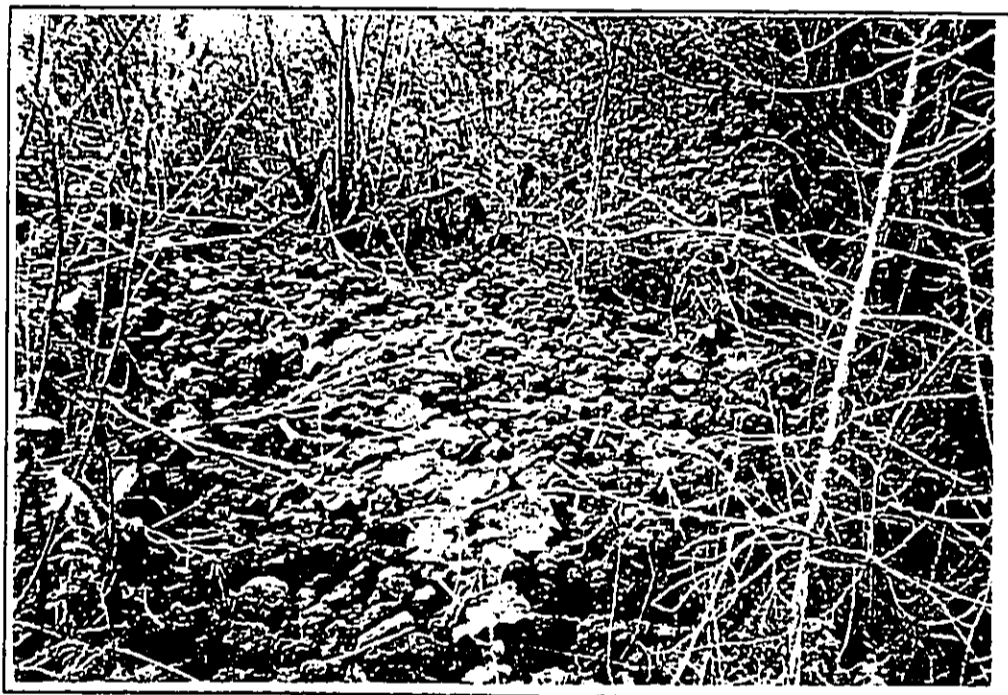


Figure 15: Photograph of Feature 3, Southern Paved Area. View to East.

### Shovel Probe 3

This unit was placed in the northwest corner of feature 3 in the paving of a modified bedrock outcrop (Figure 17). The unit measured 0.75m by 0.75m and extended to a final depth of 0.40mbs. This unit contained the same layer from the surface to the termination of the excavation. This layer was comprised of small to medium subangular a`a cobbles with small amounts of coral midden, glass and metal. There was also some sparse, sterile silt present intermittently throughout the layer, as well as some decomposing leaf litter and grass. A paniolo spur, horseshoe and rat bone were observed within this unit. Bedrock was encountered at 0.40mbs, at which point the excavation was terminated.



Figure 16: Photograph of Feature 3, Northeastern Paved Area. View to East.

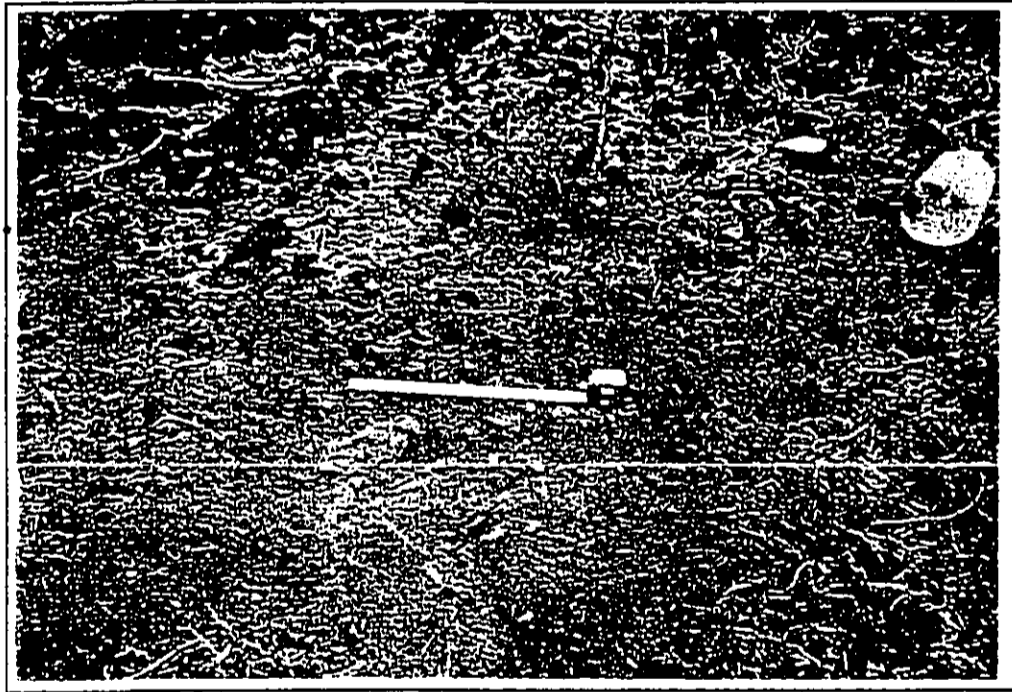


Figure 17: Photograph of Feature 3, SP-3, Post-Excavation. View to Northwest.

#### Shovel Probe 4

This unit was placed on the southeast edge of the outcrop within the second paved area (Figure 18). The unit measured 0.50m by 0.50m and terminated at 0.28mbs. The unit had one layer, which was comprised of small, subangular a`a cobbles interspersed with fragments of metal, midden, glass and a sparse amount of charcoal. A small amount of silt was also present throughout the layer as well as some decomposing leaf litter. Bedrock was reached at 0.28mbs at which point the excavation was terminated. No cultural material was retrieved from this unit.

#### Shovel Probe 5

SP-4 was placed in an area between the two paved areas where a small rock pile was located. The probe measured 0.50m by 0.50, and had a maximum depth of 0.10mbs. Medium-sized a`a cobbles were removed to reveal bedrock at 0.10mbs, at which point the excavation was terminated. No cultural material was observed within this probe.

#### **Feature 4**

This feature is a wall which is comprised of a`a cobbles and boulders. The wall measures 20.50m in length (E/W) and 1.50m in width. It is stacked 5-8 courses high and has an average height of 0.95m. The wall was impacted by tree growth and had several breaches due to pipes which ran through the wall and served the house to the north. The wall currently functions as the southern property boundary for the nearby house.

#### **Feature 5**

This feature was a wall that ran directly perpendicular to and west of Feature 1 (Figure 19). Feature 5 was comprised of two sections, with a breach in the center due to modern activity. It measured approximately 27.00m in length (E/W) and was 0.60m-1.50m in width. It was stacked 6 to 7 courses high and had a maximum height of 0.80m. The wall is constructed of medium and small a`a boulders and cobbles. Plant growth and human activity have severely impacted this feature and its condition is poor.

#### **Feature 6**

This feature consisted of two walls and an amorphous mound that most likely formed an enclosure before being severely impacted by human activity (Figures 20 and 21). The enclosure walls were constructed of large basalt boulders at the base with small boulders and cobbles comprising the mid- and upper portions. The northern portion of the enclosure was a wall that measured a total of 26.40m in length and a maximum width of 1.20m. The wall ran in a



Figure 18: Photograph of Feature 3, SP-4, Post-Excavation. View to Southeast.



Figure 19: Photograph of Feature 5, Portion of Wall. View to East.



Figure 20: Photograph of Feature 6, Portion of Wall. View to East.



Figure 21: Photograph of Feature 6, Amorphous Mound. View to Southwest.



northerly direction before turning at a right angle to run E/W. The second wall ran E/W, parallel to the second portion of the first wall. This wall measured 7.40m with a maximum width of 1.30m and a maximum height of 1.60m. The amorphous mound was located directly west of the second wall and measured 4.70m by 2.75m (E/W) with a maximum height of 1.10m. This mound lies directly in alignment with the second wall and is most likely an extension of that wall. The enclosure has been severely impacted by human activity and plant growth.

#### **Feature 7**

This feature was an amorphous rock mound measuring 3.60m (N/S) by 2.5m, with a maximum height of 0.70m (Figure 22). The mound was constructed of medium to small a'a boulders with small cobbles and 'ili`'ili fill. Some coral, glass and non-carbonated *kukui* shell was observed within the mound. A shovel probe was conducted within this feature.

#### Shovel Probe 6

This shovel probe was placed in the center of Feature 7 and measured 1.00m by 0.50m, with a maximum depth of 0.80mbs (Figure 23). The only layer consisted of the cobble and 'ili`'ili fill. Some bovine and pig bones were encountered, as well as a piece of cowrie shell and modern rubbish. The probe was otherwise sterile.

#### **Feature 8**

This feature was a small pavement area constructed of medium to small a'a cobbles interspersed with small to medium coral cobbles (Figure 24). The feature measured 3.00m by 1.90m (N/S). The height of this feature was flush with the surrounding soil surface and appeared relatively unaltered. One shovel probe was placed within this feature.

#### Shovel Probe 7

This shovel probe measured 1.00m by 1.00m, and extended to a depth of 0.54mbs (Figures 25 and 26). The feature's rock layer (Layer I) extended to 0.20mbs, and consisted primarily of small to medium subangular or angular blocky a'a cobbles. Mixed within this rock fill were several small to medium coral cobbles as well as some mammal bone fragments. Layer II (0.20-0.42mbs) consisted of a brown (7.5YR5/3) silt loam and contained 60-70% small cobbles. Cultural materials identified in this layer included a minimal amount of marine shell and a bullet casing with an inscribed date of 1901. It should be noted that these items were also located within the same provenience as modern aluminum foil, therefore their presence is not conclusive insofar as stratigraphic dating is concerned. Layer III (0.42-0.45mbs) consisted primarily of yellowish brown (10YR5/4) sand with a small amount of marine shell and coral fragments. Layer IV (0.45-0.54mbs) consisted of a dark gray (7.5YR4/1) clay, which was culturally sterile. The excavation was terminated at this point.



Figure 22: Photograph of Feature 7, Rock Mound. View to North.



Figure 23: Photograph of Feature 7, SP-6, Post-Excavation. View to South.

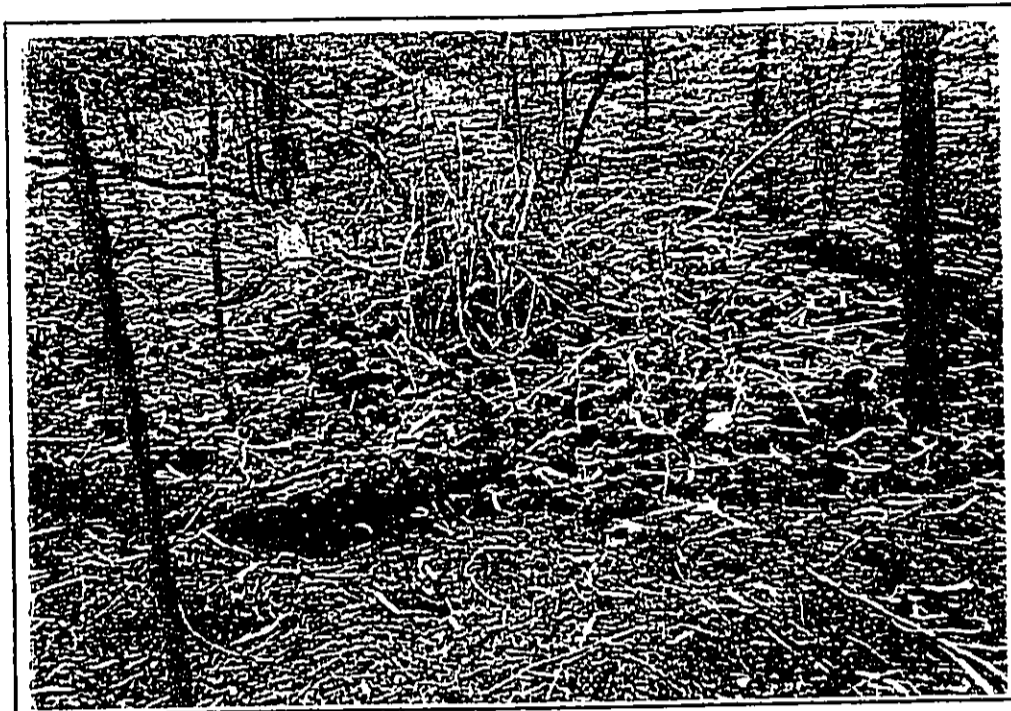


Figure 24: Photograph of Feature 8. View to Northwest.

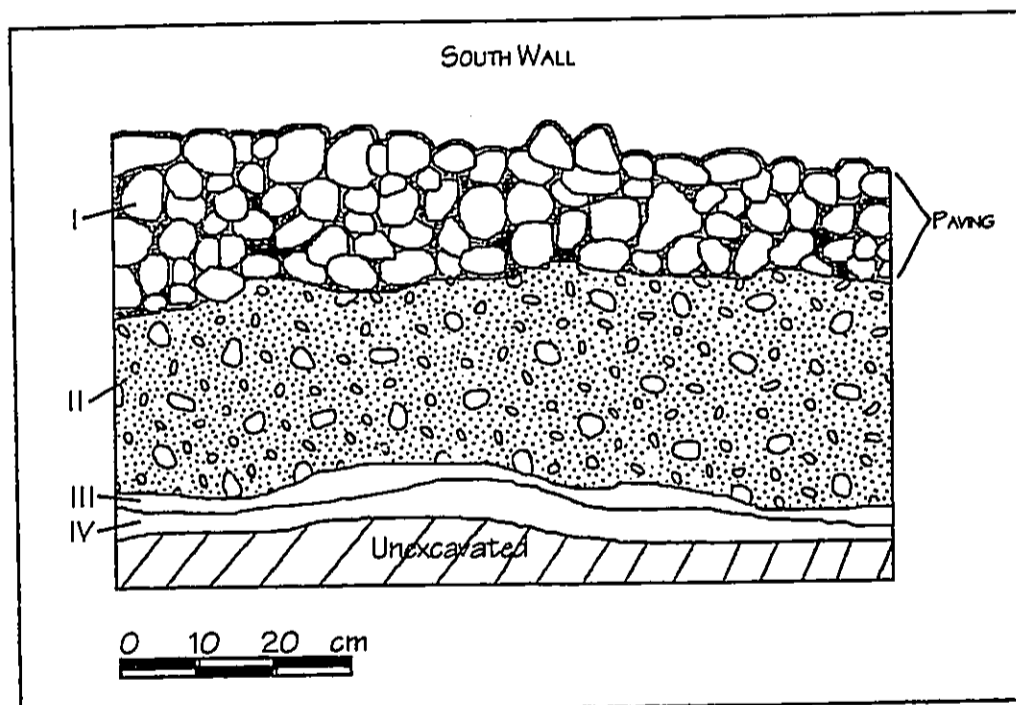


Figure 25: South Wall Profile of SP-7, Feature 8.



Figure 26: Photograph of Feature 8, SP-7, Post-Excavation. View to South.

#### Feature 9

Feature 9 consisted of a rock mound measuring 1.40m by 1.40m with a maximum height of 0.40m (Figure 27). The mound consisted of small cobbles and pebbles atop a small bedrock outcrop. A shovel probe was placed within this unit.

#### Shovel Probe 8

This shovel probe encompassed the perimeters of the entire feature, measuring 1.40m by 1.40m. The rocks were removed to the bedrock base which was flush with the surrounding soil surface. There were no cultural materials observed within this shovel probe.

#### Feature 10

Feature 10 was a rock wall located directly east of Feature 8 and north of Feature 6 (Figure 28). The wall was constructed of piled a` boulders and cobbles. This feature measured 6.00m in length (N/S), 0.90m in width, and had a maximum height of 1.15m. This wall could possibly be associated with Feature 6, though this cannot be assessed due to the poor condition of the feature, which has been severely impacted by modern activity.



Figure 27: Photograph of Feature 9. View to East.



Figure 28: Photograph of Feature 10, Portion of Wall. View to South.

#### Feature 11

This feature was a rock wall located in the northwest corner of the project area (Figure 29). The wall was in extremely poor condition due to *kiawe* intrusion, and its dimensions were undefined. Feature 11 was built on top of Feature 13 and a sparse amount of midden, coral and some animal bone were present on the surface of Feature 13.

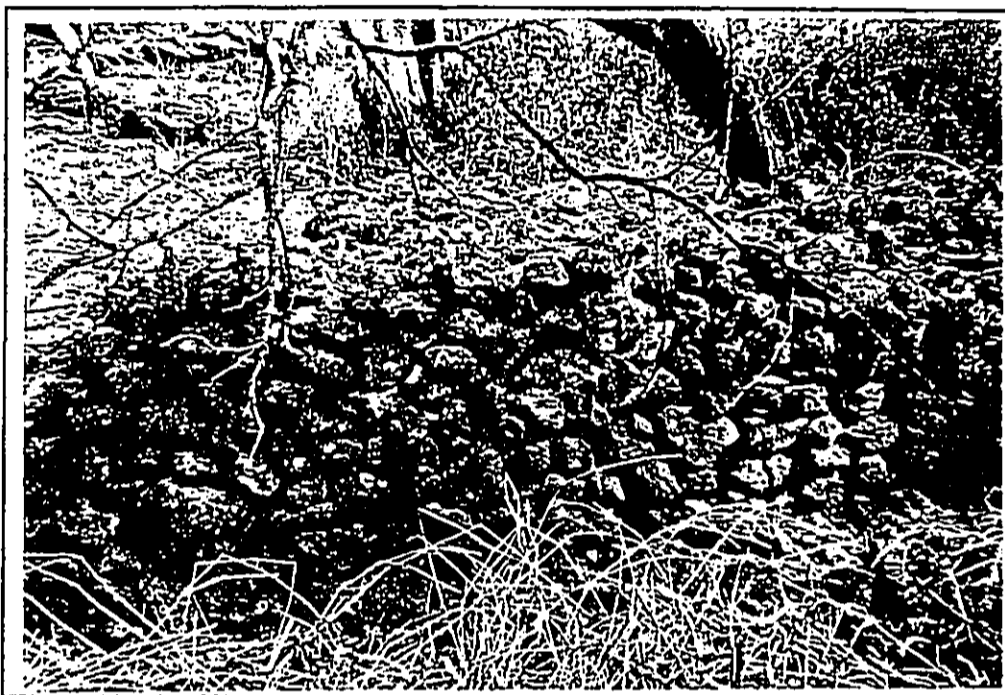


Figure 29: Photograph of Feature 11, Portion of Wall. View to Northwest.

#### Feature 12

This feature consisted of rock piles which surrounded a natural lava toe. The piles were constructed of angular a`a cobbles and small water worn boulders. Sparse marine midden was present scattered atop the feature. The entire feature measured 24.30m by 12.10m (E/W). The southwest portion of this feature had a natural overhang which had an internal structure of small lava tubes, which could have served as a small shelters or cupboards (Figure 30). The interior dimensions of this structure were 2.90m (E/W) by 0.60m at the opening, and had a maximum height of 1.40m. A shovel probe was conducted within this area of Feature 12.

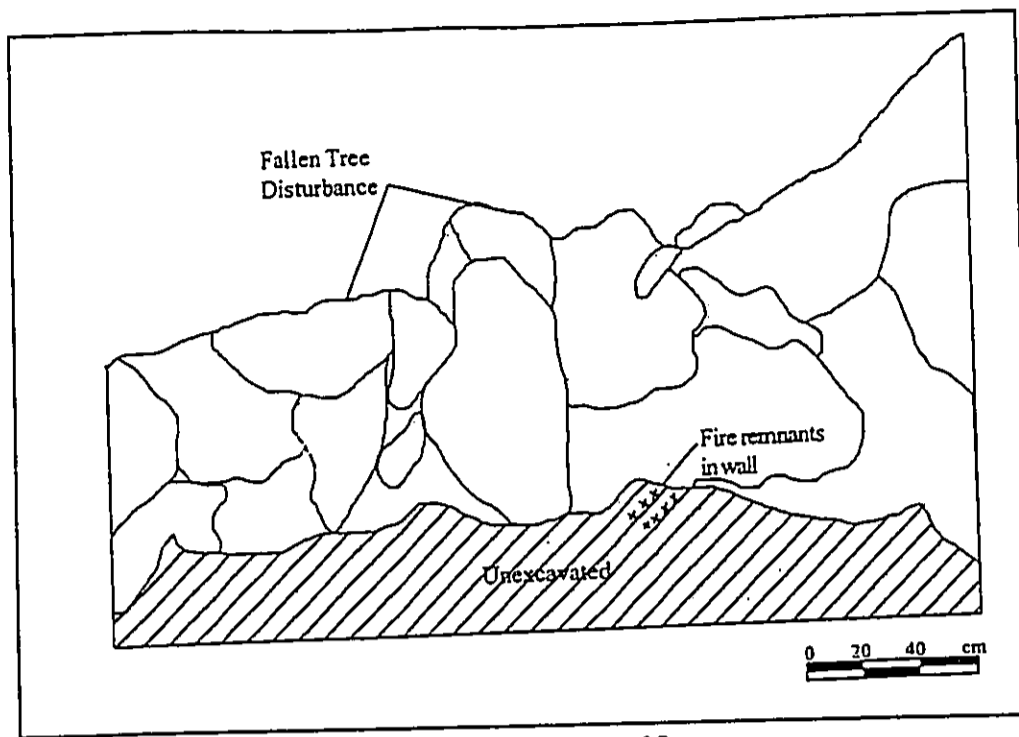


Figure 30: Profile of Rock Overhang, Feature 12.

Shovel Probe 9

SP-9 measured 0.50 by 0.50m and extended to a depth of 0.61m (Figure 31). The surface was covered with modern rubbish and some grasses. Layer I (0-0.05mbs) was comprised of an overburden consisting of grasses and small to medium a`a cobbles within a dark brown (10YR3/3) fine silt mixed with a small amount of sand. Layer II (0.05-0.17mbs) was a dark brown (10YR3/3) silt containing many rootlets throughout the layer. Layer III (0.17-0.37mbs) was a pale brown (10YR6/3) silt containing some a`a cobbles. Layer IV (0.37-0.61mbs) consisted of a dark brown (10YR3/3), dense silt which also contained some a`a cobbles. Cultural material recovered from this layer included some shell midden (0.48mbs). Some `ili `ili stones were noted just above this midden deposit.

