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

BRIAN HASHIRO, P.E.
Highways Division

Solid Waste Division

October 24, 2001

Ms. Genevieve Salmonson, Director
Office of Environmental Quality Control
Department of Health
235 S. Beretania Street, #702
Honolulu, Hawaii 96813

Dear Ms. Salmonson:

SUBJECT: FINAL ENVIRONMENTAL ASSESSMENT (EA)
FOR PROPOSED MAKENA ALANUI
IMPROVEMENTS, PHASE 2
MAKENA, MAUI, HAWAII

In accordance with the provisions of the Chapter 343, Hawaii Revised Statutes and Title 11, Chapter 200 of the Administrative Rules of the State Department of Health, a Final Environmental Assessment (EA) has been prepared for the proposed project.

As the approving agency, the County of Maui, Department of Public Works and Waste Management has determined that there will be no significant impacts as a result of the proposed action and is filing a Finding of No Significant Impact (FONSI).

Enclosed are one (1) copy of the OEQC Publication form and four (4) copies of the Final EA. In addition, please be advised that the Project Summary will be e-mailed to the OEQC by the applicant's consultant. We respectfully request that the notice of the availability of the Final EA be published in the November 8, 2001 edition of the Environmental Notice.

Thank you for your cooperation. If additional clarification is required, please contact me at 270-7845.

Very truly yours,

for DAVID C. GOODE
Director of Public Works
and Waste Management

DCG:to
Enclosures
cc: Lloyd Lee, Engineering Division
Roy Figueiroa, Makena Resort Corp.
Dean Frampton, Munekiyo & Hiraga, Inc.
makenart/alanui/oeqcltr.fea

2001-11-08-MA-FEA-

Final Environmental Assessment

MAKENA ALANUI IMPROVEMENTS

Prepared for:

Makena Resort Corp.

October 2001

MUNEKIYO & HIRAGA, INC.

Final
Environmental Assessment

MAKENA ALANUI IMPROVEMENTS

Prepared for:

Makena Resort Corp.

October 2001

MUNEKIYO & HIRAGA, INC.

CONTENTS

LIST OF FIGURES

Preface

The applicant, Makena Resort Corp., proposes the widening of Makena Alanui Road between the Maui Prince Hotel and Makena-Keoneoio Road. The proposed action will bring this segment of Makena Alanui up to County standards.

Since the proposed action involves the use of County lands (roadway right-of-way), an Environmental Assessment (EA) has been prepared as required by Chapter 343, Hawaii Revised Statutes, to document the proposed action's technical characteristics, environmental impacts and alternatives, and advances findings and conclusions relative to the significance of the project.

Chapter I

Project Overview

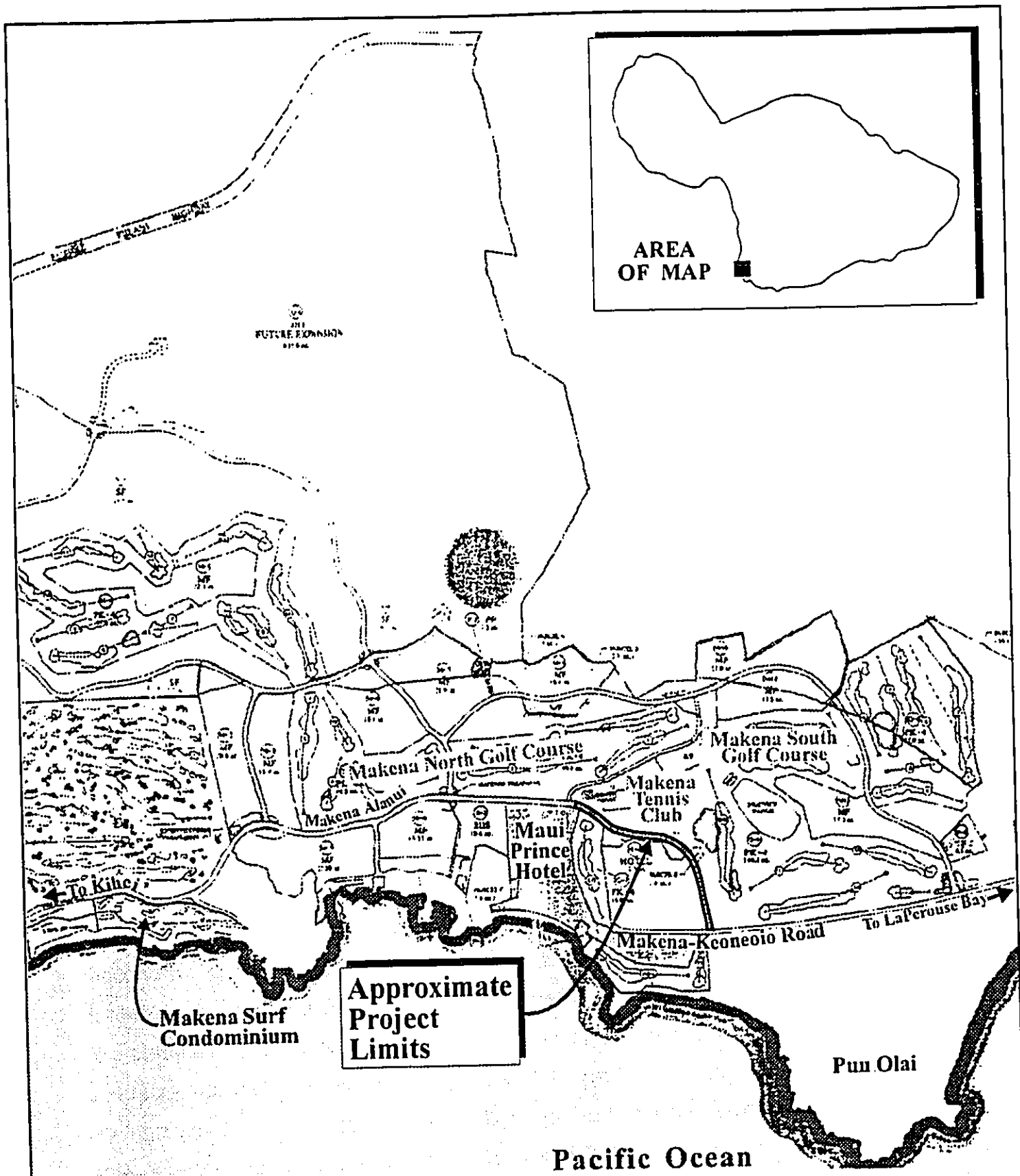
I. PROJECT OVERVIEW

A. PROPERTY LOCATION, EXISTING USE AND LAND OWNERSHIP

The applicant, Makena Resort Corp., proposes to implement additional road widening improvements to Makena Alanui Road. The segment of Makena Alanui to be improved extends from approximately the southern property line of the Maui Prince Hotel to a point just before Makena Alanui's intersection with Makena-Keoneoio Road. See Figure 1. This roadway segment traverses the Makena Resort in the vicinity of Makena Tennis Club entry drive. To the immediate north, Makena Alanui has been improved to County standards. The proposed action will connect to the improved segment of Makena Alanui. The proposed improvements are part of the Makena Resort's ongoing program to upgrade infrastructure systems to facilitate implementation of its Master Plan.

B. PROPOSED ACTION

The subject roadway segment is a two-lane, two-way paved County roadway. There are no curbs, gutters, or sidewalks along this portion of Makena Alanui. Proposed improvements call for pavement widening from 24 feet to 44 feet and the provision of a 6-foot wide sidewalk along the makai or west side of the roadway section. See Figure 2. Additionally, installation of a bike lane, street lighting, fire hydrants, roadway drainage improvements and landscaping are proposed. The proposed improvements will be implemented in the context of the existing 60-foot County right-of-way. Right-of-way acquisition for the improvements will not be required. It is noted, however, that drainage culvert outlets at two (2) roadway culvert crossings will extend makai of the roadway right-of-way into TMK 2-1-05:83 and 85, which are owned by Makena Aina Corporation. The first drainage outlet is located approximately 500 feet south of the project's north terminus. A 24-inch culvert outlet is proposed to be installed adjacent to and immediately makai of the right-of-way.



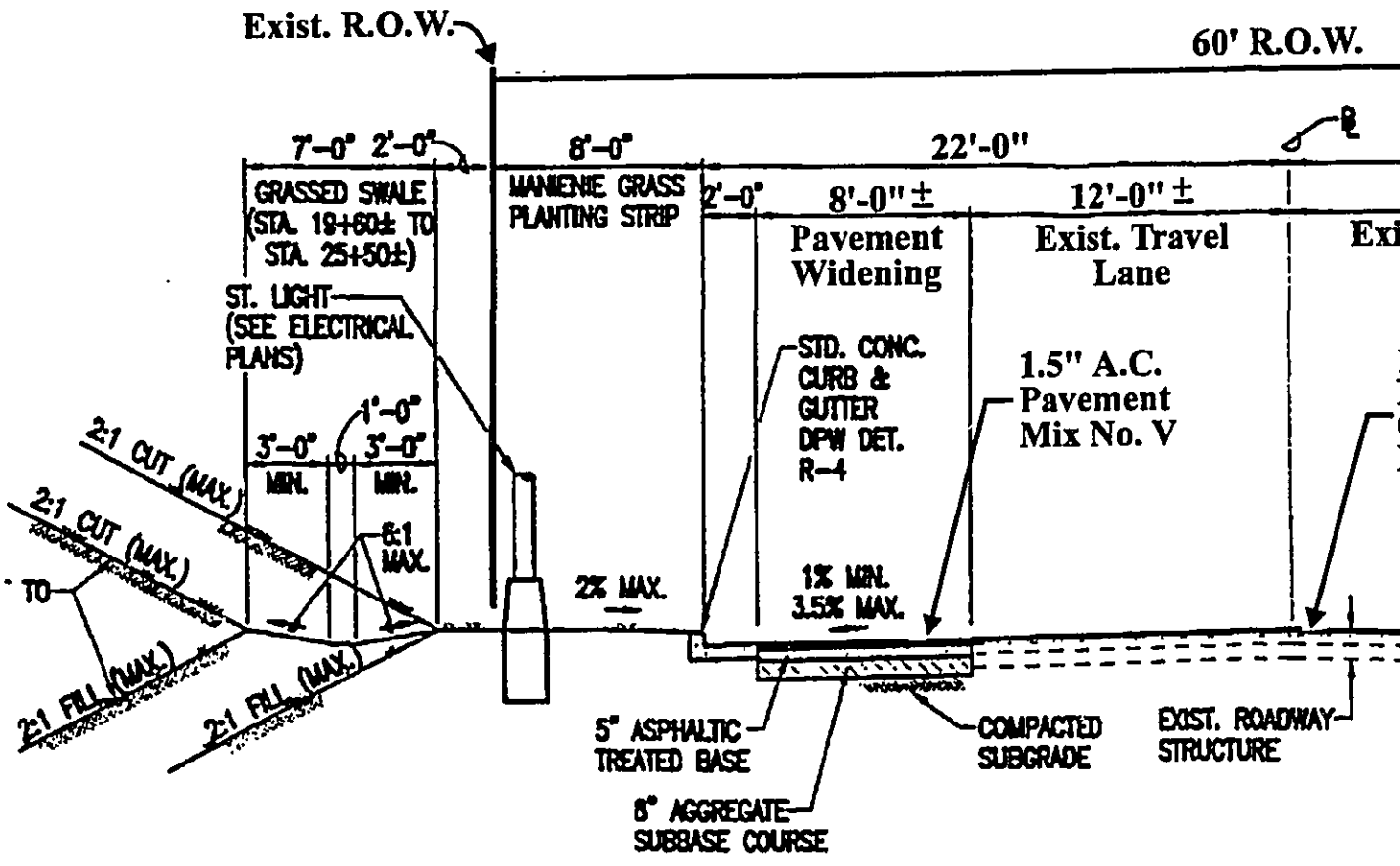
Map Source: PBR Hawaii, Inc.

Figure 1 Makena Alanui Improvements NOT TO SCALE

Site Location Map

MUNEKIYO & HIRAGA, INC.

Prepared for: Makena Resort Corp.