**Feature 13**

Feature 13 was a paving beneath Feature 11 in the northwest corner of the project area (Figure 32). It was constructed of subangular and angular small, medium and large a`a cobbles. The paving was amorphous in shape and had no distinct boundaries. Its dimensions were 15.50m by 10.50m (E/W) and its surface was flush with the surrounding soil. The area in which this feature was located was less impacted by trash than elsewhere in the project area, though vegetation (*kiawe* and *haole koa*) is quite dense. Some coral cobbles were noted scattered throughout the surface paving. This feature was in good condition though slightly altered by the placement of a historic wall, extending from the Garcia property, across its surface. One shovel probe was conducted within this unit.

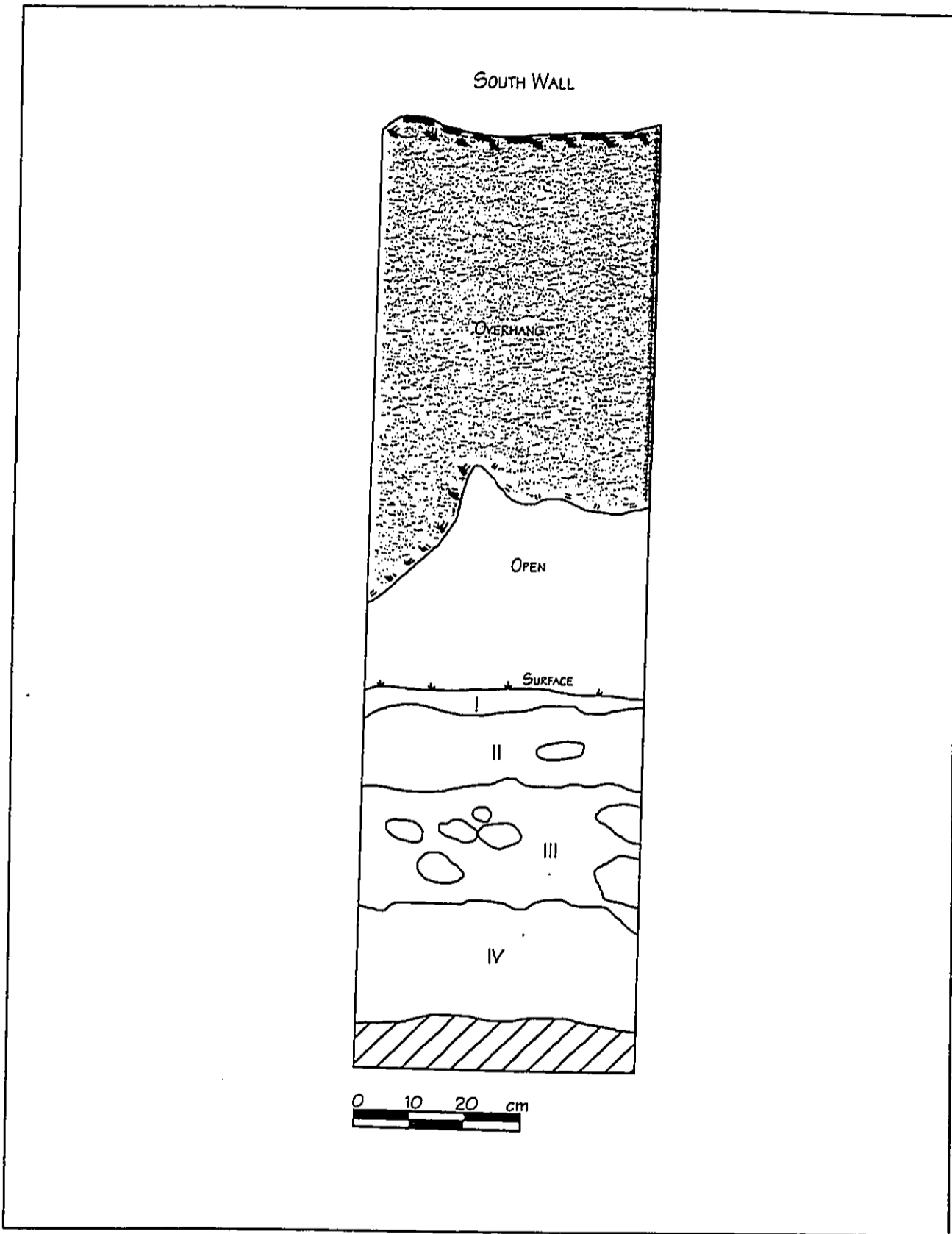


Figure 31: South Wall Profile of SP-9, Feature 12.





Figure 32: Photograph of Feature 13. View to Northeast.

#### Shovel Probe 10

SP-10 was situated in the southeast corner of Feature 13, and measured 0.75m by 0.75m, and had a maximum depth of 0.45mbs (Figure 33). The surface rock paving was removed to 0.16mbs on the north side of the unit and 0.22mbs on the south side. One large piece of branch coral (8cm by 6cm) was observed within this rock layer. The Layer I soil was a dry, very fine, brown (10YR4/3) silt loam with 60% small to medium a`a cobbles. Two medium coral cobbles were observed within this layer. This soil extended to the base of the probe at 0.45mbs, and as no cultural material was recovered, the probe was considered sterile after this point and the excavation was terminated.

### DISCUSSION AND CONCLUSIONS

Archaeological Inventory Survey-level investigations were performed on an a 1.552 acre parcel located within the *ahupua`a* of Kaeo in Mākena, Makawao District, Island of Maui (TMK2-1-07:66). The objective of this project was to investigate the presence/absence of archaeological sites within the project area. In total, 13 features, including enclosures, a modified outcrop, rock pavements, walls, and rock mounds were recorded and collectively designated Site No. 50-50-14-4986.

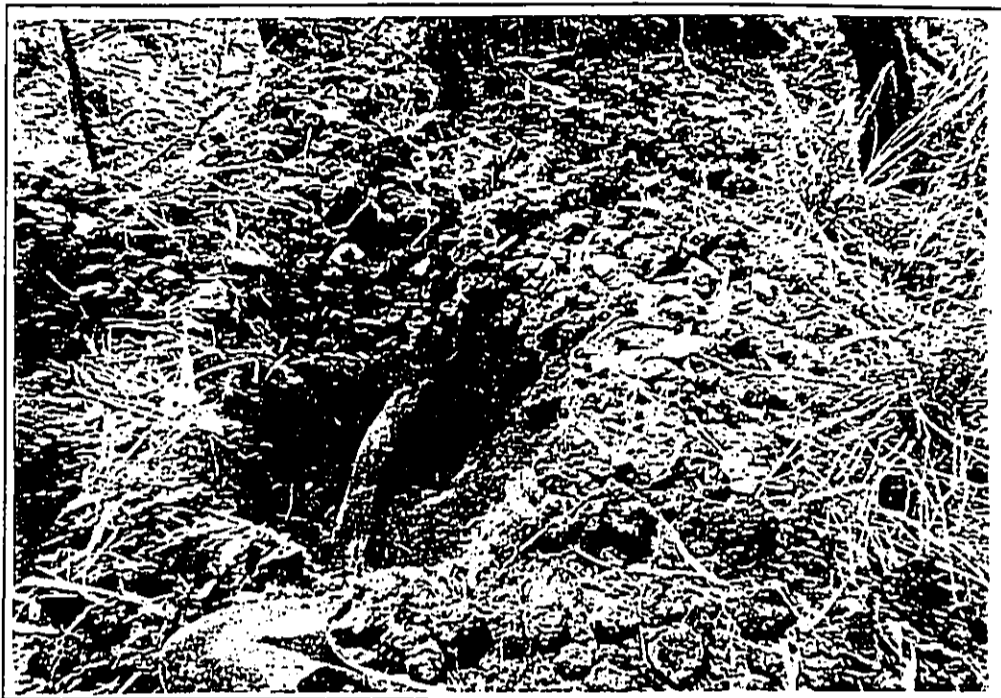


Figure 33: Photograph of Feature 13, SP-10, Post-Excavation. View to East.

Ten shovel probes were conducted within selected features (Features 1, 2, 3, 7, 8, 9, 12 and 13) to test for the presence or absence of cultural material. No suitable carbon material was acquired for dating nor was there a substantial amount of cultural material obtained although midden was observed on the surface and in several shovel probes in small amounts. Historic bottles recovered from the surface of Feature 2, the earliest date for which is 1900-1908, indicates that this portion of the project area could possibly have been used as a rubbish depository as early as this time period. Likewise, the bullet casing displaying a manufacture date of 1901 which was collected from SP-7, Feature 8 could also be indicative of such activity. There is also evidence of grading and leveling that has taken place, especially within the southeastern portion of the property and several amorphous mounds throughout the area were identified as bulldozer push or clearing piles.

Based on their construction the many walls are interpreted to have been built during the mid-to-late 1800s to early 1900s and maybe associated with ranching activities on the Mahoe Grant. Rock walls are mentioned as survey points in his Land Grant boundary description, but except for the Government (Aupuni) Wall, none are shown on Alexander's 1866/1879 map. The earlier Torbert Plantation Map (c.1848-1856) shows buildings and what appear to be property

boundary walls in and around the project area. Some of the existing wall remnants appear to form enclosures and most likely served as multiple pens for separating stock before shipping from the landing at the bay. The mounds are thought to represent clearing mounds. These wall remnants and mounds have been thoroughly mapped and documented during the course of the present inventory survey.

The fact that the walls were deemed to be related to the historic period does not preclude the possibility that this area may have once been utilized in pre-Contact times. In fact, given the presence of a *luakini* heiau and its ancillary activity area, the probable establishment during the pre-Contact time period of a canoe landing at the bay, the traditional association of coastal Honua`ula with *ho`ali`i* (high chiefs), several small fishponds, and a dense fishing population suggests many activities occurred in this area long before western intrusion. Archaeological studies verify the existence of a pre-Contact cultural deposits extending over 70 cmbs in close proximity to the project area (Donham 1998).

#### SIGNIFICANCE ASSESSMENT AND RECOMMENDATIONS

Sites that have yielded or are likely to yield information important for research on Hawaiian prehistory or history are considered significant under Criterion D of the Hawaii`i and National Register of historic Places. Based on this criterion, Site 50-50-14-4986 was originally considered significant under Criterion D. Thirteen surface features were documented during survey and consisted of rock pavements, wall remnants, a modified outcrop, and amorphous mounds. The site was interpreted as having possibly both a pre-Contact and early historic component, represented respectively by traditionally constructed pavements and historic walls and clearing mounds.

The present survey has recovered sufficient data in the form of maps, photos, and excavation so that potential impact has been addressed concerning the walls and rock mounds of this site. However, based on close proximity to Kalani Heiau, the identification of small amounts of midden, excavated branch coral and coral cobbles, early historic activities known to be present in the area, as well as the previously documented results of archaeological excavations in the nearby Mākena region, monitoring is recommended for paved sections of the project area.

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**APPENDIX A**  
**Cultural Material**

Proj.236 Shell and Echinoderm Inventory for Site 50-50-14-4986

Depth (cm)	30to48bs	0to50bs
Real life	2	8
Unit	SP-2	SP-7
Layer	I	I
Depth (cm)	30to48bs	0to50bs
<b>Gastropods</b>		
Conidae	3.3	
Cypraeidae	5.6	
<i>Cypraea caputserpentis</i>	3.3	
<i>Cypraea maculifera</i>	6.9	
<i>Nerita picea</i>	12	
<i>Cellana exarata</i>	2.1	
<i>Cellana sandwicensis</i>	2.8	
<i>Littorina scabra</i>	0.5	
<i>Littorina undulata</i>	0.7	
Thaididae	1.4	
<i>Drupa rubusidaeus</i>	0.6	
<i>Morula uva</i>	0.8	
Echinoderm	0.2	
Unidentified	1.5	16.4
<b>Total</b>	<b>41.7</b>	<b>16.4</b>

**APPENDIX B**  
**Historic Artifacts**

Historic Artifact Inventory for Site 50-50-14-4986

Quantity	Material	Artifact Description	Manufacturer	Location	Date	Condition	Notes
2	Surface	Soda Bottle	Star Ice & Soda Works	Wailuku, Maui	c. 1930's to 1940's	No	Clear/base & 1/2 portion of body.
2	Surface	Soda Bottle	Star Ice & Soda Works	Wailuku, Maui	c. 1930's to 1940's	No	Clear, neck broken off.
2	Surface	Soda Bottle	Seven-up Bottler	Wailuku, Maui	c. 1945	No	Green, portion of lip broken.
2	Surface	Soda Bottle	Star Ice & Soda Works	Wailuku, Maui	c. 1920's to 1930's	No	Clear, portion of lip & neck broken.
2	Surface	Soda Bottle	Star Ice & Soda Works	Wailuku, Maui	c. 1954	No	Green 7-Up, portion of lip broken.
2	Surface	Soda Bottle	Coca-Cola	Unknown	Unknown	Yes	Pale-green, chipped at base.
2	Surface	Soda Bottle	Coca-Cola	Unknown	Unknown	No	Pale-green, base & 1/2 portion of body.
2	Surface	Bottle	Japan	Japan	Post 1924	Yes	Green, chips at base.
2	Surface	Bottle	Adolphus Busch Glass Manufacturing Co.	Belleville, Ill.	c. 1904 to 1928	No	Pale-aqua, base and 8cm of body remaining.
2	Surface	Bottle	Massillon Bottle & Glass Co.	Massillon, Ohio	c. 1900 to 1904	No	Pale-aqua, base and 8cm of body remaining.
2	SP-2	30 to 48bs Glass Sherds	Unknown	Unknown	Unknown	No	7.2 gm.
2	SP-2	30 to 48bs Pottery Sherds	Unknown	Unknown	Unknown	No	12.3 gm.
8	SP-7	0 to 50bs Shotgun Casing	Unknown	Unknown	c. 1901	Yes	12 gauge.

# ***Appendix A-1***

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***State Historic Preservation  
Division Letter***

DOCUMENT CAPTURED AS RECEIVED

BENJAMIN J. CATYANO  
GOVERNOR OF HAWAII



OLBERT S. COLOMA-ADAM, CHAIRPERSON  
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY  
JANET E. KAWILO  
LINDA NISHIOKA

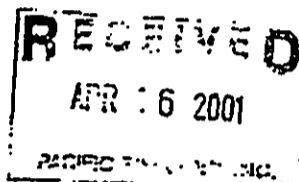
STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

HISTORIC PRESERVATION DIVISION  
Kakuhewa Building, Room 566  
601 Kamohāiwa Boulevard  
Kapolei, Hawaii 96707

AQUATIC RESOURCES  
BOATING AND OCEAN RECREATION  
COMMISSION ON WATER RESOURCE  
MANAGEMENT  
CONSERVATION AND RESOURCES  
ENFORCEMENT  
CONVEYANCES  
FORESTRY AND WILDLIFE  
HISTORIC PRESERVATION  
LAND  
STATE PARKS

April 5, 2001



Robert L. Spear, Ph.D.  
Scientific Consultant Services  
711 Kapiolani Blvd., Suite 1475  
Honolulu, Hawaii 96813

LOG NO: 27188 ✓  
DOC NO: 0103MK14

Dear Dr. Spear

**SUBJECT:** Review of A Revised Archaeological Inventory Survey of 1.552 Acres  
Kaeo Ahupua'a, Makena, Makawao, Maui  
TMK 2-1-7:66

Thank you for the opportunity to review this revised report which our staff received on February 15, 2001 (McGerty and Yeomans 2001, *Archaeological Inventory Survey of 1.552 Acres in Kaeo Ahupua'a, Makena, Makawao District, Island of Maui, Hawaii'i, TMK 2-1-07:66*) ...SCS ms.

Our comments of November 20, 2000 (Log No. 26268, Doc No. 0009MK12) have been adequately addressed. The background section has been revised, and the interpretations of Site 4986 are clarified.

We concur that monitoring is the recommended form of mitigation for any future subsurface disturbance for the paved section of the project area, because of the potential relationship with these and Kalani heiau.

We find this report to be acceptable. Should you have any questions, please contact Dr. Melissa Kirkendall (Maui/Lana'i SHPD 243-5169).

Aloha,

Don Hibbard, Administrator  
State Historic Preservation Division

MK:jen

c: John Min, Director, Department of Planning, County of Maui, FAX 270-7634  
Bert Ratte, County of Maui, Land Use and Codes, FAX 270-7972  
Glen Ueno, County of Maui, Land Use and Codes, FAX 270-7972

# ***Appendix B***

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## ***Cultural Impact Assessment***

SCS Project Number 633-CIA-1

**A CULTURAL IMPACT ASSESSMENT  
FOR THE PROPOSED DEVELOPMENT OF  
1.552 ACRES IN THE  
MĀKENA, KAEO AHUPUA`A, MAKAWAO DISTRICT  
ISLAND OF MAUI, HAWAII  
[TMK 2-01-07:66]**

Prepared by:  
**Leann McGerty, B.A.**  
and  
**Robert L. Spear, Ph.D.**  
December 2005

Prepared for:  
**Pacific Rim Land**  
381 Huku Lii Place, Suite 202  
Kihei, Hawai'i 96753



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## INTRODUCTION

Scientific Consultant Services (SCS), Inc. has been contracted by Pacific Rim Land, Inc. to conduct a Cultural Impact Assessment (CIA) on the proposed development of approximately 1.552 acres in Mākena, Kaeo Ahupua'a, Makawao District, Maui [TMK: 2-01-07:66 (Figure 1)]. Based on documents supplied by Pacific Rim Land, the proposed development consists of a 4-unit Single-Family Condominium.

A Cultural Impact Assessment involves evaluating the probability of negative impact on cultural values and rights within the project area and its vicinity. According to the Guidelines for Assessing Cultural Impacts established by the Hawaii State Office of Environmental Quality Control (OEQC 1997):

The types of cultural practices and beliefs subject to assessment may include subsistence, commercial, residential, agricultural, access-related, recreational, and religious and spiritual customs. The types of cultural resources subject to assessment may include traditional cultural properties or other types of historic sites, both man made and natural which support such cultural beliefs.

Act 50, enacted by the Legislature of the State of Hawaii (2000) with House Bill 2895, relating to Environmental Impact Statements, proposes that:

...there is a need to clarify that the preparation of environmental assessments or environmental impact statements should identify and address effects on Hawaii's culture, and traditional and customary rights...[H.B. NO. 2895].

The purpose of Act 50 is to require that Environmental Impact Statements include an assessment of any impact on the cultural practices of the community and state. It also amends the definition of 'significant effect' to include adverse effects on cultural practices. Thus, Act 50 requires an assessment of cultural practices to be included in the Environmental Impact Statement and to be taken into consideration during the planning process. The concept of geographical expansion is recognized by using, as an example, "the broad geographical area, e.g. district or ahupua'a" (OEQC 1997). It was decided that the process should identify 'anthropological' cultural practices, rather than 'social' cultural practices. For example, *limu* (edible seaweed) gathering would be considered an anthropological cultural practice, while a modern-day marathon would be considered a social cultural practice. The discussion resulted in the following workable definition for cultural practices:

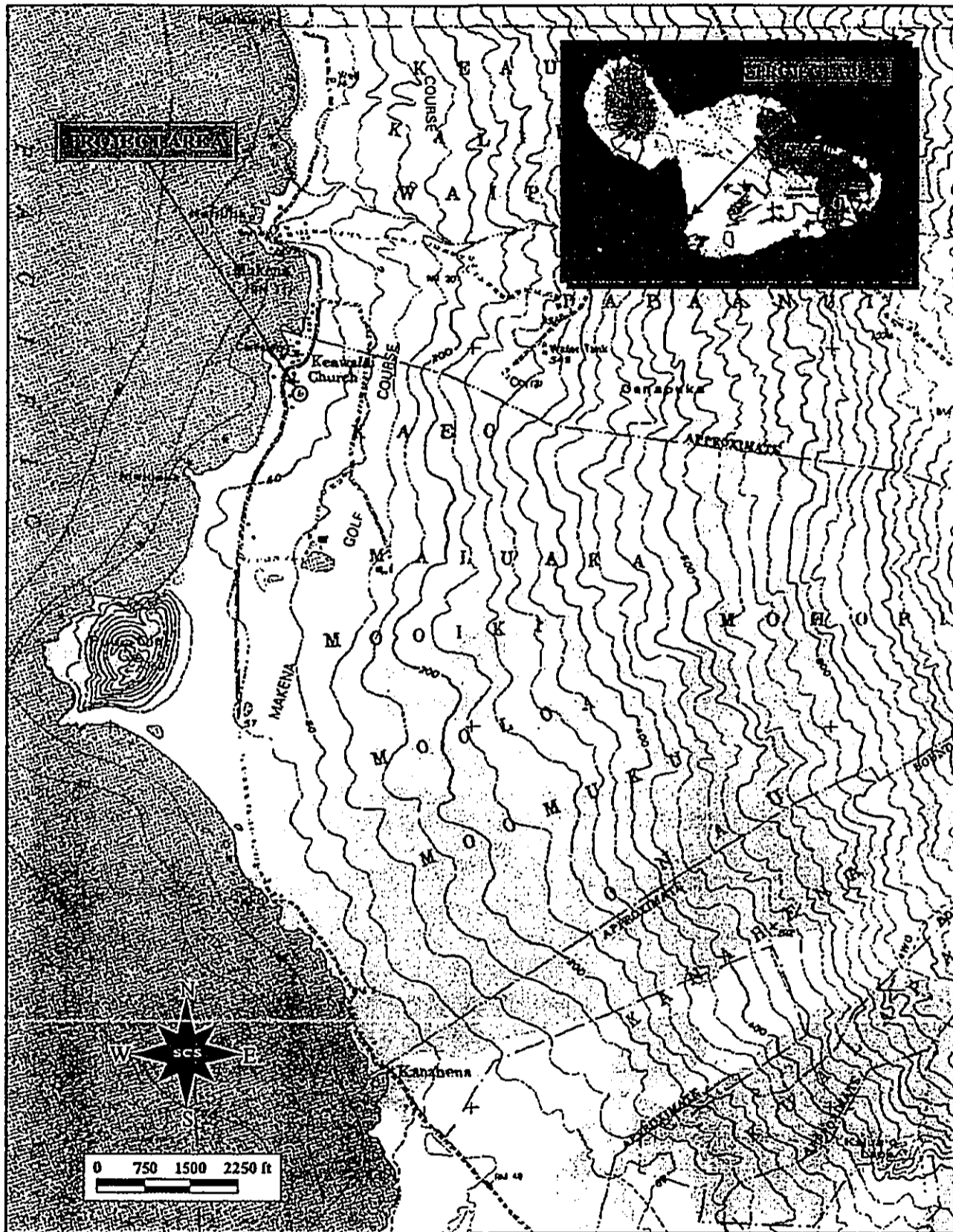


Figure 1: USGS QuadRANGLE Map Showing Project Area Location.

- 1.) A traditional cultural practice that is being conducted [at present].
- 2.) Traditional, beliefs, practices, life ways, societal, history of a community and its traditions, arts, crafts, music, and related social institutions [Act 50, Cultural Impact Assessment 2001].

### METHODOLOGY

This Cultural Impact Assessment was prepared in accordance with the methodology and content protocol provided in the *Guidelines for Assessing Cultural Impacts* (OEQC 1997). This report contains archival and documentary research, as well as consultation with individuals or organizations with knowledge of the project area, its cultural resources, and its practices and beliefs. Based on this research, an assessment of the potential effects on cultural resources in the project area and recommendations for mitigation of these effects are proposed.

### **ARCHIVAL RESEARCH**

Archival research focused on a historic documents study involving both published and unpublished sources. These included legendary accounts of native and early foreign writers; early historical journals and narratives; historic maps and land records such as Land Commission Awards, Royal Patent Grants, and Boundary Commission records; historic accounts; and previous archaeological project reports.

### **CONSULTATION**

Individuals and/or groups who have knowledge of traditional practices and beliefs associated with a project area or who know of historical properties within a project area were sought for consultation. Individuals who had particular knowledge of traditions passed down from preceding generations and a personal familiarity with the project area were invited to share their relevant information. Initial contact was made with the Office of Hawaiian Affairs (OHA) on O'ahu, the OHA Community Resource Coordinator on Maui, Central Maui Hawaiian Civic Club, and the Cultural Resource Planner in the Maui Planning Department.

### **PROJECT AREA AND VICINITY**

The project area consists of a parcel of land totaling 1.552 acres situated on the mauka side of Old Mākena Road, across from the beach, and north of the Maui Prince Resort (Figure 2).

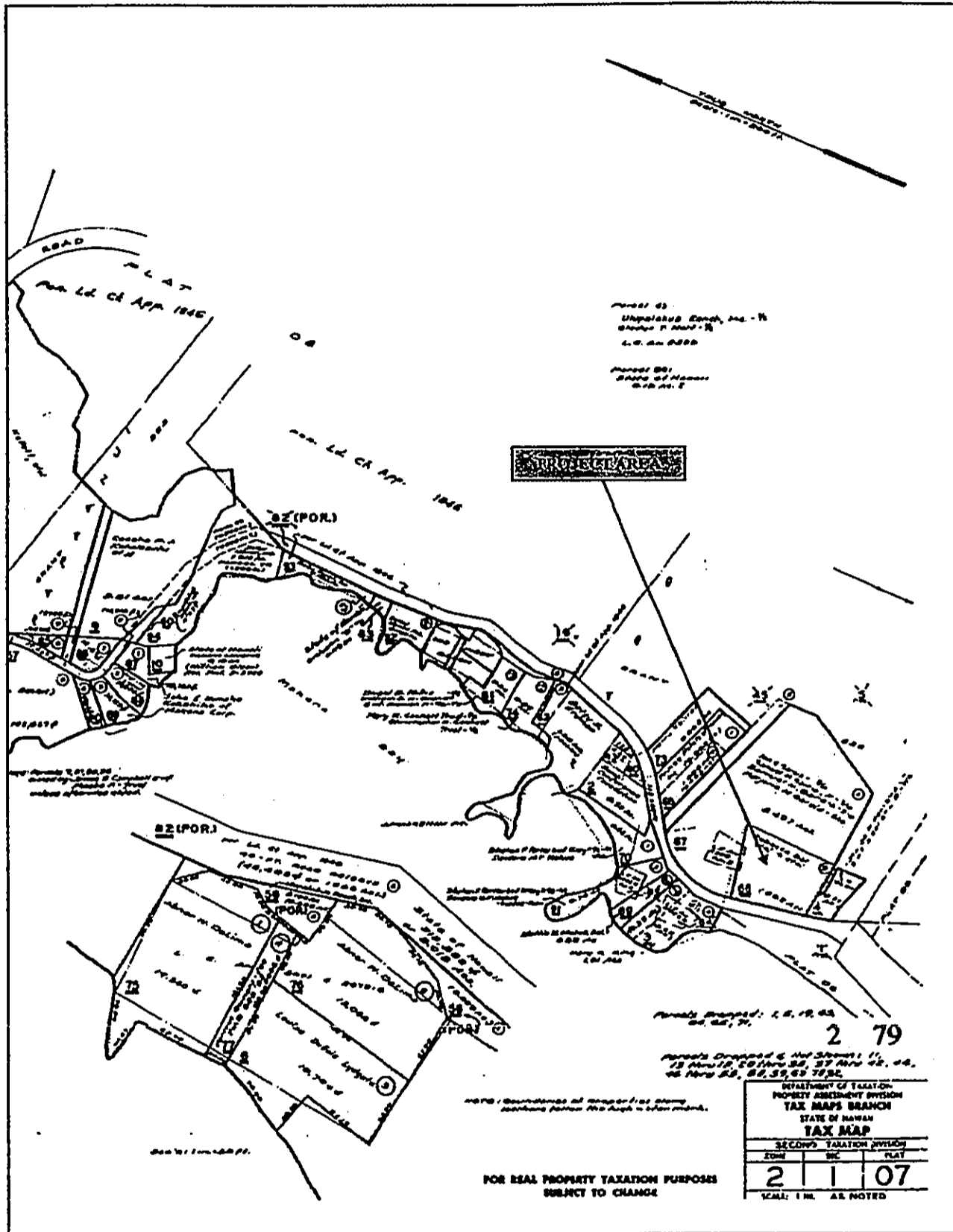


Figure 2: Tax Map Key [TMK] Showing Project Area Location.

### PAST POLITICAL BOUNDARIES

Traditionally, the division of Maui's lands into districts (*moku*) and sub-districts was performed by a *kahuna* (priest, expert) named Kalaiha'ōhia, during the time of the *ali'i* Kaka'alaneo (Beckwith 1940:383; Fornander places Kaka'alaneo at the end of the 15<sup>th</sup> century or the beginning of the 16<sup>th</sup> century [Fornander 1919-20, Vol. 6:248]). Land was considered the property of the king or *ali'i 'ai moku* (the *ali'i* who controls the island/district), which he held in trust for the gods. The title of *ali'i 'ai moku* ensured rights and responsibilities to the land, but did not confer absolute ownership. The king kept the parcels he wanted, his higher chiefs received large parcels from him and, in turn, distributed smaller parcels to lesser chiefs. The *maka'ānana* (commoners) worked the individual plots of land.

In general, several terms, such as *moku*, *ahupua'a*, *'ili* or *'ili'āina* were used to delineate various land sections. A district (*moku*) contained smaller land divisions (*ahupua'a*) which customarily continued inland from the ocean and upland into the mountains. Extended household groups living within the *ahupua'a* were therefore able to harvest from both the land and the sea. Ideally, this situation allowed each *ahupua'a* to be self-sufficient by supplying needed resources from different environmental zones (Lyons 1875:111). The *'ili'āina* or *'ili* were smaller land divisions next to importance to the *ahupua'a* and were administered by the chief who controlled the *ahupua'a* in which it was located (*ibid*:33; Lucas 1995:40). The *mo'o'āina* were narrow strips of land within an *'ili*. The land holding of a tenant or *hoa'āina* residing in a *ahupua'a* was called a *kuleana* (Lucas 1995:61). The project area is located within the old district of Honoua'ula (presently known as the Makawao District) in the *ahupua'a* of Kaeo.

### TRADITIONAL SETTLEMENT PATTERNS

The Hawaiian economy was based on agricultural production and marine exploitation, as well as raising livestock and collecting wild plants and birds. Extended household groups settled in various *ahupua'a*. During pre-Contact times, there were primarily two types of agriculture, wetland and dry land, both of which were dependent upon geography and physiography. River valleys provided ideal conditions for wetland *kalo* (*Colocasia esculenta*) agriculture that incorporated pond fields and irrigation canals. Other cultigens, such as *kō* (sugar cane, *Saccharum officinarum*) and *mai'a* (banana, *Musa* sp.), were also grown and, where appropriate, such crops as *'uala* (sweet potato, *Ipomoea batatas*) were produced. This was the typical agricultural pattern seen during traditional times on all the Hawaiian Islands (Kirch and Sahlins 1992, Vol. 1:5, 119; Kirch 1985). Agricultural development on the leeward side of Maui

was likely to have begun early in what is known as the Expansion Period (A.D. 1200–1400 [Kirch 1985]). According to Handy, there was “a small community of native fishermen who from time to time cultivate small patches of potatoes when rain favors them” who lived in Mākena in the 1940s. He writes:

For fishing, this coast is the most favorable on Maui...I think it is reasonable to suppose that the large fishing population which presumably inhabited this leeward coast ate more sweet potatoes than taro with their fish... Formerly, before deforestation of the uplands, it is said that there was ample rain in favorable seasons for planting the sweet potato, which was the staple here. A large population must have lived at Makena in ancient times for it is an excellent fishing locality, flanked by an extensive area along shore and inland that was formerly very good for sweet potato planting and even now is fairly good, despite frequent droughts... [1940:159].

North of the project area in the vicinity of Kīhei, some of the most important royal fishponds had been constructed. Their origin is lost in antiquity, but rebuilding and repairing occurred as early as the reign of Pi'ilani in the 1500s and continued to the reign of Kekaulike (A.D. 1700s [Cordy 2000]). These ponds provided fish for Kamehameha I and were still functioning in historic times. Wilcox (1921) noted that prisoners were sent from Kaho'olawe to repair its walls in the 1800s.

According to an article in the *Honolulu Advertiser*, the bay at Mākena was originally known as Keawalaimau (“a little clam bay”; August 2, 1959, 15). Marine resources were plentiful and each of the many reefs at Mākena had a name and was known for a specific type of fish. A fishpond was located south of the harbor at Apuakehau and a fishing *ko'a* were constructed at Nahuna Point (Sterling 1998:231). A *heiau* named Pohakunahaha was also present, “. . . in back of the store at the bottom of the hill beyond the pig-pen.” Located next to the project area is a *luakini* type *heiau* (Kalani Heiau) which was built and reserved for the paramount chief and his delegates, suggesting a large, supporting population during its use (Walker 1931:168). Post-Contact, the population remained high. Missionary census recorded 3,300 individuals residing along the coastal section between 1831-1832 (Woodbridge 1832).

#### WESTERN CONTACT

Early records, such as journals kept by explorers, travelers and missionaries, Hawaiian traditions that survived long enough to be written down, and archaeological investigations have assisted in the understanding of past cultural activities. Unfortunately, early descriptions of this portion of the Maui

coast are brief and infrequent. Captain King, Second Lieutenant on the *Revolution* during Cook's third voyage briefly described what he saw from a vantage point of "eight or ten leagues" (approximately 24 miles) out to sea as his ship departed the islands in 1779 (Beaglehole 1967). He mentions Pu'u Ōla'i and enumerates the observed animals, thriving groves of breadfruit, the excellence of the taro, and almost prophetically, says the sugar cane is of an unusual height. Seen from this distance the uplands of Kīpahulu-Kaupo and 'Ulupalakua were apparently his focus.

In the ensuing years, LaPérouse (1786), Nathaniel Portlock (1786) and George Dixon, (also in 1786), sailed along the western coast. LaPérouse was the first recorded European to set foot on Maui south of the project area at Keoni'ō'io. His impressions of the leeward coast left no doubt as to its inhospitable environment:

The Indians of the villages of this part of the island hastened alongside in their canoes, bringing, as articles of commerce, hogs, potatoes, bananas, roots of arum, which the Indians call *taro*, with cloth and some other curiosities making part of their dress...I had no idea of a people so mild and so attentive...It was so late before our sails were hoisted, that I was obliged to postpone going on shore at this place till the next day...but we had already observed, that this part of the coast was altogether destitute of running water, the slope of the mountains having directed the fall of all the rains towards the weather side...

The soil of this island is entirely formed of decomposed lava, and other volcanic substances. The inhabitants have no other drink but a brackish water, obtained from shallow wells, which afford scarcely more than half a barrel a day. During our excursion we observe four small villages of about ten or twenty houses each, built and covered with straw in the same manner as those of our poorest peasants [Barrère 1975:13-18].

Archibald Menzies, a naturalist accompanying Vancouver stated, "...we had some canoes off from the latter island [Maui], but they brought no refreshments. Indeed, this part of the island appeared to be very barren and thinly inhabited" (Menzies 1920:102). According to Kahekili, then chief of Maui, the extreme poverty in the area was the result of the continuous wars between Maui and Hawai'i Island, which caused the land to be neglected and human resources wasted (Vancouver 1984:856).

Missionary activities began as early as 1833 on Maui and records indicate the presence, by 1837, of the first outstation in Mākena which included a native meeting house and a school located across from the present project area (Wailuku Station Reports 1833-1863). Eventually,



the region around the project area was developed and supported native houses, a cemetery, a store, a storehouse, and a government landing. Reverend Alexander reported the building of Keawala'i Church of stone in 1857 (*Ibid.*). Forlander's report to the Inspector General of Schools in 1865-66 described the facilities at Kaeo. He stated:

Keawakapu [Keawala'i] in Makena Bay, on the premises of the Protestant Church. Four walls of cobble stones and a pandanus leaved roof constitute the School house. Pebbles from the beach make up the floor. The number of scholars about 40, comprising many from Ulupalakua, where I intend to erect a school as soon as the taxes of this year have been collected [Barrère 1975]

### **THE MĀHELE**

In the 1840s, a drastic change in the traditional land tenure resulted in a division of island lands and a system of private ownership based on Western law. While it is a complex issue, many scholars believe that in order to protect Hawaiian sovereignty from foreign powers, Kamehameha III (Kamehameha III) was forced to establish laws changing the traditional Hawaiian society to that of a market economy (Daws 1968:111; Kuykendall Vol. I, 1938:145 *et passim*; Kame'eiehiwa 1992:169-70, 176).

Among other things, the foreigners demanded private ownership of land to insure their investments (Kuykendall Vol. I, 1938:138 *et passim*; Kame'eiehiwa 1992:178; Kelly 1998:4). Once lands were made available and private ownership was instituted, native Hawaiians—including the *maka`āinana* (commoners)—were able to claim the plots they were cultivating and living on, if they had been made aware of the foreign procedures (*kuleana* lands, LCAs). This land division, or Māhele, occurred in 1848. The awarded parcels were called Land Commission Awards (LCA). If occupation could be established through the testimony of witnesses, the petitioners were issued a Royal Patent number and could then take possession of the property (Chinen 1961:16). Twelve land awards were granted by the Land Commission in Kaeo Ahupua`a, including house lots, three sweet potato patches, two taro patches, one Irish potato patch, one cane field, some grasslands and *kula* (used for dry land agriculture).

Four LCAs were awarded in, or in close proximity to the project area (Waihona `Aina 2005). Directly abutting the project area was a house lot awarded to Kalili (LCA 2399, *apana* 2). Two LCAs were located *makai* of the government road. LCA 4292-B *apana* 2 was awarded to Kalama and consisted of a house lot. LCA 2985-B, also *makai* of the government road, could not be located, but LCA 2395 appears to describe the location of the project area. This piece of land was given in 1845 to Kaili by Kalama, his neighbor and consisted of a house lot.

In 1845, 50 acres of Mākena sugar-cane and ranch lands, including a portion of Kaeo, were rented by Lonton Torbert from James Nowlein and Solomon Burrow who had received it from the government (Gosser *et al.*: 1993: 27-35). There were two landings at either end of Mākena Bay. A road for oxen extended from a landing on the northern end of the bay (known as Tobert Landing) to Torbert's *mauka* plantation. By 1848, Tobert had acquired a license to open a retail store. The Government Landing was located at the southern end of the bay. Land that had been previously leased, was finally purchased by Tobert from the government in 1849 (Grant 223, Dept. of Land and Natural Resources 1964:30). However, Tobert was forced to sell everything in 1856, including 800 cattle and 475 sheep, to pay his debts. Tolbert Plantation estate became the property of James Makee in 1858 and was afterward known as the Rose Ranch.

In 1852, a man named Mahoe purchased a 514 acre land grant in Kaeo, the boundaries of which followed the southern boundary of Tobert's land, and included the project area, the fishpond at Apuakehau Point, as well as the government landing, road *mauka*, and storehouse (Figure 3). The boundary description of the Grant (835) mentions a *kukui* (*Aleurites moluccana*) tree, an *'auwai*, and old road, five *wiliwili* (*Erythrina sandwicensis*) trees, a sand dune, "the house of a full blooded Hawaiian", and 24 rock piles. In 1868, Mahoe and his wife partition a 0.59-acre portion of their grant and conveyed it to the American Board of Commissioners for Foreign Missions (ABCFM Trustees Minute Book 1912:104).

In 1865, residents of Honua'ula were either employed by the Makee Plantation at Ulupalakua or were fishermen living along the coast. The coastal population was described by Forlander as "...a thrifty, handy set of people, to judge from the general appearance of their houses, not a few of which were of wood, and many of the others, especially along the seaboard, being neatly built and looking tidy and clean within. The children seem to be numerous and those that I observed were decently clad and looked bright and healthy" (Forlander in Barrère 1975:58).

The harbor at Mākena had become one of the busiest on Maui and was a regular stop on the Honolulu to Hilo run. An interesting anecdote from Makee, the owner of Rose Ranch, described the results of a summer hurricane in August of 1871. Makee wrote:

... It was fearful to see the havoc during its duration. Tree were prostrate in every direction; the mill and engine house, the bowling alley, sugar house, cook house, two of the Chinese and one native house were down. One store house at the beach, and all the native houses there had been blown into the sea (*Hawaiian Gazette*, August 16, 1871:2.2).

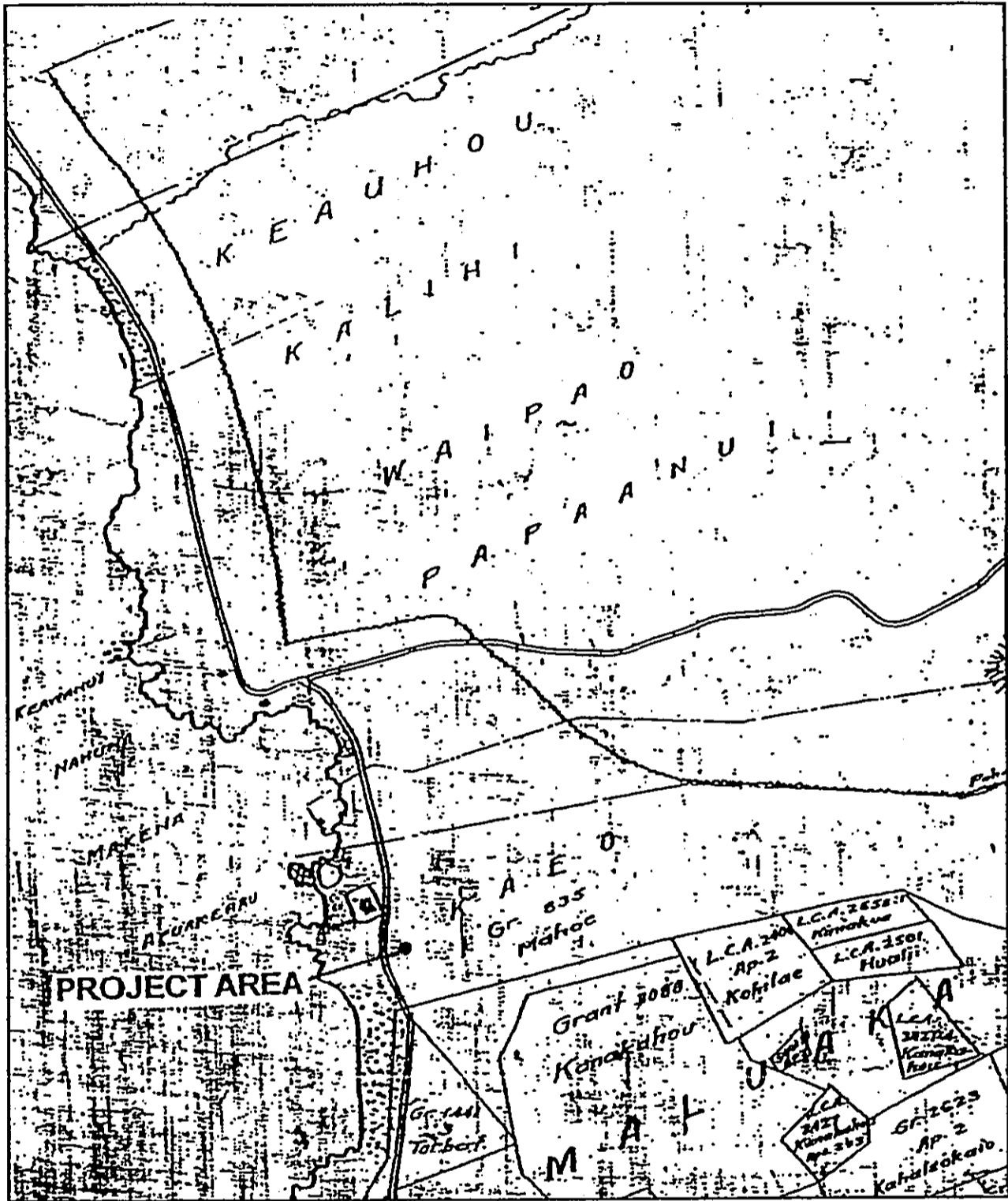


Figure 3: Project Area and General Vicinity in the Mid 1800s.