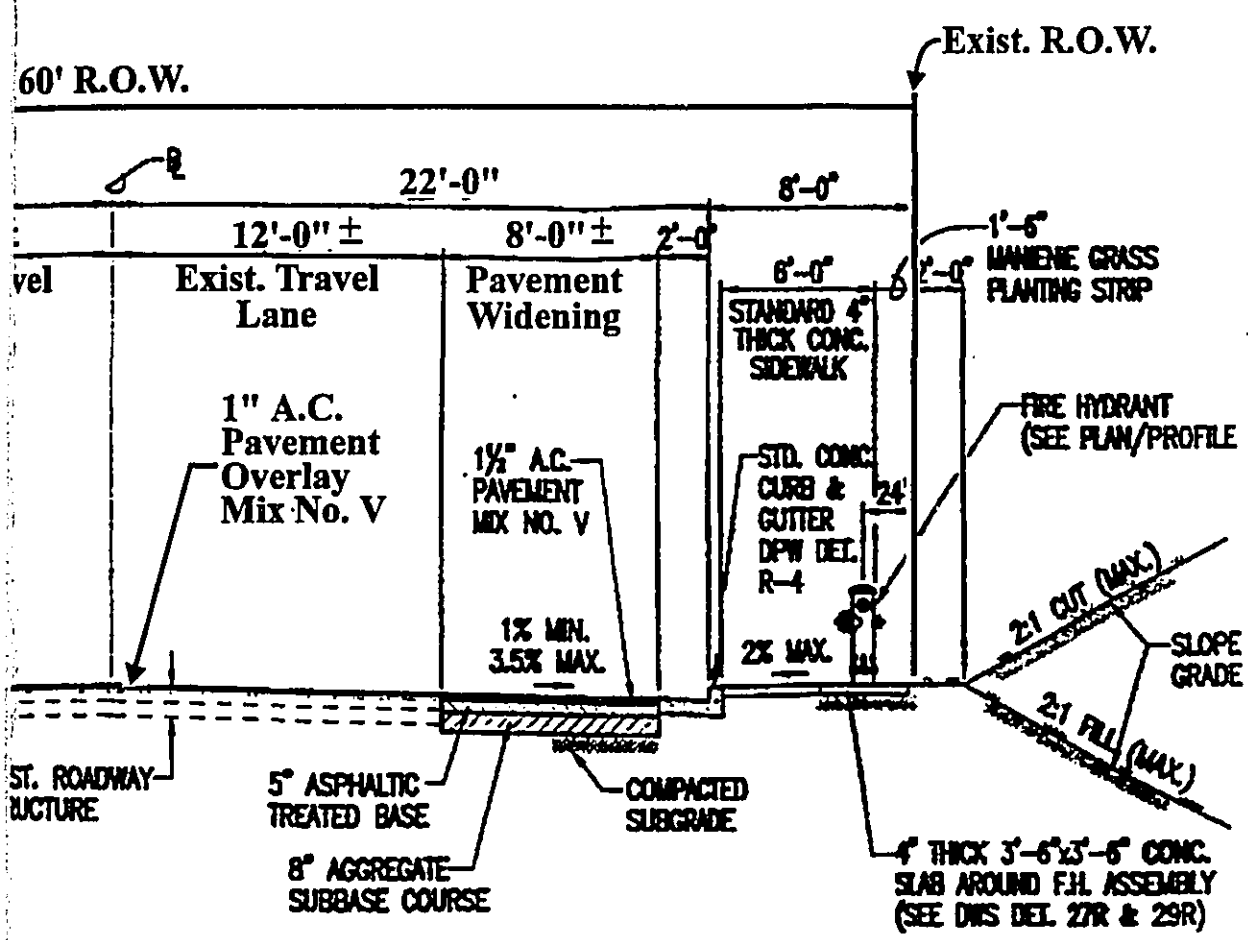


Source: Sato & Associates, Inc.

Figure 2

Makena Alanui Improv
Typical Road Sectio

Prepared for: Makena Resort Corp.



i Improvements

ɔad Section

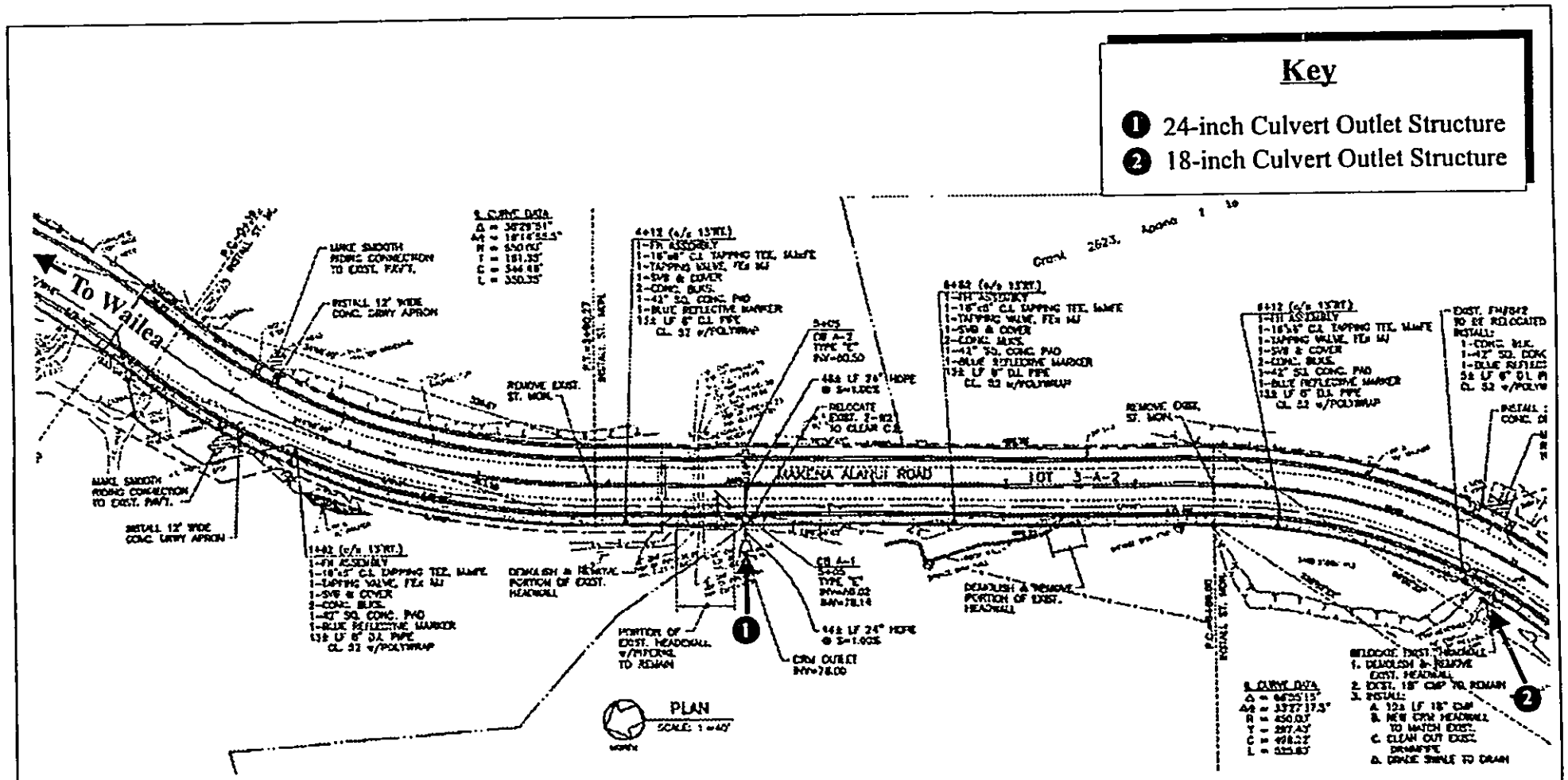
NOT TO SCALE

MUNEKIYO & HIRAGA, INC.