Thrum also reported information concerning the storm:

... A tropical storm or hurricane caused extensive damage to the Ulupalakua Ranch, took the roof off the storehouse at Makena, which was near the church, and swept all the native houses into the sea – all within six hours [1926:36].

The harbor served as a loading port for the ranch and, after a breakwater and landing were constructed in 1877, sugarcane could be transported from the location. By 1885, structures along the bay included a church, cemetery, school, corral, the “old sugar house”, a stone wall, and a total of nine houses, one being fashioned from grass (Jackson Map, Reg. No. 1337). The development of Kahului Harbor (1920s), which contained cold storage facilities, marked the end of commercial shipping for Mākena Harbor.

From the 1940s through present times, much development has occurred near the project area. Military activities, such as amphibious beach landings, were conducted along coastal areas during World War II. In addition, concrete bunkers were constructed on the beach and other locations near the shoreline. Most recently, activities along the western coast have focused upon the development of large vacation resorts and golf courses. Cattle ranching continues on the upper slopes of the Honua`ula District.

#### INTERVIEW

Although the O`ahu branch of the Office of Hawaiian Affairs had no comments concerning the project area, they suggested SCS contact Mr. Lu`uwai from the Mākena/Wailea area and Mr. Ed Lindsey who is involved in the Maui Native Hawaiian community. Ed Lindsey, a Cultural Practitioner and teacher on Maui responded to our request for an interview. In a phone interview on December 7, 2005, he stated that he knew of no cultural activities in the project area. Mr. John Lu`uwai was also contacted by phone and stated that he knew of no cultural activities in the project area.

#### CULTURAL ASSESSMENT

Letters were sent to the Office of Hawaiian Affairs (OHA) on O`ahu, the OHA Community Resource Coordinator on Maui, Central Maui Hawaiian Civic Club, the Maui Planning Department, and the Wailea Community Association, to invite consultation and information concerning cultural activities occurring at or in the vicinity of Parcel 66. In addition,

the two individuals OHA suggested be consulted, Ed Lindsey and Mr. Lu'uwai, were contacted and consulted.

Cultural resources include a broad range of categories including, places, behaviors, values, beliefs, objects, records, stories, and other overlapping subjects. Both the individuals and organizations that were contacted for consultation had no comments pertaining to on-going cultural activities on, or in the vicinity of the project area. They were unable to provide any information pertaining to the above listed categories that fall under the aegis of cultural resources. Based on community response and archival research it is reasonable to conclude that, pursuant to Act 50, the exercise of native Hawaiian rights, or any ethnic group, related to gathering, access or other customary activities will not be affected by development on Parcel 66. As no cultural resources were identified, there is no adverse effect on valued cultural, natural or historic resources, as well as native Hawaiian rights, beliefs, and practices in the project area.

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# ***Appendix C***

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## ***Preliminary Drainage and Soil Erosion Control Report***



PRELIMINARY  
DRAINAGE AND SOIL EROSION CONTROL REPORT  
FOR

A PROPOSED 4-UNIT  
CONDOMINIUM AT MAKENA, MAUI

T.M.K.: (2) 2-1-007: 066

Prepared For:

PACIFIC RIM LAND, INC.  
P.O. Box 220  
Kihei, Hawaii 96753



Prepared By:



August, 2001

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- I. INTRODUCTION
- II. SITE LOCATION AND PROJECT DESCRIPTION
- III. EXISTING TOPOGRAPHY AND SOIL CONDITIONS
- IV. EXISTING DRAINAGE CONDITIONS
- V. FLOOD AND TSUNAMI ZONE
- VI. PROPOSED DRAINAGE PLAN
- VII. HYDROLOGIC CALCULATIONS
- VIII. SOIL EROSION CONTROL PLAN
- IX. CONCLUSION
- X. REFERENCES

### EXHIBITS

- 1 Location Map
- 2 Vicinity Map
- 3 Soil Survey Map
- 4 Flood Insurance Rate Map

### APPENDICES

- A Hydrologic Calculations
- B Universal Soil Loss Calculations

**PRELIMINARY  
DRAINAGE AND SOIL EROSION CONTROL REPORT  
FOR  
A PROPOSED 4-UNIT  
CONDOMINIUM AT MAKENA, MAUI**

I. INTRODUCTION

The purpose of this report is to examine both the existing and proposed drainage conditions for the proposed project.

In addition, this examination and plan has been prepared to determine the potential movement of soil due to rainfall and surface runoff from the project site, and to prepare for measures which will control erosion therefrom. This is in accordance with Chapter 20.08 "Soil Erosion and Sediment Control" of the Maui County Code as part of the application for the grading and building permits.

II. SITE LOCATION AND PROJECT DESCRIPTION

The subject parcel is identified as T.M.K.: (2) 2-1-007: 066 which encompasses an area of 1.552 acres. The project site is bordered by an existing residence to the north, undeveloped land to the east and south, and Makena-Keoneoio Road to the west.

The proposed project consists of 4 units, each containing approximately 3,930 square feet within 2 stories. Associated improvements includes site walls, paved driveway and parking, concrete walkways, landscaping, drainage system, swimming pools and utility connections.

III. EXISTING TOPOGRAPHY AND SOIL CONDITIONS

The project site is partially developed with 4 existing structures. There is an existing house, small shed, large shed, and a temporary garage. The remainder of the site contains stored construction materials and is overgrown with kiawe trees and weeds.

The elevation on the site ranges from 24 feet above mean sea level at the southeasterly corner to 5 feet above mean sea level at the southwesterly corner, averaging approximately 10.0%.

According to the "Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii (August, 1972)," prepared by the United States Department of Agriculture Soil Conservation Service, the soil within the project site is classified as Makena loam, stony complex (MXC). Makena loam, stony complex occurs on the lower leeward slopes of Haleakala, between Makena and Kamaole. On the Makena part of the complex, permeability is moderately rapid, runoff is slow to medium, and the erosion hazard is slight to moderate. On the stony land part, permeability is very rapid and there is no erosion hazard.

IV. EXISTING DRAINAGE CONDITIONS

A portion of the runoff generated from the northern third of the project site sheet flows to and ponds within a small depressed area. The remainder of the northern third and overflow from the depressed area sheet flows onto Makena-Keoneoio Road. Runoff from the southerly two-thirds of the project site sheet flows in an east to west direction onto Makena-Keoneoio Road. The runoff then sheet flows in a southerly direction along Makena-Keoneoio Road into a low lying area situated on T.M.K.: (2) 2-1-007: 004.

It is estimated that the existing 50-year storm runoff from the project site is 1.9 cfs.

V. FLOOD AND TSUNAMI ZONE

According to Panel Number 150003 0330 B of the Flood Insurance Rate Map, June 1, 1981, prepared by the United States Federal Emergency Management Agency, the project site is situated in Flood Zone A4 with a base flood elevation of 9 feet and Flood Zone C. Flood Zone A4 represents areas of 100-year flood where the base flood elevations and flood hazard factors have been determined. Zone C represents areas of minimal flooding.

VI. PROPOSED DRAINAGE PLAN

After the development of the proposed project, it is estimated that the 50-year storm runoff will be 4.0 cfs, a net increase of 2.1 cfs.

A portion of the onsite runoff will sheet flow into grated catch basins and diverted to an onsite underground subsurface drainage system, which will be designed to accommodate the increase in runoff from a 50-year storm. No additional runoff generated from the project site will sheet flow onto Makena-Keoneoio Road or the existing low lying area on Parcel 004. This is in accordance with Chapter 4, Rules for the Design of Storm Drainage Facilities in the County of Maui.

VII. HYDROLOGIC CALCULATIONS

The hydrologic calculations are based on the "Drainage Master Plan for the County of Maui," and the "Rainfall Frequency Atlas of the Hawaiian Islands," Technical Paper No. 43, U.S. Department of Commerce, Weather Bureau.

Rational Formula Used:  $Q = CIA$

Where  $Q$  = rate of flow (cfs)

$C$  = rainfall coefficient

$I$  = rainfall intensity for a duration equal to the time of concentration (in/hr)

A = drainage area (Acres)

See Appendix A for Hydrologic Calculations

## VIII. SOIL EROSION CONTROL PLAN

### A. General:

Based on the Hawaii Environmental Simulation Laboratory (HESL) equations to estimate soil loss during the construction period, and complemented by the following erosion control plan, the soil loss during the construction period is well within the tolerable limits (See Appendix B).

Based on the County Erosion Control Standards and Guidelines, the allowable erosion rate is 5,000 tons/acre/year for a 12-month grading period and the maximum tolerable severity rating number (H) is 50,000.

### B. Erosion Control Plan:

The following measures will be taken to control erosion during the site development period (estimated 12 months).

1. Minimize time of construction.
2. Retain existing ground cover until latest date to complete construction.
3. Early construction of drainage control features.
4. Use temporary area sprinklers in non-active construction areas when ground cover is removed.
5. Station water truck on site during construction period to provide for immediate sprinkling, as needed, in active construction zones (weekends and holidays included).
6. Use temporary berms and cut-off ditches, where needed, for control of erosion.
7. Graded areas shall be thoroughly watered after construction activity has ceased for the day and on weekends.
8. All cut and fill slopes shall be sodded or planted immediately after grading work has been completed.

The development project is provided with adequate facilities for drainage control and storm water disposal. This, together with ultimate ground cover, shall preclude any appreciable onsite erosion.

## IX. CONCLUSION

The proposed development is expected to generate a 50-year storm runoff volume of 4.0 cfs, with an increase of 2.1 cfs. The onsite runoff generated from the project will be diverted to an onsite subsurface drainage system, which will be designed to accommodate the increase in runoff from a 50-year storm.

Based on our calculations, the sedimentation hazard to coastal waters and downstream properties is minimal (see Exhibit B). The soil loss per unit area and severity rating computed for the proposed development are well within the tolerable limits.

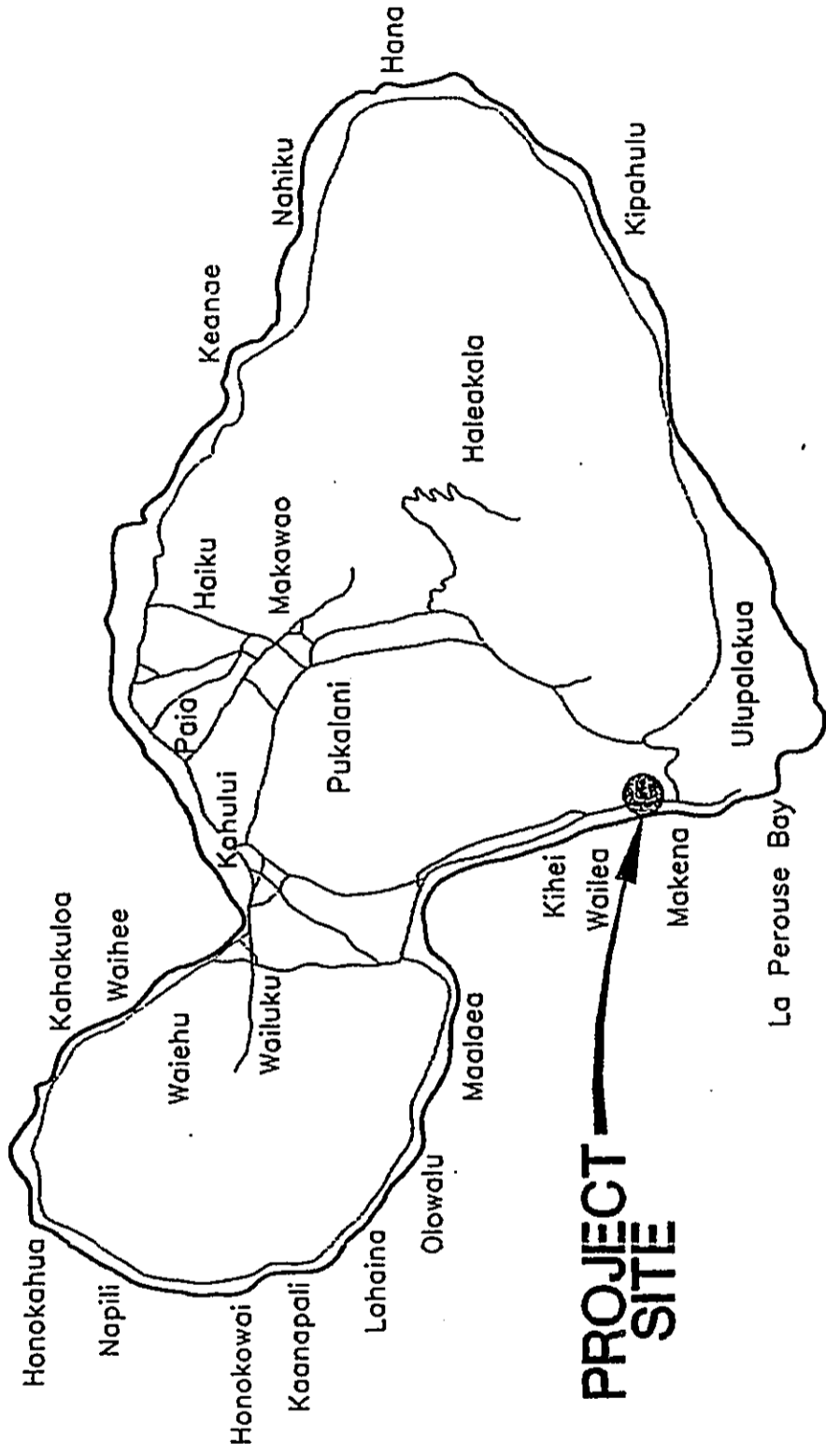
Therefore, it is our professional opinion that the proposed development will not have an adverse effect on the adjoining or downstream properties.

X. REFERENCES

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- B. Erosion and Sediment Control Guide for Hawaii, prepared by U.S. Department of Agriculture, Soil Conservation Service, March, 1981.
- C. Rainfall-Frequency Atlas of the Hawaiian Islands, Technical Paper No. 43, U.S. Department of Commerce, Weather Bureau, 1962.
- D. Flood Insurance Rate Maps of the County of Maui, September, 1989.
- E. Chapter 4, Rules for the Design of Storm Drainage Facilities in the County of Maui, prepared by the Department of Public Works and Waste Management, County of Maui, 1995.

**EXHIBITS**

- 1 Location Map**
- 2 Vicinity Map**
- 3 Soil Survey Map**
- 4 Flood Insurance Rate Map**