Portions of this outlet structure will fall within TMK 2-1-05:85. See Figure 3. The second drainage outlet is located approximately 1,100 feet south of the project's north terminus. This outlet structure (serving an existing 18-inch culvert) will be extended to accommodate the roadway widening and will fall within TMK 2-1-05:83. Refer to Figure 3.

The proposed improvements are estimated to cost approximately $1.1 million; construction of the improvements is anticipated to take about ten (10) months. The proposed action will be implemented in a single phase, with construction expected to commence upon the receipt of all applicable regulatory permits and approvals.

Since the proposed action involves the use of County lands (roadway right-of-way), an Environmental Assessment (EA) has been prepared as required by Chapter 343, Hawaii Revised Statutes.



Source: Sato & Associates, Inc.

Figure 3

Makena Alanui Improvements
Culvert Outlets Makai of Right-of-Way

NOT TO SCALE

MUNEKIYO & HIRAGA, INC.

Prepared for: Makena Resort Corp.

Chapter II

Description of the Existing Environment

II. DESCRIPTION OF THE EXISTING ENVIRONMENT

A. PHYSICAL ENVIRONMENT

1. Surrounding Land Use

Makena Alanui is the primary north-south roadway which connects the Wailea Resort to the Makena Resort and points south. Existing land uses within the Makena Resort include hotel, recreational and golf course functions. The Maui Prince Hotel is currently the only hotel in the resort. Recreational land uses include the Makena Resort's two (2) 18-hole championship golf courses and six (6) tennis courts. In a broader regional context, the Makena Resort is bordered to the north by the Wailea Resort. The Wailea Resort includes a number of high quality resorts, residential projects, recreational areas and shopping facilities provided by the recently completed Shops at Wailea project.

The proposed road widening project extends along a segment of Makena Alanui which is generally undeveloped. The entry drive to the Maui Prince Hotel is located approximately 0.2 mile to the north, while the driveway to the Makena Golf Course maintenance facilities connects to the proposed improvement area.

2. Climate

Hawaii's tropical location accounts for uniform weather conditions throughout the year. Climatic conditions on Maui are characterized by mild and consistent year-round temperatures, moderate humidity, and steady northeasterly tradewinds. Variations in the island's weather are attributable to regional topographical and climatic conditions.

During the summer months, average high temperatures approach 90 degrees Fahrenheit, while low temperatures range from the mid- to upper 60's. The winter months are more temperate, with average highs and lows in the low 80's, and low 60's, respectively.

Annual rainfall distribution in the vicinity of the project site ranges between five (5) to fifteen (15) inches, with most of the precipitation occurring during the winter months between November and March. The months between April and October are generally drier, with measurements reflecting less than one-half inch of rainfall per month.

The northeast tradewinds prevail throughout most of the year. Wind speeds in the Kihei-Makena region range from ten (10) to fifteen (15) miles per hour during the afternoon. The winds typically diminish during the morning and evening, and are usually more persistent during summer than in winter. Between the months of October and April, storm-generated "Kona" winds from the south occasionally develop, bringing high winds and heavy rainfall.

3. ***Topography and Soil Characteristics***

With the exception of two (2) culvert outlets, the proposed action will be limited to the Makena Alanui right-of-way. Current grades along this segment of roadway range between 1% and 5%. The high point of the road profile along this segment stands at an approximate elevation of 99 feet, at the north end of the project limits. The low point of the road profile along this segment stands at elevation of approximately 63 feet, near the intersection of Makena Alanui and Makena-Keoneoio Road.

Underlying the subject property is the Keawekapu-Makena soil association. See Figure 4. This series is typically found on the low uplands, and consists of gently sloping to moderately steep, well-drained, medium-textured soils. The substratum ranges in depth from shallow to deep and is comprised of fragmental Aa lava.

The soil type underlying the subject property consists of Makena loam, stony complex, 3 to 15 percent slopes (MXC). See Figure 5. The Makena loam, stony complex (MXC) soil series is typically found on the lower leeward slopes of Haleakala, between Makena and Kamaole. This series consists of Makena loam and Stony land.

4. ***Flood and Tsunami Hazard***

As reflected by the Flood Insurance Rate Map, the subject property is situated within Zone C, which is defined as areas of minimal flooding. See Figure 6.

5. ***Streams and Wetlands***

The proposed improvements are located in a region dominated by numerous gullies and gulches which accommodate storm runoff. The roadway section proposed for improvement does not traverse major gulches or drainageways. Additionally, there are no streams or wetlands in proximity to the proposed project site.

6. ***Flora and Fauna***

Vegetation associated with the Makena region varies between developed and undeveloped properties. Developed areas of Makena include two (2) golf courses, six (6) tennis courts and the Maui Prince Hotel. Monkeypod, palm, wili wili, hibiscus and lauhala

LEGEND

① Pulehu-Ewa-Jaucas association

② Waiakoa-Keahua-Molokai association

③ Honolua-Olelo association

④ Rock land-Rough mountainous land association

⑤ Puu Pa-Kula-Pane association

⑥ Hydrandepts-Tropaquods association

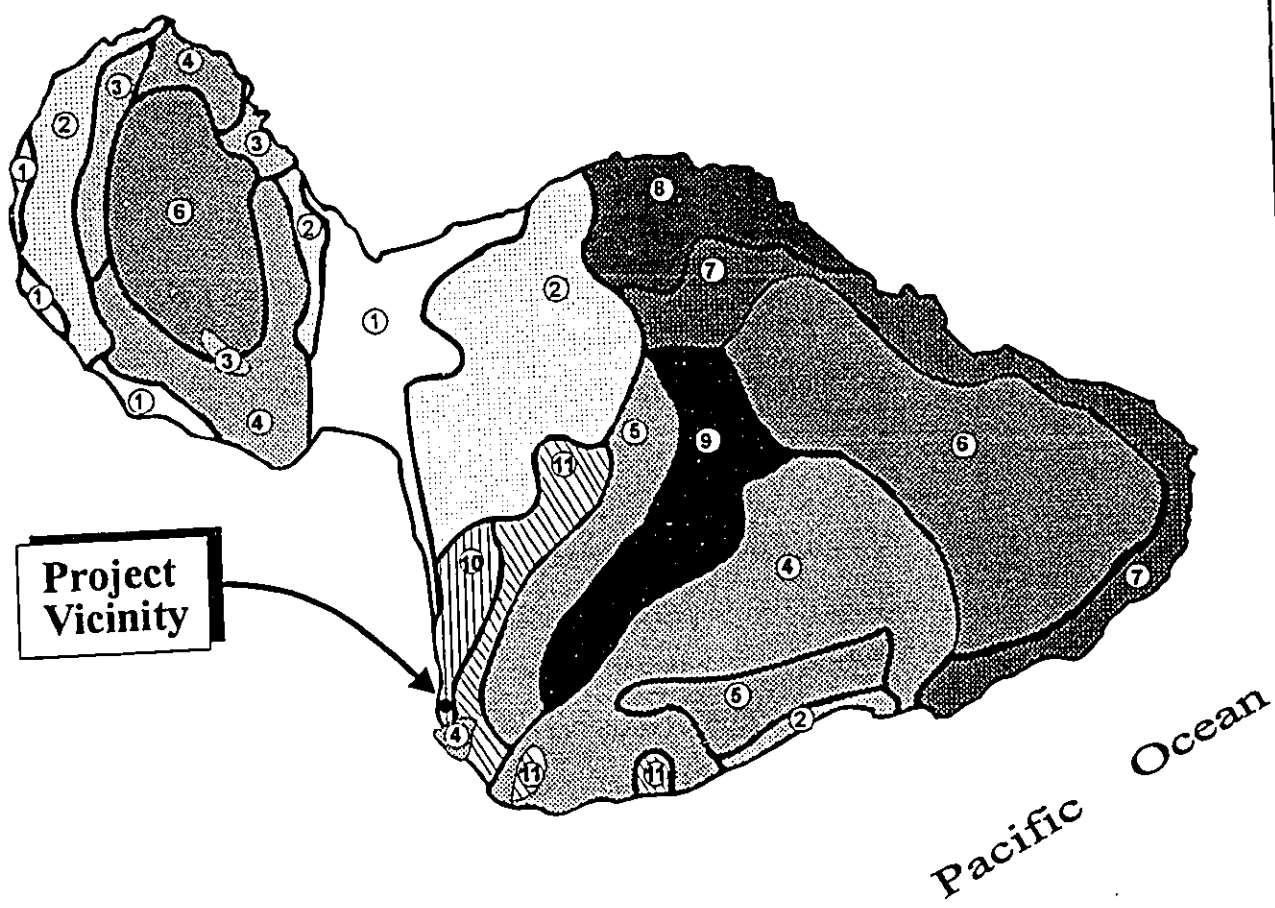
⑦ Hana-Makaalae-Kailua association

⑧ Pauwela-Haiku association

⑨ Laumaia-Kaipoipoi-Olinda association

⑩ Keawakapu-Makena association

⑪ Kamaole-Oanapuka association



Source: USDA, Soil Conservation Service

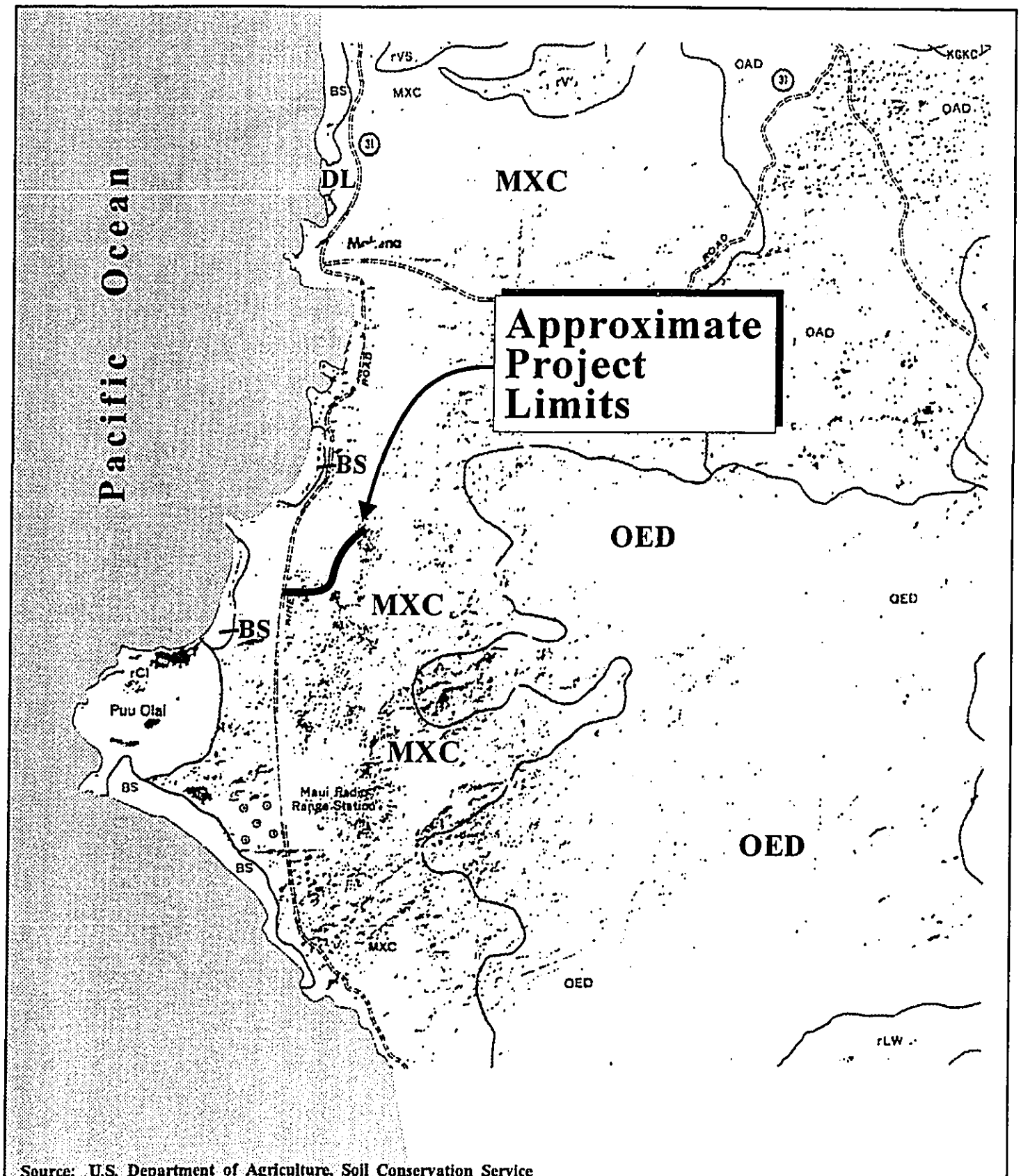
NOT TO SCALE

Figure 4

Makena Alanui Improvements
Soil Association Map

MUNEKIYO & HIRAGA, INC.

Prepared for: Makena Resort Corp.



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

Figure 5 Makena Alanui Improvements
Soil Classifications

0 1000 Feet
500 2000

Prepared for: Makena Resort Corp.

MUNEKIYO & HIRAGA, INC.

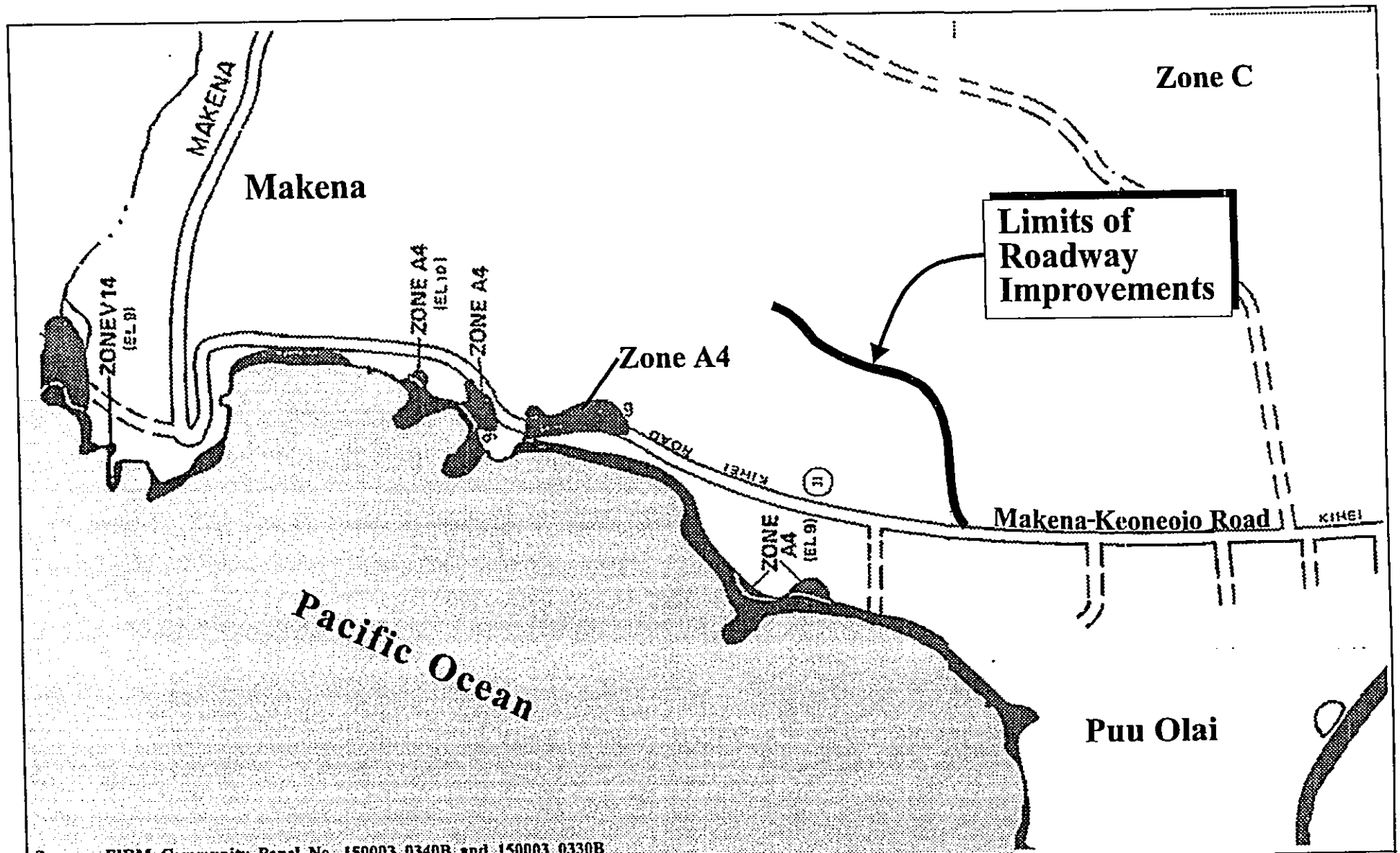


Figure 6

Makena Alanui Improvements
Flood Insurance Rate Map

Prepared for: Makena Resort Corp.

are examples of trees and shrubs which enhance Makena's landscape. In areas of undeveloped parcels, however, thickets of kiawe trees, haole-koa, cactus, buffel grass and swollen fingergrass represent the predominant vegetation. Four (4) species of endemic plants which are not endangered are found in the general vicinity: ilima hialoa (*Waltheria americana*), prickly poppy (*Argemone glauca*), and wili wili (*Erythrina sandwicensis*) (R.M. Towill Corp., October 1997).

The roadside areas to be used for the proposed improvements have been periodically mowed and maintained. Accordingly introduced species of weeds and grasses are found along the proposed roadway alignment.

Cats, mongoose, rats, axis deer and wild boar are among the feral animals that are commonly found in the area. Avifauna in the vicinity of the project are generally typical of the Kihei-Makena region. Species of birds common to the area are the Mynahs, Golden Plovers, Japanese White-eye, Northern Cardinals, Sparrows, Spotted Doves, and Zebra Doves.

The Hawaiian black necked stilt (Ae'o) has been sighted occasionally at water features within the golf courses. The Ae'o is considered endemic and endangered. Collectively, open bodies of water such as water hazards at golf courses and irrigation ponds (punawai) on the island are used as a limited loafing and feeding habitat for the Ae'o.