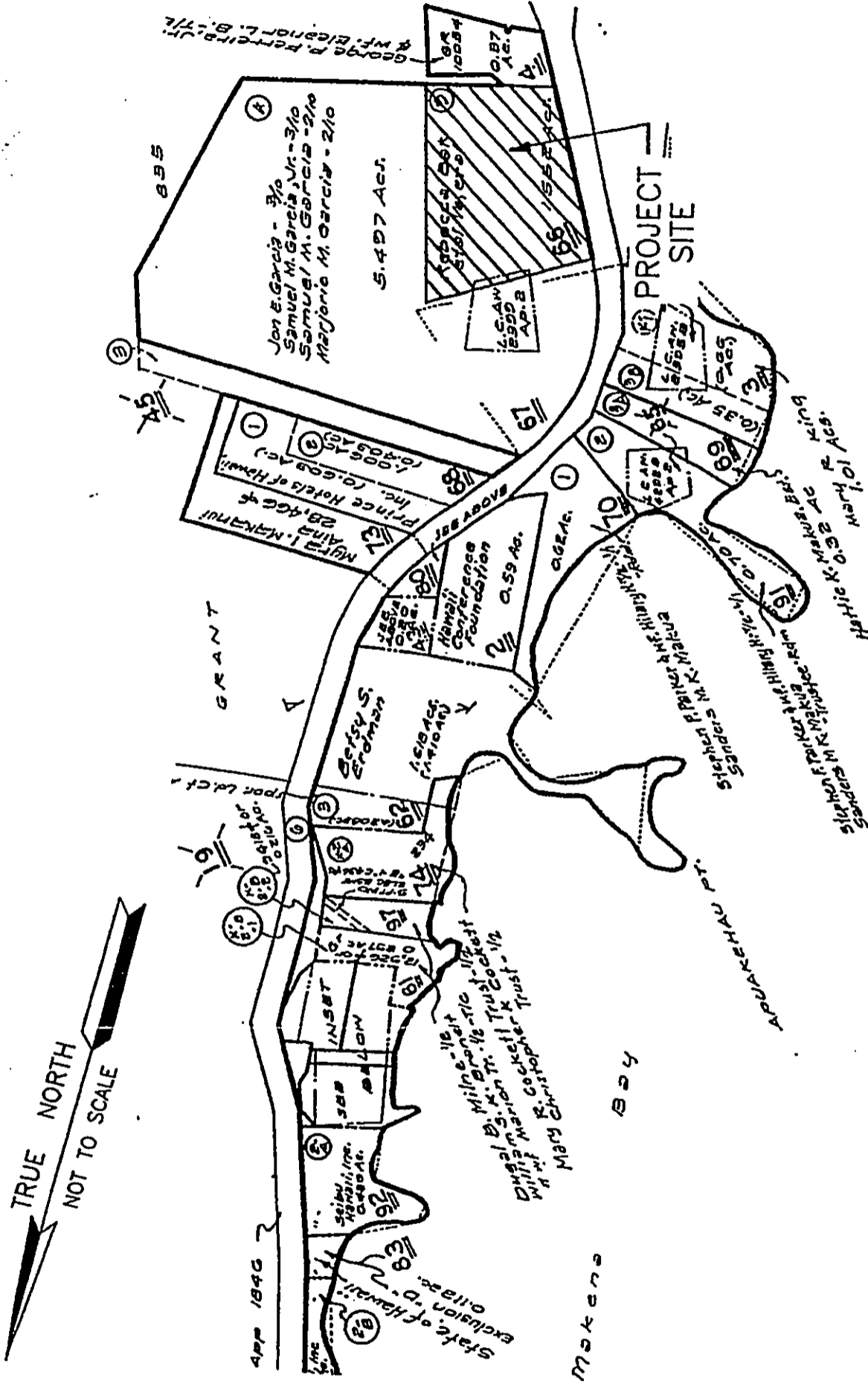


**ISLAND OF MAUI**  
NOT TO SCALE

LOCATION MAP  
EXHIBIT 1



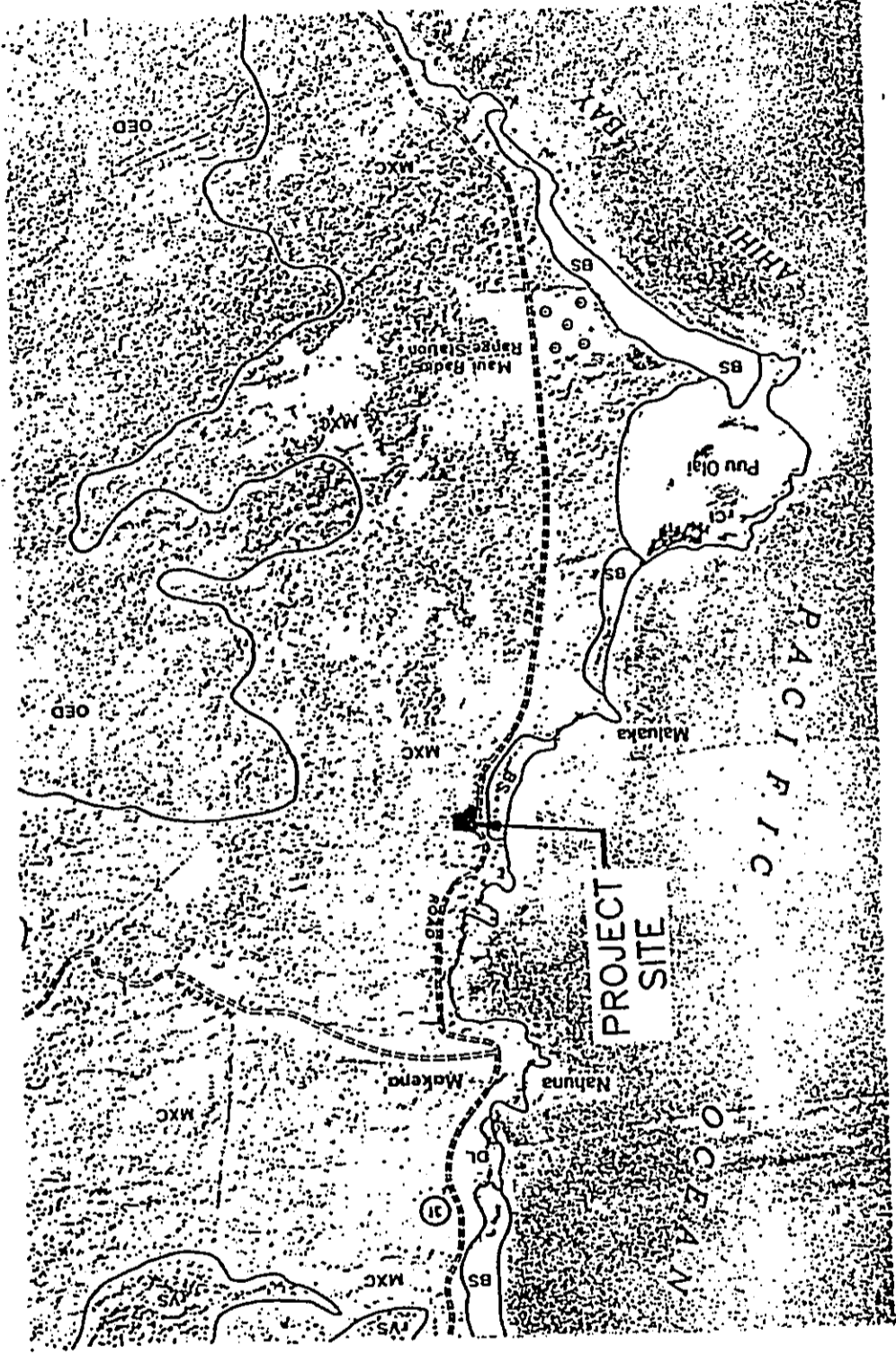




VICINITY MAP  
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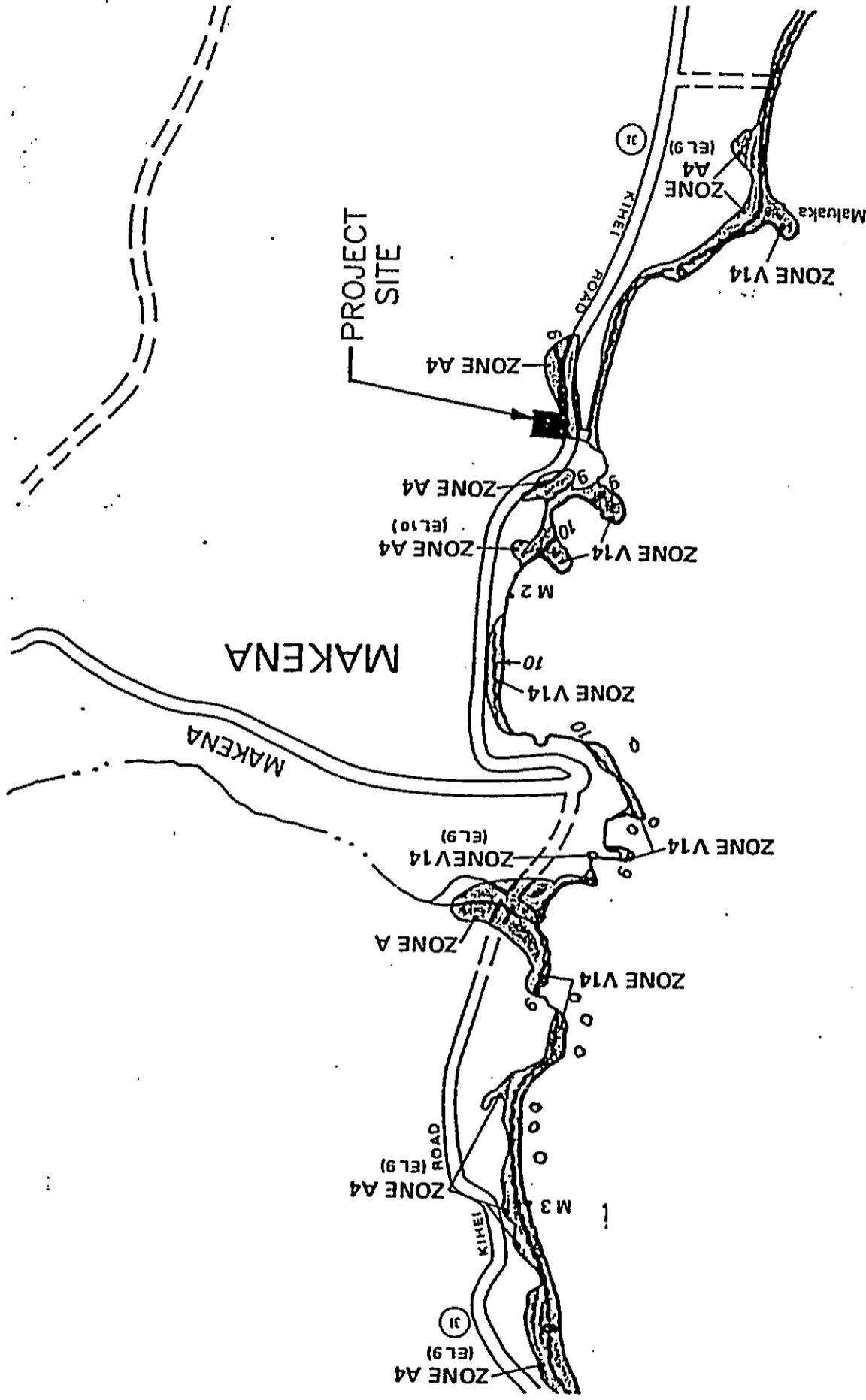
VICINITY MAP  
EXHIBIT 2

DOCUMENT CAPTURED AS RECEIVED



SOIL SURVEY MAP  
EXHIBIT 3





FLOOD INSURANCE  
RATE MAP  
EXHIBIT 4

**APPENDIX A**  
**HYDROLOGIC CALCULATIONS**

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## Hydrologic Calculations

Purpose: Determine the increase in surface runoff from the development of the proposed project based on a 50-year storm.

### A. Determine the Runoff Coefficient (C):

#### EXISTING CONDITIONS:

Infiltration (Medium)	= 0.07
Relief (Rolling)	= 0.03
Vegetal Cover (Good)	= 0.03
Development Type (Residential)	= <u>0.40</u>
C	= 0.53

#### PAVEMENT AREAS:

Infiltration (Negligible)	= 0.20
Relief (Rolling)	= 0.03
Vegetal Cover (None)	= 0.07
Development Type (Hotel)	= <u>0.45</u>
C	= 0.75

#### ROOF AREAS:

Infiltration (Negligible)	= 0.20
Relief (Hilly)	= 0.06
Vegetal Cover (None)	= 0.07
Development Type (Hotel)	= <u>0.45</u>
C	= 0.78

#### LANDSCAPED AREAS:

Infiltration (Medium)	= 0.07
Relief (Rolling)	= 0.03
Vegetal Cover (High)	= 0.00
Development Type (Open)	= <u>0.15</u>
C	= 0.25

EXISTING CONDITION:

Roof Areas = 0.07 Acres

Open Areas = 1.48 Acres

WEIGHTED C = 0.26

DEVELOPED CONDITIONS:

Pavement Areas = 0.32 Acres

Roof Areas = 0.38 Acres

Landscaped Areas = 0.85 Acres

WEIGHTED C = 0.48

B. Determine the 50-year 1-hour rainfall:

$$i_{50} = 2.5 \text{ inches}$$

Adjust for time of concentration to compute Rainfall Intensity (I):

Existing Condition:

$$T_c = 14 \text{ minutes}$$

$$I = 4.7 \text{ inches/hour}$$

Developed Condition:

$$T_c = 9 \text{ minutes}$$

$$I = 5.4 \text{ inches/hour}$$

C. Drainage Area (A) = 1.552 Acres

D. Compute the 50-year storm runoff volume (Q):

$$Q = CIA$$

Existing Conditions:

$$Q = (0.26)(4.7)(1.552)$$

$$= 1.9 \text{ cfs}$$

Developed Conditions:

$$\begin{aligned} Q &= (0.48)(5.4)(1.552) \\ &= 4.0 \text{ cfs} \end{aligned}$$

The increase in runoff due to the proposed development is  $4.0 - 1.9 = 2.1$  cfs.

**APPENDIX B**  
**UNIVERSAL SOIL LOSS CALCULATIONS**



## Universal Soil Loss Calculations

### A. HESL Soil Loss Calculations:

#### 1. Erosion rate, as set forth by the County of Maui Ordinance:

$$E = R \times K \times LS \times C \times P$$

Where:

- E = Soil Loss in tons/acre/year
- R = Rainfall Factor = 150 tons/acre/year
- K = Soil Erodibility Factor = 0.17 (Makena)
- L = Slope Length = 250 ft.
- S = Slope Gradient = 0.10
- LS = Slope Length Factor = 2.00
- C = Cover Factor, Use Bare Soil = 1.0
- P = Control Factor, Construction Site = 1.0
- E =  $150 \times 0.17 \times 2.00 \times 1.0 \times 1.0$   
= 51 tons/acre/year

#### 2. Maximum Allowable Soil Loss:

$$E_{max} = H_{max} / (2 F T + 3 D) A$$

$$\text{Coastal Water Hazard (D)} = \text{Class A} = 2$$

$$\text{Downstream Hazard (F)} = 2$$

$$\text{Duration of Site Work} = 12 \text{ months}$$

$$\text{Maximum Allowable Construction Area} \times \text{Erosion Rate} \\ = 5,000 \text{ tons/acre/year}$$

B. Severity Rating Number:

1. The degree of hazard from potential damage by erosion and sediment, known as "Severity Rating Number" will be determined for each grading site as follows:

$$H = (2 F T + 3 D) A E$$

Where:

H = Severity Rating Number

F = Unit Downslope/Downstream factor = 2

D = Unit Coastal Water Hazard = 2

T = Time of Distribution (years) = 1.0

A = Area of Disturbance (acres) = 1.552

E = Erosion Rate in tons/acre/year

$$H = ((2 \times 2 \times 1.0) + (3 \times 2)) \times 1.552 \times 51 = 792$$

The maximum allowable severity rating number established is 50,000, and is greater than 792 which is computed for the project.

# ***Appendix D***

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***Agency Comments Received During  
Review of Original District  
Boundary Amendment, Change in  
Zoning and Special Management  
Area Use Permit Applications***

OCT 08 2001



United States  
Department of  
Agriculture

Natural  
Resources  
Conservation  
Service

101 mi Kala St.  
Suite 209  
Wailuku, HI 96793

01 OCT -3 PS 02

*Our People...Our Islands...In Harmony*  
DEPT OF PLANNING  
COUNTY OF MAUI  
RECEIVED

DATE: October 2, 2001

Mr. John E. Min, Director  
Department of Planning  
County of Maui  
250 S. High Street  
Wailuku, Hawaii 96793

Dear Mr. Min,

SUBJECT: Makena Single Family Condominium; TMK: 2-1-007: 066  
I.D. DBA 2001/0003, CIZ 2001/0011, SM1 2001/0017

We have no comment on the subject application.

Thank you for the opportunity to comment.

Sincerely,

Neal S. Fujiwara  
District Conservationist

Oct-24-01 09:32am

From-DEPT OF PLANNING COUNTY OF MAUI

808-242819

T-824 P.02/02 F-970



REPLY TO  
ATTENTION OF

DEPARTMENT OF THE ARMY  
U. S. ARMY ENGINEER DISTRICT, HONOLULU  
FT. SHAFTER, HAWAII 96858-5440

October 22, 2001

01 OCT 23 P2:35

DEPT OF PLANNING  
COUNTY OF MAUI  
RECEIVED

Civil Works Technical Branch

Ms. Colleen Suyama, Staff Planner  
Department of Planning  
County of Maui  
250 South High Street  
Wailuku, Maui, Hawaii 96793

Dear Ms. Suyama:


Thank you for the opportunity to review and comment on the Zone Change Application and Project Assessment Report for the Makena Single Family Condominium, Makena, Maui (TMK 2-1-7: 66). The following comments are provided in accordance with Corps of Engineers authorities to provide flood hazard information and to issue Department of the Army (DA) permits.

a. Based on the information provided, a DA permit will not be required for the project.

b. The flood hazard information provided on page 13 of the Project Assessment Report is correct.

Should you require additional information, please contact Ms. Jessie Dobinchick of my staff at (808) 438-8876.

Sincerely,

  
James Pennaz, P.E.  
Chief, Civil Works  
Technical Branch

BENJAMIN J. CAYETANO  
GOVERNOR



01 OCT -3 P3:02

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
869 PUNCHBOWL STREET  
HONOLULU, HAWAII 96813  
DEPARTMENT OF PLANNING  
COUNTY OF MAUI  
RECEIVED  
September 28, 2001

BRIAN K. MINAAI  
DIRECTOR

DEPUTY DIRECTORS  
GLENN M. OKIMOTO  
JADINE Y. URASAKI

OCT 0 8 2001

IN REPLY REFER TO:

STP 8.0041

Mr. John E. Min  
Director  
Department of Planning  
County of Maui  
250 South High Street  
Wailuku, Hawaii 96793

Dear Mr. Min:

Subject: Makena Single Family Condominium  
District Boundary Amendment (DBA),  
Change in Zone (CIZ) and  
Special Management Area Use Permit (SMA)  
TMK: 2-1-07: 066

Thank you for your transmittal requesting our review of the subject project.

The proposed development will not impact our State transportation facilities.

We appreciate the opportunity to provide comments.

Very truly yours,

*Brian K. Minaai*  
BRIAN K. MINAAI  
Director of Transportation

Oct-24-01 09:32am From-DEPT OF PLANNING COUNTY OF MAUI

808-242818

T-824 P.01/02 F-970

BENJAMIN J. CAYETANO  
GOVERNOR



WAYNE H. KIMURA  
Comptroller

MARY ALICE EVANS  
Deputy Comptroller

STATE OF HAWAII  
DEPARTMENT OF ACCOUNTING  
AND GENERAL SERVICES  
P.O. BOX 119  
HONOLULU, HAWAII 96810-0119

'01 OCT 22 P255

DEPT OF PLANNING  
COUNTY OF MAUI  
RECEIVED

October 19, 2001

**MEMORANDUM**

**TO:** John E. Min, Planning Director  
Maui County Planning Department

**ATTN:** Colleen Suyama, Staff Planner

**FROM:** Randall M. Hashimoto, State Land Surveyor  
DAGS, Survey Division

**SUBJECT:** L.D.: DBA 2001/0003, CIZ 2001/0011, SM1 2001/0017  
TMK: 2-1-007:066  
Project Name: Makena Single Family Condominium  
Applicant: Pacific Rim Land, Inc.

The subject proposal has been reviewed and confirmed that no Government Survey Triangulation Stations or Benchmarks are affected. Survey has no objections to the proposed project.

*Randall M. Hashimoto*  
RANDALL M. HASHIMOTO  
State Land Surveyor

BENJAMIN J. CAYETANO  
GOVERNOR



**STATE OF HAWAII**  
DEPARTMENT OF HEALTH  
**MAUI DISTRICT HEALTH OFFICE**  
54 HIGH STREET  
WAILUKU, MAUI, HAWAII 96793

OCT 30 2001

BRUCE S. ANDERSON, Ph.D., M.P.H.  
DIRECTOR OF HEALTH

LORRIN W. PANG, M.D., M.P.H.  
MAUI DISTRICT HEALTH OFFICER

October 25, 2001

Mr. John Min  
Director  
Department of Planning  
County of Maui  
250 South High Street  
Wailuku, Hawai'i 96793

Dear Mr. Min:

Subject: **Makena Single Family Condominium**  
TMK: (2) 2-1-007:066  
DBA 2001/0003, CIZ 2001/0011, SM1 2001/0017

Thank you for the opportunity to comment on the land use applications. The following comment is offered:

The matter of wastewater disposal is not clear. The document states that each individual dwelling will be serviced by an individual wastewater system (IWS). It also states that a new private wastewater collection system is being "implemented" by the Makena Resort Corp. If available, tie-in to the private wastewater system is required.

Should you have any questions, please call me at 984-8230.

Sincerely,

A handwritten signature in black ink, appearing to be "H. Matsubayashi", enclosed in a hand-drawn oval.

Herbert S. Matsubayashi  
District Environmental Health Program Chief

c: ✓ Michael Munekiyo  
Roland Tejano



OCT 09 2001



**DEPARTMENT OF WATER SUPPLY  
COUNTY OF MAUI  
P.O. BOX 1109  
WAILUKU, MAUI, HAWAII 96793-6109  
Telephone (808) 270-7816 • Fax (808) 270-7833**

October 1, 2001

Mr. John Min, Director  
County of Maui  
Planning Department  
250 South High Street  
Wailuku, Maui, Hawaii 96793

I.D.: DBA 2001/0003, CIZ 2001/011, SM1 2001/0017  
TMK: 2-1-:007:006  
Project Name: Makena Single Family Condominium

Dear Mr. Min,

Thank you for the opportunity to provide comments on this application. We provide the following information:

Water use for the proposed development would be approximately 4,650 gpd based on system per-acre standards. However, considering average consumption for this area and the water features proposed for this project, actual water use should be estimated to about 8,300 gpd.

The project area is served by the Central Maui System. The major source of water for this system is the Iao Aquifer. Rolling annual average groundwater withdrawals from the Iao Aquifer as of September 1, 2001 were 17.540 mgd. The regulatory sustainable yield of this aquifer is 20 mgd. If rolling annual average withdrawals exceed 20 mgd, the State Commission on Water Resource Management will designate Iao Aquifer. The Department is implementing a plan to bring new sources on line and to mitigate withdrawals. Two wells in North Waihee were brought on-line in 1997 and another two adjacent wells were brought on-line during 2000. The Department is continuing to implement a plan to bring new sources on-line and to mitigate withdrawals. No guarantee of water is granted or implied as a result of these comments. Water availability will be reviewed at the time of application for meter or meter reservation.

Domestic, fire, and irrigation calculations will be reviewed in detail during the development process.

In order to conserve water resources, we recommend that the following measures be implemented:

Use Brackish/Reclaimed Water: Where possible, brackish and/or reclaimed water should be used for all non-potable uses during and after development, including irrigation, outdoor water features, and dust control during construction.

Eliminate Single-Pass Cooling: Single-pass, water-cooled systems should be eliminated per Maui County Code Subsection 14.21.20. These units pass water once-through for cooling, and then dispose of the water into the

drain. Although prohibited by code, single-pass water cooling is still manufactured into some models of air conditioners, freezers, and commercial refrigerators.

Utilize Low-Flow Fixtures and Devices: Maui County Code Subsection 16.20.675 requires the use of low flow water fixtures and devices in faucets, showerheads, urinals, water closets and hose bibs. Water conserving washing machines, ice-makers and other units are also available, and can help cut back on water bills.

Maintain Fixtures to Prevent Leaks: A simple, regular program of repair and maintenance can prevent the loss of hundreds or even thousands of gallons a day. Refer to the attached handout, "The Costly Drip". The applicant should establish a regular maintenance program.

Use Climate-adapted Plants: The project site is located in "Maui County Planting Plan" - Plant Zones 3 and 5. Please refer to the "Maui County Planting Plan", and to the attached plant brochure. We encourage the applicants to increase the use of climate-adapted and salt-tolerant native plants. Native plants adapted to the area, conserve water and further protect the watershed from degradation due to invasive alien species.

Prevent Over-Watering By Automated Systems: Provide rain-sensors on all automated irrigation controllers. Check and reset controllers at least once a month to reflect the monthly changes in evapotranspiration rates at the site. As an alternative, provide the more automated, soil-moisture sensors on controllers.

Should you have any questions, please call our Water Resources and Planning Division at 270-7199.

Sincerely,



David Craddick  
Director  
emb

cc: engineering division  
applicant, with attachments:

"The Costly Drip"  
Maui County Department of Water Supply, "Saving Water in The Yard - What and How to Plant In Your Area."  
Ordinance 2108 - An ordinance amending Chapter 16.20 of the Maui County Code, pertaining to the plumbing code"  
"A Checklist for Water Conservation Ideas for Cooling"  
"A Checklist for Water Conservation Ideas for the Home"

*By Water All Things Find Life*



THE COSTLY DRIP

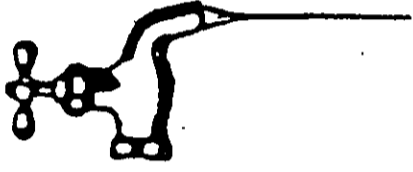
### "THE COSTLY DRIP"



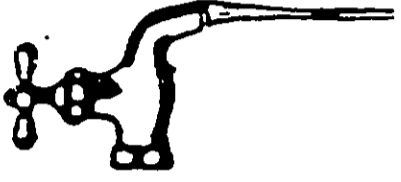
Slowly Dripping  
Spigot Wastes  
15 Gallons a day.



1/32" Leak Wastes  
25 Gallons a day.



1/16" Stream Wastes  
100 Gallons a Day.



1/8" Stream Wastes  
400 Gallons a day.