The American golden plover (kolea) and the black crowned night heron ('auku'u) have also been sighted at the golf courses. The

kolea and 'auku'u are considered indigenous but not endangered. Kolea are generally found on mudflats, lawns and fields. The 'auku'u frequents water features such as ponds, streams, marshes, and lagoons.

7. *Air Quality*

There are no point sources of airborne emissions in the immediate vicinity of the subject property. The air quality in the Makena region is considered good, with existing airborne pollutants attributed to vehicle-generated exhaust from the region's roadways. Other sources of airborne pollutants typically include dust resulting from construction activities, and residual smoke from sugarcane harvesting operations occurring in the Central Maui plain. These sources are considered intermittent, and the generated particulates are quickly dispersed by the prevailing tradewinds.

8. *Noise Characteristics*

There are no permanent sources of noise which are considered to have an adverse impact on the proposed action. With the exception of temporary construction activities, vehicles traveling along Wailea Alanui, Makena Alanui, and Makena-Keoneoio Road are the primary source of background noise in the area.

9. *Scenic and Open Space Resources*

Scenic resources to the east of the project site include Haleakala, while the Puu Olai cinder cone lies to the south.

The subject property is not located within a scenic view corridor.

10. *Archaeological Resources*

The proposed action involves improvements to the existing County right-of-way. The right-of-way has been previously cleared and graded to provide for the existing roadway travelway as well as existing unpaved shoulder areas. There are no surface archaeological features along the project segment.

B. *SOCIO-ECONOMIC ENVIRONMENT*

1. *Land Use and Community Character*

From a regional standpoint, the subject property is part of the Kihei-Makena Community Plan region which stretches from Maalaea to La Perouse Bay. The region includes a diverse range of physical and socio-economic environments. With its dry and mild climate and proximity to recreation-oriented shoreline resources, the visitor-based economy has grown steadily over the past few years. The town of Kihei serves as the commercial and residential center of the region with the master-planned communities of Wailea and Makena serving as the focal point for visitor activities. The project site is within the master-planned Makena Resort.

The Makena Resort's Master Plan has been updated and is reflected in the current Kihei-Makena Community Plan. Land uses planned for the resort include hotel, single-family and multi-family residential, park and golf course, and business/commercial uses.

2. *Population*

The population of the island of Maui has exhibited relatively strong growth over the past decade, with the Year 2000 population

reflecting a count of 117,644, a 28.8 percent increase over the 1990 population of 91,361 (DBEDT).

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. According to Census data results, the year 2000 resident population of the Kihei-Makena region was 16,749. Compared to 1990, these estimates reflect increases of 50.8 percent (DBEDT).

3. *Economy*

The economy of Maui is heavily dependent upon the visitor industry. In 1996, Maui was frequented by 2.3 million visitors (Maui County Data Book 1998). The dependency on the visitor industry is especially evident in Kihei-Makena, which is one of the State's major Resort destination areas. The Maui Prince Hotel, as well as the Four Seasons Resort-Maui, the Grand Wailea Resort Hotel & Spa, and the Kea Lani Hotel in Wailea have continued to reinforce the region's status as a premier resort destination.

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 20 miles northeast of Makena, while the Department's Kihei substation is located in the Kihei Town Center, about four (4) miles north of the project site. The Department's Kihei patrol covers the Kihei-Makena region.

Fire prevention, protection, and suppression services are provided by the Maui Fire Department's (MFD) Kihei Station situated approximately four (4) miles north of the project site.

2. ***Medical Facilities***

Maui Memorial Medical Center, the only major medical facility on the island, is approximately 20 miles northeast of the project site. The medical center, operated by the Hawaii Health Systems Corporation, 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***

Makena Alanui is located within a master-planned resort area. Recreational opportunities in the Kihei-Makena community are abundant and diverse. In the Makena area, there are two (2) championship golf courses, a tennis center, and open space for jogging and walking. Shoreline resources in the vicinity include Makena State Park's Oneloa Beach, the Ahihi-Kinau Natural Area Reserve and LaPerouse Bay. To the north of the project area, there are numerous beaches and parks, golf courses, and other recreational opportunities available.

In addition, Makena Resort Corp. has developed for public use, comfort stations and public parking at Makena Landing, across Keawalai Church and near the southern portion of the Makena-Keoneoio pedestrian walkway.

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 700, 700 and 800 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, approximately 20 miles north of the project site.

5. Solid Waste

Single-family residential solid waste collection service is provided by the County of Maui on a once-a-week basis. 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-collected refuse, the Central Maui Landfill accepts commercial waste from private collection companies.

D. INFRASTRUCTURE

1. Roadways

Access to the Kihei-Makena region is provided by 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. Wailea Alanui is a four-lane divided road 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 joins with Makena Alanui and the Makena-Keoneoio Road.

Makena Alanui is a two-way, two-lane road, within a 60-foot right-of-way linking Wailea Alanui extending past the Makena Resort to an area south of Paako Point. Makena Alanui has been improved to County standards from a point approximately 1,800 feet north of the Makena Alanui-Honoiki Street intersection to the southern boundary of the Makena Prince Hotel.

2. ***Water***

The Kihei-Makena region is served by the County of Maui, Department of Water Supply's domestic water system. This system consists of a network of transmission and distribution lines and reservoirs. Waterline sizes range between eight (8) inches and twenty (20) inches. A 1.5 million gallon water tank is located at approximately 265 feet above sea level. Built by Makena Resort Corp. and turned over to the Department of Water Supply, the water tank serves the Makena area. There is an 16-inch County waterline within the right-of-way along the roadway segment proposed for project improvements.

3. ***Wastewater***

The developed portions of the Makena Resort are presently serviced by a private treatment plant located at the southwest corner of the Maui Prince Hotel site. The design capacity of the plant is 127,000 gallons per day. Daily flows to the plant range from 30,000 to 107,000 gallons per day.

A new private wastewater reclamation facility has been constructed mauka of the Makena Golf Course and should be in operation by January 2002. The initial plant increment is proposed to accommodate an average daily flow of 700,000 gallons per day. Wastewater is proposed to be processed and reused for golf course irrigation purposes. Upon completion of the new facility, use of the existing treatment plant will be phased out.

There are no sewerlines within Makena Alanui, within the segment proposed for improvement.