**DO NOT PLANT THESE PLANTS !!!**

Common name	Scientific name	Plant family
	<i>Jasminum fluminense</i>	Oleaceae
	<i>Arthrosteima ciliatum</i>	Melastomataceae
	<i>Dissotis rotundifolia</i>	Melastomataceae
	<i>Erigeron karwinskianus</i>	Asteraceae
	<i>Eucalyptus robusta</i>	Myrtaceae
	<i>Hedychium gardnerianum</i>	Zingiberaceae
	<i>Juncus planifolius</i>	Juncaceae
	<i>Lophospermum confertus</i>	Myrtaceae
	<i>Medinilla cunninghamii</i>	Melastomataceae
	<i>Medinilla magnifica</i>	Melastomataceae
	<i>Medinilla venosa</i>	Melastomataceae
	<i>Melastoma candidum</i>	Melastomataceae
	<i>Melinis minutiflora</i>	Poaceae
	<i>Olea europaea</i>	Melastomataceae
	<i>Oxyspora paniculata</i>	Poaceae
	<i>Panicum maximum</i>	Poaceae
	<i>Paspalum urvillei</i>	Passifloraceae
	<i>Passiflora edulis</i>	Agavaceae
	<i>Phormium tenax</i>	Pinaceae
	<i>Pinus taeda</i>	Fabaceae
	<i>Prosopis pallida</i>	Melastomataceae
	<i>Pterolepis glomerata</i>	Myrtaceae
	<i>Rhodomyrtus tomentosa</i>	Araliaceae
	<i>Schefflera actinophylla</i>	Myrtaceae
	<i>Syzygium jambos</i>	Mimosaceae
	<i>Acacia melanoxylon</i>	Cyathaceae
	<i>Cyathia cooperi</i>	Cyathaceae
	<i>Sphaeropteris cooperi</i>	Cyathaceae
	<i>Bidens pilosa</i>	Asteraceae
	<i>Bracharia mullica</i>	Poaceae
	<i>Ficus microcarpa</i>	Moraceae
	<i>Asystasia gangetica</i>	Acanthaceae
	<i>Schinus terebinthifolius</i>	Anacardiaceae
	<i>Acacia confusa</i>	Mimosaceae
	<i>Senecio mikanoides</i>	Asteraceae
	<i>Lonicera japonica</i>	Caprifoliaceae
	<i>Clidemia hirta</i>	Melastomataceae
	<i>Lantana camara</i>	Verbenaceae
	<i>Furcraea foetida</i>	Agavaceae
	<i>Fraxinus uhdei</i>	Oleaceae
	<i>Hunnemannia fumarifolia</i>	Papaveraceae
	<i>Angiotesis evecta</i>	Marattiaceae
	<i>Corynocarpus laevigatus</i>	Corynocarpaceae
	<i>Lepidospermum scoparium</i>	Myrtaceae
	<i>Coriaderia jubata</i>	Poaceae
	<i>Castilleja elaeagnifolia</i>	Moraceae
	<i>Ardisia elliptica</i>	Myrsinaceae
	<i>Passiflora mollissima</i>	Passifloraceae
Australian blackwood		
Australian tree fern		
Australian tree fern		
Beggar's tick, Spanish needle		
California grass		
Chinese banyon, Maylayan banyon		
Chinese violet		
Christmasberry, Brazilian pepper		
Formosan koa		
German ivy		
Japanese honeysuckle		
Koster's curse		
Lantana		
Mauritius hemp		
Mexican ash, tropical ash		
Mexican tulip poppy		
Mules foot, Madagascar tree fern		
New Zealand laurel, karakaranul		
New Zealand tea		
Pampas grass		
Panama rubber tree, Mexican rubber tree		
Shoebutlon ardisia		
banana poka		

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

**DO NOT PLANT THESE PLANTS !!!**

Common name	Scientific name	Plant family
black wattle	Acacia mearnsii	Mimosaceae
blackberry	Rubus argutus	Rosaceae
blue gum	Eucalyptus globulus	Myrtaceae
bocconia	Bocconia frutescens	Papaveraceae
broad-leaved cordia	Cordia alliodora	Boraginaceae
broomsedge, yellow bluestem	Andropogon virginicus	Poaceae
buffelgrass	Cenchrus ciliaris	Poaceae
butterfly bush, smoke bush	Buddleia madagascariensis	Buddleiaceae
cats claw, Mysore thorn, wait-a-bit	Caesalpinia decapetala	Caesalpinaceae
common ironwood	Casuarina equisetifolia	Casuarinaceae
common velvet grass, Yorkshire fog	Holcus lanatus	Poaceae
fiddlewood	Citharexylum spinosum	Verbenaceae
fire tree, laya tree	Myrica laya	Myricaceae
glorybower	Clerodendrum laponicum	Verbenaceae
hairy cat's ear, gosmore	Hypochoeris radicata	Asteraceae
haole koa	Leucaena leucocephala	Fabaceae
ivy gourd, scarlet-fruited gourd	Coccinia grandis	Cucurbitaceae
juniper berry	Citharexylum caudatum	Verbenaceae
kahili flower	Grevillea banksii	Proteaceae
kiu, popinac	Acacia farnesiana	Mimosaceae
logwood, bloodwood tree	Haematoxylon campechianum	Caesalpinaceae
loquat	Eriobotrya japonica	Rosaceae
meadow ricegrass	Ehrharta stipoides	Poaceae
melaleuca	Melaleuca quinquenervia	Myrtaceae
miconia, velvet leaf	Miconia calvenscens	Melastomataceae
narrow-leaved carpelgrass	Axonopus fissifolius	Poaceae
oleaster	Elaeagnus umbellata	Elaeagnaceae
oriental mangrove	Bruguiera gymnorhiza	Rhizophoraceae
padang cassia	Cinnamomum burmannii	Lauraceae
palmgrass	Scleria palmifolia	Poaceae
pearl flower	Heterocentron subtripinervium	Melastomataceae
quinine tree	Cinchona pubescens	Rubiaceae
salin leaf, caimitillo	Chrysophyllum oliviforme	Sapotaceae
silkwood, Queensland maple	Findleria brayleyana	Rutaceae
silky oak, silver oak	Grevillea robusta	Proteaceae
sirawberry guava	Psidium cattleianum	Myrtaceae
swamp oak, salmarsh, longleaf ironwood	Casuarina glauca	Casuarinaceae
sweet vernalgrass	Anthoxanthum odoratum	Poaceae
tree of heaven	Allanhus ailissima	Simaroubaceae
trumpet tree, quarumo	Cecropia obtusifolia	Cecropiaceae
white ginger	Hedychium coronarium	Zingiberaceae
white moho	Heliocarpus popayanensis	Liliaceae
yellow ginger	Hedychium flavescens	Zingiberaceae



Purple

Zone 5

Zone-specific Native and Polynesian plants for Maui County

TYPE: F Fern G Grass Gr Ground Cover Sh Shrub P Palm S Sedge Tr Tree V Vine

Type	Scientific Name	Common Name	Height	Spread	Elevation	Water req.
G	<i>Colubrina asiatica</i>	'anapanapa	3'	10'	sea to 1,000'	Dry to Wet
G	<i>Eragrostis variabilis</i>	'emo-ia	1'	2'	sea to 3,000'	Dry to Medium
G	<i>Fimbristylis cymosa</i> ssp. <i>spalifera</i>	mau'u'aki'aki fimbriatylis	0.5'	1'	sea to 1,000'	Dry to Medium
Gr	<i>Boerhavia repens</i>	alena	0.5'	4'	sea to 1,000'	Dry to Medium
Gr	<i>Chamaesyce celastroides</i> var. <i>laevis</i>	'akoko	2'	3'	sea to 1,000'	Dry to Medium
Gr	<i>Cressa truxillensis</i>	cressa	0.5'	1'	sea to 1,000'	Dry to Medium
Gr	<i>Heliotropium anomalum</i> var. <i>argenteum</i>	hinahina ku kahakai	1'	2'	sea to 1,000'	Dry to Medium
Gr	<i>Jacquemontia ovalifolia</i> ssp. <i>sandwicensis</i>	pa'u o hi'iaka	0.5'	6'	sea to 1,000'	Dry to Medium
Gr	<i>Lipochaeta integrifolia</i>	nehe	1'	5'	sea to 1,000'	Dry to Medium
Gr	<i>Sesuvium portulacastrum</i>	'akulikuli, sea-purslane	0.5'	2'	sea to 1,000'	Dry to Wet
Gr	<i>Sida fallax</i>	'ilima	0.5'	3'	sea to 1,000'	Dry to Medium
Gr	<i>Tephrosia purpurea</i> var. <i>purpurea</i>	'auhuhu	2'	2'	sea to 1,000'	Dry to Medium
Gr - Sh	<i>Hibiscus calyphyllus</i>	ma'o hau hele, Rock's hibiscus	3'	2'	sea to 3,000'	Dry to Medium
Gr - Sh	<i>Lycium sandwicense</i>	'ohelo-kai, 'ae'ae	2'	2'	sea to 1,000'	Dry to Medium
P	<i>Cocos nucifera</i>	coconut, niu	100'	30'	sea to 1,000'	Dry to Wet
P	<i>Pritchardia hillebrandii</i>	lo'ulu, fan palm	25'	15'	sea to 1,000'	Dry to Wet
S	<i>Mariscus javanicus</i>	marsh cypress, 'ahu'awa	0.5'	0.5'	sea to 1,000'	Dry to Medium
Sh	<i>Argemone glauca</i> var. <i>decipiens</i>	pua kala	3'	2'	sea to 3,000'	Dry to Medium
Sh	<i>Artemisia australis</i>	'ahinahina	2'	3'	sea to 3,000'	Dry to Medium
Sh	<i>Bidens hillebrandiana</i> ssp. <i>hillebrandiana</i>	ko'oko'olau	1'	2'	sea to 1,000'	Dry to Wet
Sh	<i>Bidens mauiensis</i>	ko'oko'olau	1'	3'	sea to 1,000'	Dry to Medium
Sh	<i>Chenopodium oahuense</i>	'aheahea, 'aweoweo	6'		sea to higher	Dry to Medium
Sh	<i>Dianella sandwicensis</i>	'uki	2'	2'	1,000' to higher	Dry to Medium
Sh	<i>Gossypium tomentosum</i>	mao, Hawaiian cotton	5'	8'	sea to 1,000'	Dry to Medium





Blue

Zone 4

Zone-specific Native and Polynesian plants for Maui County

Type	Scientific Name	Common Name	Height	Spread	Elevation	Water req.
Sh	<i>Artemisia mauiensis</i> var. <i>diffusa</i>	Maui wormwood, 'ahinahina	2'	3'	1,000' to higher	Dry to Medium
Sh	<i>Bidens hillebrandiana</i> ssp. <i>hillebrandiana</i>	ko'oko'olau	1'	2'	sea to 1,000'	Dry to Wet
Sh	<i>Bidens menziesii</i> ssp. <i>menziesii</i>	ko'oko'olau	1'	3'		
Sh	<i>Bidens micrantha</i> ssp. <i>micrantha</i>	ko'oko'olau	1'	3'		
Sh	<i>Cordylone fruticosa</i>	ti, ki	6'			
Sh	<i>Dianella sandwicensis</i>	'uki	2'	2'	1,000' to higher	Dry to Medium
Sh	<i>Lipochaeta lavarum</i>	nehe	3'	3'	sea to 3,000'	Dry to Medium
Sh	<i>Osteomeles anthyllifolia</i>	'ulei, eluehe	4'	6'	sea to 3,000'	Dry to Medium
Sh	<i>Scaevola sericea</i>	naupaka, naupaka-kahakai	6'	8'	sea to 1,000'	Dry to Medium
Sh	<i>Solanum nelsonii</i>	'akia, beach solanum	3'	3'	sea to 1,00'	Dry to Medium
Sh	<i>Styphelia tameiameia</i>	pukiawe	6'	6'	1,000' to higher	Dry to Medium
Sh	<i>Vitex rotundifolia</i>	pohinahina	3'	4'	sea to 1,000'	Dry to Medium
Sh	<i>Wikstroemia uva-ursi</i> <i>kauaiensis</i> <i>kauaiensis</i>	'akia, Mo'okai osmanthus				
Sh - Tr	<i>Broussonetia papyrifera</i>	wauke, paper mulberry	8'	6'	sea to 1,000'	Dry to Medium
Sh - Tr	<i>Myoporum sandwicense</i>	naio, false sandalwood	10'	10'	sea to higher	Dry to Medium
Sh - Tr	<i>Notolichium sandwicense</i>	kulu'i	8'	8'	sea to 3,000'	Dry to Medium
Sh - Tr	<i>Dodonaea viscosa</i>	'a'ali'i	6'	8'	sea to higher	Dry to Medium
Tr	<i>Acacia koa</i>	koa	50' - 100'	40' - 80'	1,500' to 4,000'	Dry to Medium
Tr	<i>Aleurites moluccana</i>	candlenut, kukui	50'	50'	sea to 3,000'	Medium to Wet
Tr	<i>Calophyllum inophyllum</i>	kamani, alexandrian laurel	60'	40'	sea to 3,000'	Medium to Wet
Tr	<i>Canthium odoratum</i>	'Alahe'e, 'oh'e'e, walahe'e	12'	8'	sea to 3,000'	Dry to Medium
Tr	<i>Charpentiera obovata</i>	kou	15'			
Tr	<i>Cordia subcordata</i>		30'	25'	sea to 1,000'	Dry to Wet
Tr	<i>Diospyros sandwicensis</i>	lama	12'	15'	sea to 3,000'	Dry to Medium
Tr	<i>Hibiscus furcellatus</i>	'akiohala, hau-hale	8'			
Tr	<i>Metrosideros polymorpha</i> var. <i>macrophylla</i>	ohi'a lehua	25'	25'	sea to 1,000'	Dry to Wet
Tr	<i>Morinda citrifolia</i>	Indian mulberry, noni	20'	15'	sea to 1,000'	Dry to Wet

# Blue

## Zone 4

### Zone-specific Native and Polynesian plants for Maui County

TYPE: F Fern G Grass Gr Ground Cover Sh Shrub P Palm S Sedge Tr Tree V Vine

Type	Scientific Name	Common Name	Height	Spread	Elevation	Water req.
F	<i>Psilotum nudum</i>	moa, moa kula	1'	1'	sea to 3,000'	Dry to Wet
F	<i>Sadleria cyatheoides</i>	'ama'u, ama'uma'u				
G	<i>Colubrina asiatica</i>	'anapanapa	3'	10'	sea to 1,000'	Dry to Wet
G	<i>Eragrostis monticola</i>	'kalamalo	1'	2'	sea to 3,000'	Dry to Medium
G	<i>Eragrostis variabilis</i>	'emo-loa	1'	2'	sea to 3,000'	Dry to Medium
G	<i>Fimbristylis cymosa</i> ssp. <i>spathacea</i>	mau'u'aki'aki fimbriatylis	0.5'	1'	sea to 1,000'	Dry to Medium
Gr	<i>Chamaesyce celastroides</i> var. <i>laehiensis</i>	'akoko	2'	3'	sea to 1,000'	Dry to Medium
Gr	<i>Ipomoea tuboides</i>	Hawaiian moon flower, 'uala	1'	10'	sea to 3,000'	Dry to Medium
Gr	<i>Jacquemontia ovalifolia</i> ssp. <i>sandwicensis</i>	pa'u o hiiaka	0.5'	6'	sea to 1,000'	Dry to Medium
Gr	<i>Lipochaeta integrifolia</i>	nehe	1'	5'	sea to 1,000'	Dry to Medium
Gr	<i>Peperomia leptostachya</i>	'ala'ala-wai-nui	1'	1'	sea to 3,000'	Dry to Medium
Gr	<i>Plumbago zeylanica</i>	'ilie'e	1'			
Gr	<i>Sida fallax</i>	'ilima	0.5'	3'	sea to 1,000'	Dry to Medium
Gr	<i>Tephrosia purpurea</i> var. <i>purpurea</i>	'auhuu	2'	2'	sea to 1,000'	Dry to Medium
Gr - Sh	<i>Hibiscus calyphyllus</i>	ma'o hau hele, Rock's hibiscus	3'	2'	sea to 3,000'	Dry to Medium
Gr - Sh	<i>Lipochaeta rockii</i>	nehe	2'	2'	sea to 3,000'	Dry to Medium
Gr - Sh	<i>Lipochaeta succulenta</i>	nehe	2'	5'	sea to 1,000'	Dry to Wet
P	<i>Cocos nucifera</i>	coconut, niu	100'	30'	sea to 1,000'	Dry to Wet
P	<i>Pritchardia arecina</i>	lo'ulu, hawane	40'	10'	1,000' to 3,000'	Dry to Wet
P	<i>Pritchardia forbesiana</i>	lo'ulu	15'			
P	<i>Pritchardia hillebrandii</i>	lo'ulu, fan palm	25'	15'	sea to 1,000'	Dry to Wet
S	<i>Mariscus javanicus</i>	marsh cypress, 'ahu'awa	0.5'	0.5'	sea to 1,000'	Dry to Medium
Sh	<i>Argemone glauca</i> var. <i>decipiens</i>	pua kala	3'	2'	sea to 3,000'	Dry to Medium
Sh	<i>Artemisia australis</i>	'ahinahina	2'	3'	sea to 3,000'	Dry to Medium

Yellow

Zone 3

Zone-specific Native and Polynesian plants for Maui County

Type	Scientific Name	Common Name	Height	Spread	Elevation	Water req.
Tr	Morinda citrifolia	Indian mulberry, noni	20'	15'	sea to 1,000'	Dry to Wet
Tr	Nesoluma polynesicum	keahi	15'	15'	sea to 3,000'	Dry
Tr	Nestegis sandwicensis	olopua	15'	15'	1,000' to 3,000'	Dry to Medium
Tr	Pandanus tectorius	hala, puhala (HALELIST)	35'	25'	sea to 1,000'	Dry to Wet
Tr	Pleomele auwahiensis	halapepe	20'			
Tr	Rauvolfia sandwicensis	hiao	20'	15'	sea to 3,000'	Dry to Medium
Tr	Reynoldsia sandwicensis	'Ohe makai	20'	20'	1,000' to 3,000'	Dry
Tr	Santalum ellipticum	coastal sandalwood, 'ili-ahi	8'	8'	sea to 3,000'	Dry to Medium
Tr	Thespesia populnea	imilo	30'	30'	sea to 3,000'	Dry to Wet

Yellow

Zone 3

Zone-specific Native and Polynesian plants for Maui County

Type	Scientific Name	Common Name	Height	Spread	Elevation	Water req.
Sh	<i>Argemone glauca</i> var. <i>deciplens</i>	puu kala	3'	2'	sea to 3,000'	Dry to Medium
Sh	<i>Bidens mauiensis</i>	ko'oko'olau	1'	3'	sea to 1,000'	Dry to Medium
Sh	<i>Bidens menziesii</i> ssp. <i>menziesii</i>	ko'oko'olau	1'	3'		
Sh	<i>Bidens micrantha</i> ssp. <i>micrantha</i>	ko'oko'olau	1'	3'		
Sh	<i>Chenopodium oahuense</i>	ahaehe, aweoweo	6'		sea to higher	Dry to Medium
Sh	<i>Dianella sandwicensis</i>	'uki	2'	2'	1,000' to higher	Dry to Medium
Sh	<i>Gossypium tomentosum</i>	mao, Hawaiian cotton	5'	8'	sea to 1,000'	Dry to Medium
Sh	<i>Hedyotis</i> spp.	au, pilo	3'	2'	1,000' to 3,000'	Dry to Wet
Sh	<i>Lipochaeta lavarum</i>	nehe	3'	3'	sea to 3,000'	Dry to Medium
Sh	<i>Osteomeles anthyllifolia</i>	'ulei, eluehe	4'	6'	sea to 3,000'	Dry to Medium
Sh	<i>Scaevola sericea</i>	naupaka, naupaka-kahakai	6'	8'	sea to 1,000'	Dry to Medium
Sh	<i>Sanna gaudichaudii</i>	kolomana	5'	5'	sea to 3,000'	Dry to Medium
Sh	<i>Solanum nelsonii</i>	'akia, beach solanum	3'	3'	sea to 1,000'	Dry to Medium
Sh	<i>Styphelia tameiameia</i>	pukiawe	6'	6'	1,000' to higher	Dry to Medium
Sh	<i>Vitex rotundifolia</i>	pohinahina	3'	4'	sea to 1,000'	Dry to Medium
Sh	<i>Wikstroemia uva-ursi</i> <i>kauaiensis</i> <i>kauaiensis</i>	'akia, Moikoi osmanthus				
Sh - Tr	<i>Broussonetia papyrifera</i>	wauke, paper mulberry	8'	6'	sea to 1,000'	Dry to Medium
Sh - Tr	<i>Myoporum sandwicense</i>	naio, false sandalwood	10'	10'	sea to higher	Dry to Medium
Sh - Tr	<i>Nototrichium sandwicense</i>	kulu'i	8'	8'	sea to 3,000'	Dry to Medium
Sh - Tr	<i>Dodonaea viscosa</i>	'a'ali'i	6'	8'	sea to higher	Dry to Medium
Tr	<i>Aleurites moluccana</i>	candlenut, kukui	50'	50'	sea to 3,000'	Medium to Wet
Tr	<i>Calophyllum inophyllum</i>	kamani, alexandrian laurel	60'	40'	sea to 3,000'	Medium to Wet
Tr	<i>Canthium odoratum</i>	Alahe'e, 'ohe'e, walahe'e	12'	8'	sea to 3,000'	Dry to Medium
Tr	<i>Cordia subcordata</i>	kou	30'	25'	sea to 1,000'	Dry to Wet
Tr	<i>Diospyros sandwicensis</i>	fama	12'	15'	sea to 3,000'	Dry to Medium
Tr	<i>Erythrina sandwicensis</i>	willwill	20'	20'	sea to 1,000'	Dry
Tr	<i>Mezostichos polymorpha</i> var. <i>macrophylla</i>	ohi'a lehua	25'	25'	sea to 1,000'	Dry to Wet

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25

Yellow

Zone 3

Zone-specific Native and Polynesian plants for Maui County

TYPE: F Fern G Grass Gr Ground Cover Sh Shrub P Palm S Sedge Tr Tree V Vine

Type	Scientific Name	Common Name	Height	Spread	Elevation	Water req.
F	<i>Psilotum nudum</i>	moa, moa kula	1'	1'	sea to 3,000'	Dry to Wet
G	<i>Colubrina asiatica</i>	'anapanapa	3'	10'	sea to 1,000'	Dry to Wet
G	<i>Eragrostis monticola</i>	kalamalo	1'	2'	sea to 3,000'	Dry to Medium
G	<i>Eragrostis variabilis</i>	emo-ia	1'	2'	sea to 3,000'	Dry to Medium
G	<i>Fimbristylis cymosa</i> ssp. <i>spathacea</i>	mau'u'aki'aki fimbriatylis	0.5'	1'	sea to 1,000'	Dry to Medium
Gr	<i>Boerhavia repens</i>	alena	0.5'	4'	sea to 1,000'	Dry to Medium
Gr	<i>Chamaesyce celastroides</i> var. <i>laehiensis</i>	akoko	2'	3'	sea to 1,000'	Dry to Medium
Gr	<i>Cressa truxillensis</i>	cressa	0.5'	1'	sea to 1,000'	Dry to Medium
Gr	<i>Heliotropium anomalum</i> var. <i>argenteum</i>	hinahina ku kahakai	1'	2'	sea to 1,000'	Dry to Medium
Gr	<i>Ipomoea tuboides</i>	Hawaiian moon flower, 'uala	1'	10'	sea to 3,000'	Dry to Medium
Gr	<i>Jacquemontia ovalifolia</i> ssp. <i>sandwicensis</i>	pa u o hi'aka	0.5'	6'	sea to 1,000'	Dry to Medium
Gr	<i>Lipochaeta integrifolia</i>	nehe	1'	5'	sea to 1,00'	Dry to Medium
Gr	<i>Peperomia leptostachya</i>	'ala'ala-wai-nui	1'	1'	sea to 3,000'	Dry to Medium
Gr	<i>Plumbago zeylanica</i>	'ile'e	1'			
Gr	<i>Sesuvium portulacastrum</i>	'akulikuli, sea-purslane	0.5'	2'	sea to 1,000'	Dry to Wet
Gr	<i>Sida fallax</i>	'ilima	0.5'	3'	sea to 1,000'	Dry to Medium
Gr	<i>Tephrosia purpurea</i> var. <i>purpurea</i>	'auhuhu	2'	2'	sea to 1,000'	Dry to Medium
Gr - Sh	<i>Hibiscus calyphyllus</i>	ma'o hau hele, Rock's hibiscus	3'	2'	sea to 3,000'	Dry to Medium
Gr - Sh	<i>Lipochaeta rockii</i>	nehe	2'	2'	sea to 3,000'	Dry to Medium
Gr - Sh	<i>Lipochaeta succulenta</i>	nehe	2'	5'	sea to 1,000'	Dry to Wet
Gr - Sh	<i>Lycium sandwicense</i>	'ohelo-kai, 'ae'ae	2'	2'	sea to 1,000'	Dry to Medium
P	<i>Cocos nucifera</i>	coconut, niu	100'	30'	sea to 1,000'	Dry to Wet
P	<i>Pritchardia hillebrandii</i>	lo'ulu, fan palm	25'	15'	sea to 1,000'	Dry to Wet
S	<i>Mariscus javanicus</i>	marah cypress, 'ahu'awa	0.5'	0.5'	sea to 1,000'	Dry to Medium

Pink

Zone 2

Zone-specific Native and Polynesian plants for Maui County

Type	Scientific Name	Common Name	Height	Spread	Elevation	Water req.
Tr	<i>Nestegis sandwicensis</i>	olopua	15'	15'	1,000' to 3,000'	Dry to Medium
Tr	<i>Pleomele auwahiensis</i>	halepepe	20'			
Tr	<i>Rauvolfia sandwicensis</i>	hao	20'	15'	sea to 3,000'	Dry to Medium
Tr	<i>Santalum ellipticum</i>	coastal sandalwood, 'll-ahl	8'	8'	sea to 3,000'	Dry to Medium
Tr	<i>Sophora chrysophylla</i>	mamane	15'	15'	1,000' to 3,000'	Medium
V	<i>Alyxia oliviformis</i>	maile	Vine		sea to 6,000'	Medium to Wet





# Green

## Zone 1

### Zone-specific Native and Polynesian plants for Maui County

Type	F Fern	G Grass	Gr Ground Cover	Sh Shrub	P Palm	S Sedge	Tr Tree	V Vine
Type	Scientific Name	Common Name	Height	Spread	Elevation	Water req.		
F	<i>Psilotum nudum</i>	moa, moa kula	1'	1'	sea to 3,000'	Dry to Wet		
F	<i>Sadleria cyathoides</i>	'ama'u, ama'uma'u						
Gr - Sh	<i>Lipochaeta succulenta</i>	nehe	2'	5'	sea to 1,000'	Dry to Wet		
P	<i>Cocos nucifera</i>	coconut, niu	100'	30'	sea to 1,000'	Dry to Wet		
P	<i>Pritchardia arecina</i>	io'ulu, hawane	40'	10'	1,000' to 3,000'	Dry to Wet		
P	<i>Pritchardia forbesiana</i>	io'ulu	15'					
P	<i>Pritchardia hillebrandii</i>	io'ulu, fan palm	25'	15'	sea to 1,000'	Dry to Wet		
S	<i>Mariscus javanicus</i>	marsh cypress, 'ahu'awa	0.5'	0.5'	sea to 1,000'	Dry to Medium		
Sh	<i>Bidens hillebrandiana</i> ssp. <i>hillebrandiana</i>	ko'oko'olau	1'	2'	sea to 1,000'	Dry to Wet		
Sh	<i>Cordyline fruticosa</i>	ti, ki	6'					
Sh	<i>Hedyotis</i> spp.	au, pilo	3'	2'	1,000' to 3,000'	Dry to Wet		
Sh - Tr	<i>Broussonetia papyrifera</i>	wauke, paper mulberry	8'	6'	sea to 1,000'	Dry to Medium		
Tr	<i>Acacia koa</i>	koa	50' - 100'	40' - 80'	1,500' to 4,000'	Dry to Medium		
Tr	<i>Aleurites moluccana</i>	candlenut, kukui	50'	50'	sea to 3,000'	Medium to Wet		
Tr	<i>Calophyllum inophyllum</i>	kamani, alexandrian laurel	80'	40'	sea to 3,000'	Medium to Wet		
Tr	<i>Charpentiera obovata</i>	kou	15'					
Tr	<i>Cordia subcordata</i>	kou	30'	25'	sea to 1,000'	Dry to Wet		
Tr	<i>Hibiscus furcellatus</i>	'akiohala, hau-hele	8'					
Tr	<i>Metrosideros polymorpha</i> var. <i>macrophylla</i>	ohi'a lehua	25'	25'	sea to 1,000'	Dry to Wet		
Tr	<i>Morinda citrifolia</i>	Indian mulberry, noni	20'	15'	sea to 1,000'	Dry to Wet		
Tr	<i>Pandanus tectorius</i>	'hala, puhala (HALELIST)	35'	25'	sea to 1,000'	Dry to Wet		
V	<i>Alyxia olivifolia</i>	maile	Vine		sea to 6,000'	Medium to Wet		

**PLACES TO BUY NATIVES ON:**

**Maui:**

1. **Hoolawa Farms** **575-5099**  
P O Box 731  
Haiku HI 96708  
The largest and best collection of natives  
in the state. They will deliver, but it's  
worth the drive to go and see!  
Will propagate upon request
  
2. **Kula True Value Nursery** **878-2551**  
Many natives in stock  
Get most of their plants from Hoolawa Farms  
They take special requests
  
3. **Kihei Garden and Landscape** **244-3804**
  
4. **Kihana Nursery, Kihei** **879-1165**
  
5. **The Hawaiian Collection** **878-1701**  
Specialize in Sandalwood propagation  
Will propagate special requests

## ZONES

The Maui County Planting Plan has compiled a system of 5 zones of plant growth for Maui County. The descriptions of zones and maps for these zones are as follows:

Zone 1:

Wet areas on the windward side of the island. More than 40 inches of rain per year. Higher than 3,000 feet.

Zone 2:

Cool, dry areas in higher elevations (above 1,000 feet). 20 to 40 inches of rain per year.

Zone 3:

Low, drier areas, warm to hot. Less than 20 inches of rain per year. Sea level to 1,000 feet.

Zone 4:

Lower elevations which are wetter due to proximity of mountains. 1,000 to 3,000 feet.

Zone 5:

Salt spray zones in coastal areas on the windward side.

These zones are to be used as a general guide to planting for Maui County. In addition to looking at the maps, read the descriptions of the zones and decide which zone best fits your area. Plants can be listed in more than one zone and can be planted in a variety of conditions. For best results, take notes on the rainfall, wind, sun and salt conditions of your site. Use the zones as a general guide for selection and read about the plants to decide which best fits your needs as far as care and or function.

## PLACES TO SEE NATIVES ON:

The following places propagate native Hawaiian plants from seeds and/or cuttings. Their purpose is to protect and preserve these native plants. Please contact them before going to view the sites, they can provide valuable information and referral to other sources.

### Maui:

1. Hoolawa Farms, P.O. Box 731, Haiku, Hawaii, 96708 572-4835
2. The Hawaiian Collection, 1127 Manu St., Kula, Hawaii, 96790 878-1701
3. Kula Botanical Gardens, RR 4, Box 228, Kula, Hawaii, 96790 878-1715
4. Maui Botanical Gardens, Kanaloa Avenue across from stadium 243-7337
5. Kula Forest Reserve, access road at the end of Waipouli Rd.  
Call the Maui District Forester 984-8100
6. Wailea Point, Private Condominium residence, 4000 Wailea Alanui,  
public access points at Four Seasons Resort or Polo Beach 875-9557
7. Kahanu Gardens, National Tropical Botanical Garden,  
Alau Pt, Hana, Hawaii, 96713 248-8912
9. Kahului Library Courtyard, 20 School Street, Kahului, Hawaii 873-3097

coarse compost. Place some slow-release fertilizer at the bottom of the hole.

3. Carefully remove the plant from the container and place it in the hole.

The top of the soil should be at the same level as the top of the hole, if it is too high or too low, adjust the soil level so that the plant is at the right depth.

4. Water thoroughly after you transplant.

## **Mulch**

Most natives cannot compete with weeds, and therefore must be weeded around constantly in order to thrive. Mulch is a practical alternative, which discourages and prevents weeds from growing.

Hawaii's hot, humid climate leads to the breaking down of organic mulches. Thick organic mulches such as wood chips and leaves, may also be hiding places for pests.

Stone mulches are attractive, permanent and can help to improve soil quality. Red or black cinder, blue rock chips, smooth river rocks and coral chips are some natural choices.<sup>10</sup> Macadamia nut hulls are also easy to find and can make a nice mulch.<sup>11</sup>

Never pile up mulch right next to the stem or trunk of a plant, keep it a few inches away.

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<sup>10</sup> Bornhorst, p. 24

<sup>11</sup> Nagata, p. 7

## Propagation

There are many ways to propagate and plant-out native Hawaiian species. One of the most thorough and helpful book is Heidi Bornhorst's book, *Growing Native Hawaiian Plants*. The easiest, and best way to obtain natives for the novice gardener is to get them from a reputable nursery (see appendix c). That way all you will have to do is know how to transplant (if necessary) and plant-out when you are ready. These are the two methods I have listed here.

### Transplanting

1. Use pots that are one size bigger than the potted plant is in
2. Get your potting medium ready

Good potting medium is a ½, ½ mixture of peat moss and perlite. If the plant is from a dry or coastal area, add chunks of cinder or extra perlite. If it is a wet forest species, add more peat moss or compost. Be aware that peat moss is very acidic and certain plants react severely to acidity.

If the plant is to eventually be planted into the ground, make a mix of equal parts peat moss, perlite, and soil from the area in which the plant is to be planted. Slow-release fertilizer can be mixed into the potting medium.

3. Once pots, potting medium, fertilizer and water are ready, you can begin re-potting. Keep the plant stem at the same depth it was in the original pot. Avoid putting the plant in too large a pot, as the plant may not be able to soak up all the water in the soil and the roots may drown and rot.

Mix potting medium and add slow-release fertilizer at this time. Pre-wet the medium to keep dust down and lessen shock to the plant. Put medium in bottom of pot. Measure for the correct depth in the new pot. Make sure there is from ½ to 2 inches from the top of the pot so the plant can get adequate water. Try to stand the plant upright and center the stem in the middle of the pot.

Water the plant thoroughly after transplanting. A vitamin B-1 transplanting solution can help to lessen the transplant shock. Keep the plant in the same type of environment as it was before, sun or shade. If roots were broken, trim off some of the leaves to compensate for the loss.<sup>9</sup>

### Planting out

1. Plant most native Hawaiian plants in a sunny location in soil that is well-drained.
2. Make the planting hole twice as wide as the root ball or present pot, and just as deep. If the soil is clay-like, and drains slowly, mix in some coarse red or bland cinder, coarse perlite or

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<sup>9</sup> Bornhorst, p.20-21

Automatic sprinkler systems are expensive to install and must be checked and adjusted regularly. Above-ground systems allow you to monitor how much water is being put out, but you lose a lot due to malfunctioning of sprinkler heads and wind. The most efficient way to save water and make sure your plants get enough water, is to hand-water. This way you are getting our precious water to the right places in the right amounts.<sup>7</sup>

## **Fertilizer**

An all-purpose fertilizer 10-10-10 is adequate for most species. They should be applied at planting time, 3 months later, and 6 months thereafter. Use half the dosage recommended for ornamentals and pay special attention to native ferns which are sensitive to strong fertilizers. Use of organic composts and aged animal manures is suggested instead of chemical fertilizers. In addition, use of cinders for providing trace minerals is strongly recommended.<sup>8</sup>

Natives are plants which were here hundreds of years before the polynesians inhabited the Hawaiian Islands. They were brought here by birds, or survived the harsh ocean conditions to float here. They are well-adapted to Hawaii's varying soil and environmental conditions. This is why they make prime specimens for a xeriscape garden. However, natives will not thrive on their own, especially under harsh conditions. On the other hand, like any other plant, if you over-water and over-fertilize them, they will die. Follow the instructions given to you by the nursery you buy the plant from, or from this booklet. Better yet, buy a book (suggested readings can be found in the bibliography in the back of this pamphlet), read it, and learn more about native plants. I guarantee that you will be pleased with the results.

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<sup>7</sup> Bornhorst, p. 19-20

<sup>8</sup> Nagata, p. 6

## Soil

Once you have selected your site and the plants you wish to establish there, you must look at the soil conditions on the site. Proper soil is necessary for the successful growth of most native plants, which perform poorly in hard pan, clay or adobe soils. If natives are to be planted in these types of soil, it would be wise to dig planting holes several times the size of the rootball and backfill with 50-75% compost.<sup>4</sup> A large planting hole ensures the development of a strong root system. The plant will have a headstart before the roots penetrate the surrounding poor soil.<sup>5</sup>

It is recommended that native plants not be planted in ground that is more dense than potting soil. If there is no alternative, dig a hole in a mound of soil mixed with volcanic cinder which encourages maximum root development. Fill the hole with water, if the water tends to puddle or drain too slowly, dig a deeper hole until the water does not puddle longer than 1 or 2 minutes.<sup>6</sup> Well-drained soil is one of the most important things when planting natives as you will see in the next section.

## Irrigation

Most natives do very poorly in waterlogged conditions. Do not water if the soil is damp. Water when the soil is dry and the plants are wilting. Once established, a good soaking twice a week should suffice. Deep soaking encourages the development of stronger, and deeper root systems. This is better than frequent and shallow watering which encourage weaker, more shallow root systems.

The following is a watering schedule from Kenneth Nagata's Booklet, *How To Plant A Native Hawaiian Garden*:

<u>WATER REQUIREMENT</u>	<u>WATERING FREQUENCY</u>
Heavy	3x / week
Moderate	2x / week
Light	1x / week

Red clay soils hold more water for a longer period of time than sandy soils do. If your area is very sunny or near a beach, things will dry out faster. Even in the area of one garden, there are parts that will need more or less water. Soils can vary and amount of shade and wind differ. After plants are established (a month or two for most plants, up to a year for some trees), you can back off watering.

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<sup>4</sup> Nagata, p. 6.

<sup>5</sup> Nagata, p. 8

<sup>6</sup> Nagata, p. 8



## Selection

As a general rule, it is best to select the largest and healthiest specimens. However, be sure to note that they are not pot-bound. Smaller, younger plants may result in a low rate of plant survival.<sup>1</sup> When selecting native species, consider the site they are to be planted in, and the space that you have to plant. For example: Mountain species such as koa and maile will not grow well in hot coastal areas exposed to strong ocean breezes. Lowland and coastal species such as wiliwili and Kou require abundant sunshine and porous soil. They will not grow well with frequent cloud cover, high rainfall and heavy soil.

Consider too, the size that the species will grow to be. It is not wise to plant trees that will grow too large.<sup>2</sup> Overplanting tends to be a big problem in the landscape due to the underestimation of a species' height, width or spread.

A large, dense canopied tree such as the kukui is a good shade tree for a lawn. However, its canopy size and density of shade will limit what can be planted in the surrounding area. Shade cast by a koa and ohia lehua is relatively light and will not inhibit growth beneath it.

Keep seasons in mind when you are selecting your plants. Not all plants look good year round, some plants such as ilima will look scraggly after they have flowered and formed seeds. Avoid planting large areas with only one native plant. Mixing plants which naturally grow together will ensure the garden will look good all year round.<sup>3</sup> Looking at natural habitats helps to show how plants grow naturally in the landscape.

When planting an area with a mixed-ecosystem, keep in mind the size and ecological requirements of each plant. Start with the hardiest and most easily grown species, but allow space for fragile ones in subsequent plantings.

## Acquiring natives

Plants in their wild habitat must be protected and maintained. It is best and easiest to get your plants from nurseries (see list), or friend's gardens. Obtain proper permits from landowners and make sure you follow a few common sense rules:

- ▶ collect sparingly from each plant or area.
- ▶ some plants are on the state or Federal Endangered Species list. Make sure you get permits (see app. A,B)

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<sup>1</sup> K. Nagata, P.6

<sup>2</sup> K. Nagata, P.9

<sup>3</sup> Nagata, P.9

## A Checklist of Conservation Ideas for the Yard



### Limit Lawn Size

Most turf grasses require 30% to 50% more water than shrubs and ground covers. Limit the use of grass and lawns to active picnicking and play areas. Shade in these areas will reduce moisture loss and make a cool area for children to play. If you do have a lawn, mow at least once per week, and try to cut no more than 1/2 of the grass blade, or 1/2 to 3/4 of an inch at a time. Adjust your lawn mower to a higher setting. Taller blades of grass actually hold up better in the heat, because that little bit of extra shade helps to more moisture in the soil. If you mow the grass too short, root shock will cause your grass to turn yellow despite your watering!

### Designing for Irrigation Zones

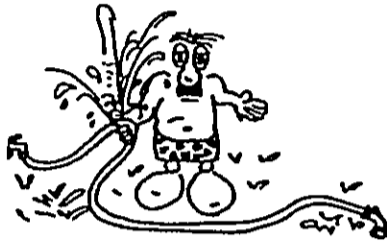
Avoid putting thirsty exotics with plants that do well in dry weather. Zone your plants so that each area has similar water needs. This will enable you to water more efficiently, and keep the plants healthier. Limit thirsty plants to small decorative borders around the house itself or in specific viewing areas or shady areas. While you're at it, call the Board of Water Supply at 270-7199 for more information.

### Choosing Native Plants: A Hawaiian Sense of Place

An out-of-place, thirsty landscape can slurp up 3/4 of your home's water use. Plant shrubs and trees that nature designed to look green and full here on Maui without a lot of water. Make sure they get regular watering in the first year or two, to help them establish good, deep roots. Then, once they are grown in, you can cut back or stop watering, depending upon your location. At worst, in our hot, low southern areas an occasional, slow, deep watering placed right at the roots should be enough to keep a climate adapted plant looking good even through the hot summer.



- **Find and Repair Leaks**  
Your garden hose and irrigation lines can carry thousands of gallons per day, so you can imagine a leak outdoors wastes a lot of water! Check and repair all of your outdoor fixtures regularly.



- **Irrigation Systems**  
Drip irrigation is designed to get water slowly and directly to the roots of plants. This not only saves water, but for some plants it helps to reduce the risk of diseases. Sprinklers with fine, high sprays lose a lot of water to evaporation. So, if you do use a sprinkler for certain plants, go for the sort with low, flat spray patterns and larger drops of water. Check timers on irrigation controllers and adjust them monthly to water appropriately for the season. For small grassy areas, watering by hand can actually reduce waste! But if you use a hose, set a kitchen timer or buy a timer attachment that hooks on between the faucet and hose. This will help remind you not to over-water one area. Use a soaker hose on slopes to reduce run-off.



- **Watering**  
If you do have a lawn, water only when it needs it. A good deep soaking is better than a light sprinkling. If you water too frequently and lightly, plants develop shallower roots and become less drought resistant! A good way to see if your lawn needs watering is to step on the grass. If it springs back up when you move, it doesn't need water. If it stays flat, it could use a bit. Avoid watering in the heat of the day. By 10 A.M., the sun is up and so is the heat. This will rob your lawn's moisture. In dry areas you can also choose evenings to water.



- **Watching the Weather...**  
As simple-minded as it sounds ...never water while it's raining! Many people forget to follow this simple rule. Install rain-shutoffs or soil moisture sensors on automated systems. Teach your family to turn off your irrigation in the rain. You also create "weather conditions" by how and where you plant. Sunny exposed areas and slopes need to be watered more frequently than shady areas. Place your plants appropriately.
- **Getting to the Root**  
Root feeder or water aerator probes around trees and bushes will help direct water where it is needed. Even for the biggest trees, you don't need to go any deeper than 18 inches. 8 to 12 inches is big enough for small trees and shrubs. You can also build a watering basin in the soil around the base of your plants to help the water to seep in deeply. Drip systems are good for this too.
- **Soils & Mulch**  
Soils are not all alike. Clay soils can typically take from 1/4 to 1/2" of water per hour before water starts running off and is wasted. Sandy soils require more frequent, shorter watering. You can have your soils tested. Call the Ag Extension Service at MCC for advice (244-3242). Compost or other organic material will also help soils hold moisture and support heartier, more drought-tolerant plants. Try leaves, grass clippings, manure, aged sawdust, wood chips, or humic acid. Mulching is an excellent way to hold moisture, keep the ground from overheating and discourage weeds. You should also loosen the soil by rototilling or spading while you add the organic matter. Looser soil can make a healthier lawn.





## A Checklist of Conservation Ideas for the Home



### Use Water Habits

#### Shaving & Brushing Teeth

If you leave the water running while you shave or brush your teeth, you are wasting a gallon a minute! Stopper the sink and fill the basin half way when you shave, and you use just 1/2 a gallon! Turn off the water while brushing your teeth!

#### Bathing & Showering

Which uses more water, a shower or a tub bath? That depends! A partially filled tub uses less water than a long shower, but a short shower with a low flow showerhead uses much less than a brimful tub! You can compare for yourself. Try plugging the tub while you shower and see how high the water gets. Make a habit of showering quickly or using a partially filled tub. Or try the "navy shower". Turn on the water to get wet, turn it off to soap up, and turn it back on to rinse off. It's a great conservation technique, especially in drought emergencies.



#### House plants & Fish Tanks

If you have a fish tank you probably clean it regularly. Use the dirty water to water your House plants. It saves using the same water twice, and the plants love the water, which is rich in nitrogen and phosphorous!

#### Washing Smart

Some washing machines use 40 or more gallons whether you're washing a full load, or only a few pairs of socks. Use full washloads, especially for older machines. If your machine is adjustable, use the proper setting. You'll save electricity as well as water.

#### Food Prep

If you like to rinse off vegetables and fruits, stopper the sink instead of using running water. And when you're finished, turn on the garbage disposal as you pull the plug, rather than running water just for the disposal.

#### Doing Dishes

Which is more efficient, washing dishes in the sink or in a dishwasher? You can check by testing how much water your full sink basin holds compared with the 9.5 to 12 gallons dishwashers use during a regular cycle. Either way, it is more water efficient to wash full loads. If you do wash dishes by hand, stopper the sink and run the disposal as you pull the plug.



#### Washing the Car

Do you wash your car at home? Use a bucket, or a hose with a trigger nozzle to avoid wasting water. Wet the car thoroughly, and then turn off the hose while you wash the car! Swab the car with soapy water from a bucket. You can use the hose again for a final rinse. Better still, take your car to a car wash. Most of the car washes on Maui are fitted with recirculating water.



#### For a Cold Glass of Water

Keep a pitcher of cool water in the refrigerator. Running the water until it turns cool can waste a gallon for each glass. Letting the water sit in the fridge can also allow any chlorine to dissipate, and improve the taste.

#### Don't Use the Toilet for Trash!!

Some people toss and flush away tissues, cigarettes or bits of trash in the toilet. Use a wastebasket instead. If everyone in the U.S. flushed just once less per day, we could save a sea full of water a mile wide, a mile long and four feet deep, every day!



### Water Saving Devices

#### Showerheads

Replacing your old showerhead with a low flow can save as much as 7.2 gallons per person per day. You can get showerheads and other low flow fixtures from the Maui County Board of Water Supply (270-7199), or the Public Works Department (270-7417).

#### Toilets

Installing A New Water Conserving Toilet can save as much as 17 gallons per person per day. Even a low cost installing a toilet flapper can save more than 5 gallons per person per day.

#### Faucets

Replacing your old faucets with more efficient models can save 4 gallons per person per day. Faucet aerators or spray taps can also help, by mixing air with water. This cuts the flow and reduces splashing, while leaving enough pressure to cut the soap and grease.

#### Washing Machines

A water-efficient washing machine can save up to 20 gallons per load. With the average household washing 6 loads per week, that's a lot of water! In fact, within 2 years, these can save as much water as the average person drinks in a lifetime! And that's not all. Statistics on energy savings potential indicate that highly efficient washing machines save from 35% to 65% on energy used for washing!

### Maintenance

#### Check for Leaks!

Leaking faucets cost you money! Even a slow drip wastes 15 gallons per day. A 1/8" stream can waste 400 gallons per day! Think about it. A single dripping faucet can waste more water in one day than a person needs for drinking for an entire week! Unfortunately, the average non-conserving home loses more than 10% of the water it pays for to leaks! Check for leaks regularly. Try putting 10 drops of food coloring in your toilet tank. Don't flush, just wait 15 minutes. If colored water shows up in the bowl, your tank is leaking. Check your water meter while no water is running in your house. If the meter is registering, you have a leak somewhere.



After toilets, most indoor leaks are caused by worn washers in faucets. Check your faucets twice a year. If any drip after you've turned them off firmly, turn off the supply line, take the faucet apart and replace the washer. And don't forget the faucets on the side of the house.

#### A Clean Sweep

Did you know that 5 minutes of unnecessary hosing will waste 25 gallons of water? Try sweeping sidewalks and driveways. This will get them clean without wasting water.

#### Pipes Break - Be Prepared

Do you know where your master shut-off valve is located? If a pipe breaks in your home, you could experience flooding and property damage as well as huge water waste unless you quickly shut your valve. Locate your valve and mark it for quick easy identification. Learn how to shut it properly, and teach your family to do so as well.

#### Cover Pools and Jacuzzis

They're fun, but they can waste a lot of water! An average sized pool loses about 1,000 gallons of water per month to evaporation. A pool cover can cut these losses by 90%!



**A Checklist of Water Conservation Ideas  
For**



**COOLING TOWERS**

**Understanding Your System ...**

- Prepare an inventory of each cooling tower you have, its cooling capacity, and the equipment or processes that it serves.
- Meter and record the amount of make-up water added to each tower, and the amount of blow-down water discharged from each tower.
- If you purchase chemicals for the treatment of the recirculating cooling tower water, have the chemical vendor explain the purpose and action of each chemical.
- Have your chemical vendor provide a written report of each service call, and be sure that the vendor explains the meaning of each analysis performed, as well as the test results.
- Tell your chemical vendor that water conservation is a priority at your facility. Ask your vendor to tell you about alternative programs that could reduce the amount of water that is bled-off from the towers.

**Water Conservation Opportunities**

- If you are using conventional water treatment, work with your chemical vendor to increase your cycles of concentration, thereby decreasing the amount of water bled off.
- Establish a performance-based specification, and have vendors make proposals for your facility's cooling tower water treatment. Require that vendors commit to a predetermined minimum level of water-efficiency. Have them provide figures showing projected annual water and chemical consumption and costs.
- Consider incorporating sulfuric acid in your treatment program. This could enable you to reduce carbonate scale and achieve significantly higher cycles of concentration. If you use sulfuric acid, be sure to observe the appropriate safety precautions.

DOCUMENT CAPTURED AS RECEIVED

WE HEREBY CERTIFY that the foregoing BILL NO. 6 (1992), Draft 1.

1. Passed FINAL READING at the meeting of the Council of the County of Maui, State of Hawaii, held on the 1st day of May, 1992, by the following votes:

Howard S. KIHUNE Chair	Patrick S. KAWANO Vice-Chair	Vince G. BAGOYO, Jr.	Goro HOKAMA	Alice L. LEE	Ricardo MEDINA	Wayne K. NISHIKI	Joe S. TANAKA	Leinaala TERUYA DRUMMOND
Aye	Aye	Excused	Excused	Aye	Aye	Aye	Aye	Aye

2. Was transmitted to the Mayor of the County of Maui, State of Hawaii, on the 1st day of May, 1992.

DATED AT WAILUKU, MAUI, HAWAII, this 1st day of May, 1992.

*Howard S. Kihune*  
HOWARD S. KIHUNE, CHAIR  
Council of the County of Maui

*Daryl T. Yamamoto*  
DARYL T. YAMAMOTO, COUNTY CLERK  
County of Maui

THE FOREGOING BILL IS HEREBY APPROVED THIS 5<sup>th</sup> DAY OF MAY, 1992.

*Linda Crockett Lingle*  
LINDA CROCKETT LINGLE, MAYOR  
County of Maui

I HEREBY CERTIFY that upon approval of the foregoing BILL by the Mayor of the County of Maui, the said BILL was designated as ORDINANCE NO. 2108 of the County of Maui, State of Hawaii.

*Daryl T. Yamamoto*  
DARYL T. YAMAMOTO, COUNTY CLERK  
County of Maui

Passed First Reading on January 17, 1992.  
Effective date of Ordinance May 5, 1992.

I HEREBY CERTIFY that the foregoing is a true and correct copy of Ordinance No. 2108, the original of which is on file in the Office of the County Clerk, County of Maui, State of Hawaii.

Dated at Wailuku, Hawaii, on

\_\_\_\_\_  
County Clerk, County of Maui

ORDINANCE NO. 2108

BILL NO: 6 (1992)

Draft 1

A BILL FOR AN ORDINANCE AMENDING  
CHAPTER 16.20 OF THE MAUI COUNTY  
CODE, PERTAINING TO THE PLUMBING CODE

BE IT ORDAINED BY THE PEOPLE OF THE COUNTY OF MAUI:

SECTION 1. Title 16 of the Maui County Code is amended by adding a new section to Chapter 10 of the Uniform Plumbing Code to be designated and to read as follows:

\*16.20.675 Section 1050 added. Chapter 10 of the Uniform Plumbing Code is amended by adding a new section, pertaining to low-flow water fixtures and devices, to be designated and to read as follows:

Sec. 1050 Low-flow water fixtures and devices. (a) This section establishes maximum rates of water flow or discharge for plumbing fixtures and devices in order to promote water conservation.

(b) For the plumbing fixtures and devices covered in this section, manufacturers or their local distributors shall provide proof of compliance with the performance requirements established by the American National Standards Institute (ANSI) and such other proof as may be required by the director of public works. There shall be no charge for this registration process.

(c) Effective December 31, 1992, only plumbing fixtures and devices specified in this section shall be offered for sale or installed in the County of Maui, unless otherwise indicated in this section. All plumbing fixtures and devices which were installed before December 31, 1992, shall be allowed to be used, repaired or replaced after December 31, 1992.

(1) Faucets (kitchen): All kitchen and bar sink faucets shall be designed, manufactured, installed or equipped with a flow control device or aerator which will prevent a water flow rate in excess of two and two-tenths gallons per minute at sixty pounds per square inch of water pressure.

(2) Faucets (lavatory): All lavatory faucets shall be designed, manufactured, installed or equipped with a flow control device or aerator which will prevent a water flow rate in excess of two and two tenths gallons per minute at sixty pounds per square inch of water

pressure.

(3) Faucets (public rest rooms): In addition to the lavatory requirements set forth in paragraph (2), lavatory faucets located in rest rooms intended for use by the general public shall be of the metering or self-closing types.

(4) Hose bibbs: Water supply faucets or valves shall be provided with approved flow control devices which limit flow to a maximum three gallons per minute.

EXCEPTIONS: (A) Hose bibbs or valves not used for fixtures or equipment designated by the director of public works.

(B) Hose bibbs, faucets, or valves serving fixed demand, timing, or water level control appliances, and equipment or holding structures such as water closets, pools, automatic washers, and other similar equipment.

(5) Showerheads: Showerheads, except where provided for safety or emergency reasons, shall be designed, manufactured, or installed with a flow limitation device which will prevent a water flow rate in excess of two and one-half gallons per minute at eighty pounds per square inch of water pressure. The flow limitation device must be a permanent and integral part of the showerhead and must not be removable to allow flow rates in excess of two and one-half gallons per minute or must be mechanically retained requiring force in excess of eight pounds to remove.

(6) Urinals: Urinals shall be designed, manufactured, or installed so that the maximum flush will not exceed one gallon of water. Adjustable type flushometer valves may be used provided they are adjusted so the maximum flush will not exceed one and six tenths gallons of water.

(7) Water closets (toilets): Water closets shall be designed, manufactured, or installed so that the maximum flush will not exceed one and six tenths gallons of water.

(d) Beginning December 31, 1992, it is unlawful to sell or install any plumbing fixtures or devices not specified in this section, except as permitted under this section.


(e) The director of public works may exempt the use of low-flow water fixtures and devices if there is a finding that the use of such fixtures and devices would not be consistent with accepted engineering practices and would be detrimental to the public health, safety and welfare.

(f) Any person violating this section shall be fined \$250 for each violation and shall correct all instances of non-compliance for which a citation is issued. Violation of this section shall constitute a violation as defined in section 701-107 Hawaii Revised Statutes and shall be enforceable by employees of the department of public works. The foregoing fine may also be imposed in a civil administrative proceeding pursuant to Rules and Regulations adopted by the department of public works in accordance with chapter 91 Hawaii Revised Statutes."

SECTION 2. New material is underscored. In printing this bill, the County Clerk need not include the underscoring.

SECTION 3. This ordinance shall take effect upon its approval.

APPROVED AS TO FORM  
AND LEGALITY:

  
\_\_\_\_\_  
HOWARD M. FUKUSHIMA  
Deputy Corporation Counsel  
County of Maui  
c:\wp51\ords\flows4\pk



Mayor  
DAVID C. GOODE  
Director  
MILTON M. ARAKAWA, A.I.C.P.  
Deputy Director  
Telephone: (808) 270-7845  
Fax: (808) 270-7955



RALPH NAGAMINE, L.S., P.E.  
Land Use and Codes Administration

Wastewater Reclamation Division

LLOYD P.C.W. LEE, P.E.  
Engineering Division

BRIAN HASHIRO, P.E.  
Highways Division

COUNTY OF MAUI 01 OCT -9 P3 06  
DEPARTMENT OF PUBLIC WORKS  
AND WASTE MANAGEMENT DEPARTMENT OF PLANNING  
200 SOUTH HIGH STREET COUNTY OF MAUI  
WAILUKU, MAUI, HAWAII 96793 RECEIVED

October 8, 2001

MEMO TO: JOHN E. MIN  
PLANNING DIRECTOR

FROM: *for* DAVID GOODE *Milton Arakawa*  
DIRECTOR OF PUBLIC WORKS AND WASTE MANAGEMENT

SUBJECT: DISTRICT BOUNDARY AMENDMENT/CHANGE IN ZONING/SPECIAL  
MANAGEMENT AREA USE PERMIT APPLICATIONS  
MAKENA SINGLE-FAMILY CONDOMINIUM  
TMK: (2) 2-1-007:066  
DBA 2001/0003, CIZ 2001/0011, SM1 2001/0017

We reviewed the subject application and have the following comments:

1. Submit solid waste management plan for construction/demolition waste disposal/recycling and cleared and grubbed material disposal/composting.
2. Developer is not required to pay assessment fees for this area at the current time.
3. Provide a road widening and construction of curb, gutter and sidewalk on their adjoining half of Makena Keoneoio Road.
4. If the driveway is not gated, we would recommend that a stop sign be provided at the exit onto Makena Keoneoio Road; that "Private Road" and "Dead End" signs be provided at the entrance to the driveway off of Makena Keoneoio Road.

Memo to John E. Min, Planning Director  
October 8, 2001  
Page 2

5. Maintenance of landscaping along Makena Keoneoio Road shall be provided such that landscaping shall not be a hazard to pedestrians, bicycles or vehicles.
6. The owners shall be responsible for cleaning of Makena Keoneoio Road and its shoulders of any debris from the landscape plantings.
7. The landscape plantings along Makena Keoneoio Road shall be maintained at a height that does not interfere with sight distances associated with vehicles exiting the driveway.
8. That the servicing of the individual wastewater system be done by a private company as the County may not be able to pump septic tank systems.
9. Construction of improvements shall comply with the provisions of the grading ordinance and the drainage rules.
10. As the project entails construction of more than three (3) dwellings on a single lot, it shall comply with the provisions of the subdivision ordinance.

If you have any questions, please feel free to call Milton Arakawa at Ext. 7845.

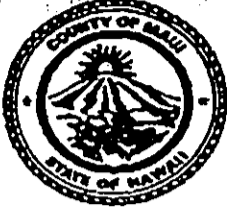
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Oct-22-01 01:06pm

From-DEPT OF PLANNING COUNTY OF MAUI

808-242819

T-795 P.01/04 F-813



**DEPARTMENT OF  
PARKS AND RECREATION  
COUNTY OF MAUI**

1580-C KAAHUMANU AVENUE WAILUKU, HAWAII 96793

-Mayor

FLOYD S. MIYAZONO  
Director

ELIZABETH D. MENOR  
Deputy Director

(808) 270-7230  
FAX (808) 270-7934

**MEMORANDUM**

October 16, 2001

DEPT OF PLANNING  
COUNTY OF MAUI  
RECEIVED

01 OCT 17 P2:52

**TO:** John E. Min, Planning Director

**FROM:** *Floyd S. Miyazono*  
Floyd S. Miyazono, Director

**SUBJECT:** Four Unit Single Family Condominium at Makena, Maui  
TMK: (2) 2-1-07:66  
District Boundary Amendment Application  
Change in Zoning Application  
Special Management Area Use Permit Application

Thank you for the opportunity to review and comment on the above subject actions for the proposed Four Unit Single Family Condominium at Makena, Maui.

At this time we have no comment to offer on this matter. Should you have any questions or need of further information in this regard, please call me or Patrick Matsui, Chief of Parks Planning & Development at extension 7387.

c: Patrick Matsui, Chief of Parks Planning & Development

JAMES "KIMO" APANA  
Mayor

JOHN E. MIN  
Director

CLAYTON I. YOSHIDA  
Deputy Director



COUNTY OF MAUI  
DEPARTMENT OF PLANNING

October 26, 2001

OCT 30 2001

Mr. Michael Munekiyo, AICP  
Munekiyo & Hiraga, Inc.  
305 S. High Street, Suite 104  
Wailuku, Hawaii 96793

Dear Mr. Munekiyo:

RE: Special Management Area Use Permit Application for the Proposed Four Unit Single Family Condominium Project and Related Improvements at TMK: 2-1-007:066, Makena, Maui, Hawaii (SM1 2001/0011)

Please be advised that the above-referenced project has been scheduled for review with the Maui Urban Design Review Board (Board) at its November 6, 2001, Meeting at 9:00 a.m., in the Council Committee Room, Seventh Floor, Kalana O Maui Building, 200 South High Street, Wailuku, Maui, Hawaii. You or your authorized representative should be present at the scheduled meeting.

To facilitate the Board's review of your project, you are advised to make available at the meeting, presentation materials such as renderings of the project including site plan and all elevations, color and material samples, graphics, landscaping (including plant materials and sizes) and irrigation plans, lighting plans, exterior mechanical and ventilation systems, etc. Enclosed for your use is the recommended checklist of the Maui Urban Design Review Board.

Thank you for your cooperation. If additional clarification is required, please contact Ms. Colleen Suyama, Staff Planner, of this office at 270-7735.

Very truly yours,

A handwritten signature in cursive script, appearing to read "Colleen Suyama".

COLLEEN SUYAMA, Staff Planner  
For JOHN E. MIN  
Planning Director

250 SOUTH HIGH STREET, WAILUKU, MAUI, HAWAII 96793  
PLANNING DIVISION (808) 270-7735; ZONING DIVISION (808) 270-7253; FACSIMILE (808) 270-7634

*Quality Seamless Service - Now and for the Future*

Mr. Michael Munekiyo, AICP  
October 26, 2001  
Page 2

JEM:CMS:smb  
Enclosure

cc: Clayton Yoshida, AICP, Deputy Planning Director  
Pacific Rim Land, Inc.  
Colleen Suyama, Staff Planner  
Project File  
General File  
(K:\WP\_DOCS\PLANNING\DBA\01dba03Makena4unitSF\UDRBNOT.wpd)

(Revised March 8, 2000)  
**MAUI COUNTY URBAN DESIGN REVIEW BOARD (UDRB)  
CHECKLIST**

**MINIMUM SUBMITTAL FOR UDRB PROJECT REVIEW:**

*The following items are recommended, as a minimum, to be submitted by the applicant to facilitate the review of the projects:*

- Written narrative description of the proposed improvements including the project parcel description as well as the neighboring properties land use designations and existing uses.
- Photographs or a VHS format video of the project site and surrounding buildings and properties.
- Colored conceptual architectural site plan to include, siting of structures, parking layout, access and circulation, landscaping (identification of plant types, general plant sizes, existing landscaping, and identification of landscaping to be retained or relocated), automated irrigation and drainage. Note: the property boundary and street right-of-way should be identified on the basic site plan. For clarity, more than one site plan may be appropriate.
- Colored conceptual drawings of all elevations of the structures within the project site.
- Samples of exterior materials and color chips.
- Conceptual lighting, mechanical (i.e. exterior vents/exhausts, air conditioning equipment, pool equipment, etc.), signage, and graphic plans.
- Location of miscellaneous structures such as trash enclosures, walls/fences, garages and carports, trellises, bicycle racks, propane storage gas tanks, loading areas, etc.
- Voluntary input from the community such as Community Associations, design committees, etc. (For information only)
- Other materials as may be requested.

**SMA Permit or Project Review: (Recommendation to the Planning Commission or Department)**

**Concerns that should be addressed through the presentation to the UDRB or discussion**

**Siting:**

- Site Plan identifies all structures of the project (buildings, recreational structures, walls, fences, trellises, etc.)
- Protection of significant onsite features (historic structures, cultural remains, topographic features, views, etc.)
- Pedestrian and vehicular circulation patterns to and within the site including the parking layout
- Relationship of Conceptual Drainage (subsurface drains, catch basins, culverts, inlets and outlets, retention/detention basins, etc.) to the project
- Grading of site (cuts and fills)

**Architecture: Relationship of project to the property and surrounding neighborhood**

- Building scale and massing
- Roof design, fenestration, ornamentation
- Building color, texture, materials and shadows
- Exterior lighting on buildings and site
- Relationship to special design districts (Both within a district or adjacent to a district)
- Comprehensive signage program
- Miscellaneous structures such as pools, storage, garages, trash enclosures, walls and fences, etc.

**Landscape Plans:**

- Landscaping within parking areas in conformance with standards of Chapter 19.36 Offstreet Parking, Maui County Code, 1980 as amended
- Identification of any significant historical or exceptional trees on site or adjacent properties
- Protection of existing landscaping on site particularly mature trees
- Landscaping appropriate to the area
- Use of native Hawaiian plants and xeriscaping plants within the project
- Use of landscape as an amenity to the project to provide visual relief to the structures (height, massing, siting, etc.) and to mitigate impacts the project may have such as a means of noise attenuation and screening.
- Irrigation plans appropriate

**Visual Impacts: The visual impacts of the proposed siting of the structures**

- Visual Relationship to the public street scape and surrounding properties.
- View corridors

(Revised March 8, 2000)

**MINIMUM SUBMITTAL FOR UDRB SIGN REVIEW:**

***The following items are recommended, as a minimum, to be submitted by the applicant to facilitate the review of the sign:***

- Colored photographs or a VHS format video of the project site and surrounding buildings and properties. Note: Should show existing signs on the property and in the vicinity.
- Detailed colored sign design to scale showing dimensioned elevation and section identifying lettering style, graphics, supporting structure, method of illumination (if any), and building or structure on which it is mounted or is adjacent to.
- Scaled plot plan showing the location on the property of the proposed sign or signs and other existing signs to remain or be removed in relationship to the property boundaries, street and buildings. Distance between proposed sign and property lines and/or right-of-way should be shown and identified.
- General location map of the property in relationship to the surrounding neighborhood.
- Samples of sign materials and/or color chips.
- If not the property owner, authorization letters from property owner or management agency for the proposed sign.
- Comprehensive Signage Plan approved for the property. *Note: Many shopping centers or multiple tenanted projects have approved comprehensive signage plans which tenants must comply with.*
- Other information which may be requested.

**SIGN PERMIT REVIEW: (UDRB advisory to the Planning Director for approval or denial)  
Concerns that should be addressed through the presentation to the UDRB or discussion**

- Sign is consistent to the standards of the sign ordinance
- Size, shape, lettering style, graphics, and materials of sign
- Percentage of building frontage covered by sign
- Existing and proposed signs on building or onsite
- Location of sign to the street or property boundaries
- Height of sign above grade, street right of way, or building
- Illumination of sign and measures to control the intensity or brightness.
- Consistent to comprehensive signage program for property or compatible with other signs in the area
- Voluntary approvals from design committees or review boards. (For information only)



OCT 08 2001



01 OCT -5 P3:05

DEPT OF PLANNING  
COUNTY OF MAUI  
RECEIVED

October 3, 2001

Mr. John E. Min  
Planning Director  
Maui Planning Department  
250 S. High Street  
Wailuku, HI 96793

Dear Mr. Min:

Subject: Makena Single Family Condominium  
TMK: 2-1-007:066  
I.D.: DBA 2001/0003, CIZ 2001/0011, SM1 2001/0017

Thank you for allowing us to comment on the subject project.

In reviewing the information transmitted and our records, we have no objection to the subject project. We encourage the developer's electrical consultant to meet with us as soon as practical to verify the project's electrical requirements so that service can be provided on a timely basis.

If you have any questions or concerns, please call Dan Takahata at 871-2385.

Sincerely,

Neal Shinyama  
Manager, Energy Delivery