4. ***Drainage***

There are no roadway drainage improvements along Makena Alanui, within the proposed limits of new work. Runoff currently sheetflows along the shoulder areas until finding its way to drainage gullies which convey flows downstream to the ocean. It is noted that within the limits of the proposed roadway segment intended for improvement, there are two (2) existing culvert crossings. The first consists of three (3) 18-inch CMP pipes located approximately 500 feet from the project's northern terminus. The second crossing occurs near the golf course maintenance facility access driveway and consists of a single 18-inch pipe.

5. ***Electrical and Telephone Systems***

Electrical and telephone services to the Makena region are provided by Maui Electric Company and Verizon Hawaii, respectively.

Chapter III

Potential Impacts and Mitigation Measures

III. POTENTIAL IMPACTS AND MITIGATION MEASURES

A. IMPACTS TO THE PHYSICAL ENVIRONMENT

1. Surrounding Uses

The proposed roadway improvement is an infrastructure upgrade element being implemented in connection with the Makena Resort Master Plan. With the exception of two (2) culvert outlets, construction activity will be contained within the existing 60-foot right-of-way. There are no adverse impacts to surrounding uses anticipated as a result of the proposed improvements.

2. Flora and Fauna

The existing right-of-way or abutting areas are not known to contain sensitive habitat areas. In this regard, the proposed action is not considered to have an adverse impact upon these environmental features.

3. Archaeological Features

The existing right-of-way does not contain surface archaeological features.

In comments dated May 10, 2001, the State Historic Preservation Division recommends that an archaeological monitor be present during ground-altering activities. Monitoring will be conducted in accordance with a monitoring plan already approved by the State Historic Preservation Division. (See Chapter X of this EA document for State Historic Preservation Division Letter dated May 10, 2001.)

4. *Cultural Impact Considerations*

The Makena region is historically known for its traditional subsistence economy dependent on ocean resources and dryland cultivation (Garcia and Associates). Accordingly, the region shows historic patterns of discontinuous areas of cultivation with permanent and temporary habitation. The abundance of terraces, low retaining walls and mounds and informal irrigation features are evidence of past cultivation activities.

Garcia notes that the agricultural mainstays of the Makena region in the mid-1800's included sugar cane and Irish potatoes. Cultivation declined during the late 1800's, with cattle ranching holding greater economic significance.

Subsistence fishing has also been a part of the region's history and continues to be practiced today.

The proposed roadway improvements will be confined to the existing County right-of-way and will not affect cultural resources. In addition, the proposed action will not adversely affect parameters which impinge upon access to cultural resources, nor will it affect cultural practices or beliefs.

5. *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 material hauling trucks and operation of onsite equipment during the construction period. Dust generated from construction activities are generally attributed to clearing and grubbing. 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.

6. ***Scenic and Open Space Resources***

The roadway segment proposed for improvement is not within a scenic corridor or open space area. The proposed action will not involve vertical construction and therefore, is not anticipated to have an adverse impact on the area's scenic qualities.

B. *IMPACTS TO THE SOCIO-ECONOMIC ENVIRONMENT*

Construction improvements will provide short-term monetary input to the local economy as expenditures to contractors and vendors are made during the contract period. From a long-term perspective, however, the proposed action is not anticipated to have a significant impact upon the local economy. The long-term value of the proposed action is the provision of an adequate infrastructure system which can meet future traffic safety and operations demands as the Makena Resort Master Plan is implemented over time.

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.

2. *Recreational Services and Educational Services*

The proposed project is not a direct population generator. As such, the proposed improvements will not place new demands on recreational activities. School enrollments or locations will likewise not be affected by the proposed action.

3. *Solid Waste Management*

Construction waste which may be generated by the proposed action will be disposed or recycled at appropriate construction waste handling sites. The project will not affect County solid waste collection of disposal capacities.

D. *IMPACTS TO INFRASTRUCTURE*

1. *Roadways*

Appropriate traffic control measures, including signage and use of traffic safety personnel, will be implemented to ensure the smooth and safe flow of traffic during construction. Some delays may be anticipated during construction, however, these are expected to be of minimal duration to accommodate construction equipment staging and movement.

The proposed roadway improvements will upgrade the subject segment of Makena Alanui to County standards. This level of

improvement is designated to address roadway safety and drainage parameters to improve the overall utility of the roadway. In addition, the improvement of this roadway segment will establish Makena Alanui as a County-standard roadway through the developed areas of the Makena Resort.

2. ***Water and Wastewater Systems***

The proposed improvements will not impact existing water demands. Moreover, the existing waterlines within the right-of-way will not be affected by the roadway improvements.

There are no existing wastewater collection and transmission facilities within the subject roadway segment. No new wastewater facilities are proposed in connection with the action. Accordingly, no impacts to municipal or private wastewater systems are expected.

3. ***Drainage***

Project improvements will be designed within the context of existing drainage patterns, and integrated with the Makena Master Drainage Plan. Roadway runoff from the proposed project will be collected and piped by new catch basins and underground drainlines and conveyed to existing drainageways, utilizing current downstream conveyance routes.

The 50-year, 1-hour runoff in the project area will increase by approximately 15.90 cubic feet per second (cfs), representing a 7.6 percent increase over the existing rate of 210 cfs. See Appendix "A". No adverse effects are anticipated on adjacent or downstream

properties. The proposed drainage improvements will be designed in accordance with all applicable regulatory requirements.

4. ***Electrical and Telephone Systems***

The existing overhead utility lines will be placed underground as part of the proposed action. This work will not adversely affect service capabilities of utility companies. Appropriate design and construction coordination will be undertaken with both Maui Electric Company, Ltd. and Verizon Hawaii.

Chapter IV

Relationship to Governmental Plans, Policies and Controls

IV. RELATIONSHIP TO GOVERNMENTAL PLANS, POLICIES AND CONTROLS

A. STATE LAND USE DISTRICTS

Chapter 205, Hawaii Revised Statutes, relating to the Land Use Commission (LUC), establishes the four (4) major land use districts in which all lands in the State are placed. These districts are designated "Urban", "Rural", "Agricultural", and "Conservation".

The roadway segment proposed for improvement is within the "Urban" District. See Figure 7. The proposed action is compatible with its "Urban" designation.

B. 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, "The purpose of the General Plan is to recognize and state the major problems and opportunities concerning the needs and development of the County and the social, economic and environmental effects of such development and set forth the desired sequence, patterns and characteristics of future development".

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

Objective:

To develop a program for anticipating and enlarging the local street and highway systems in a timely response to planned growth.

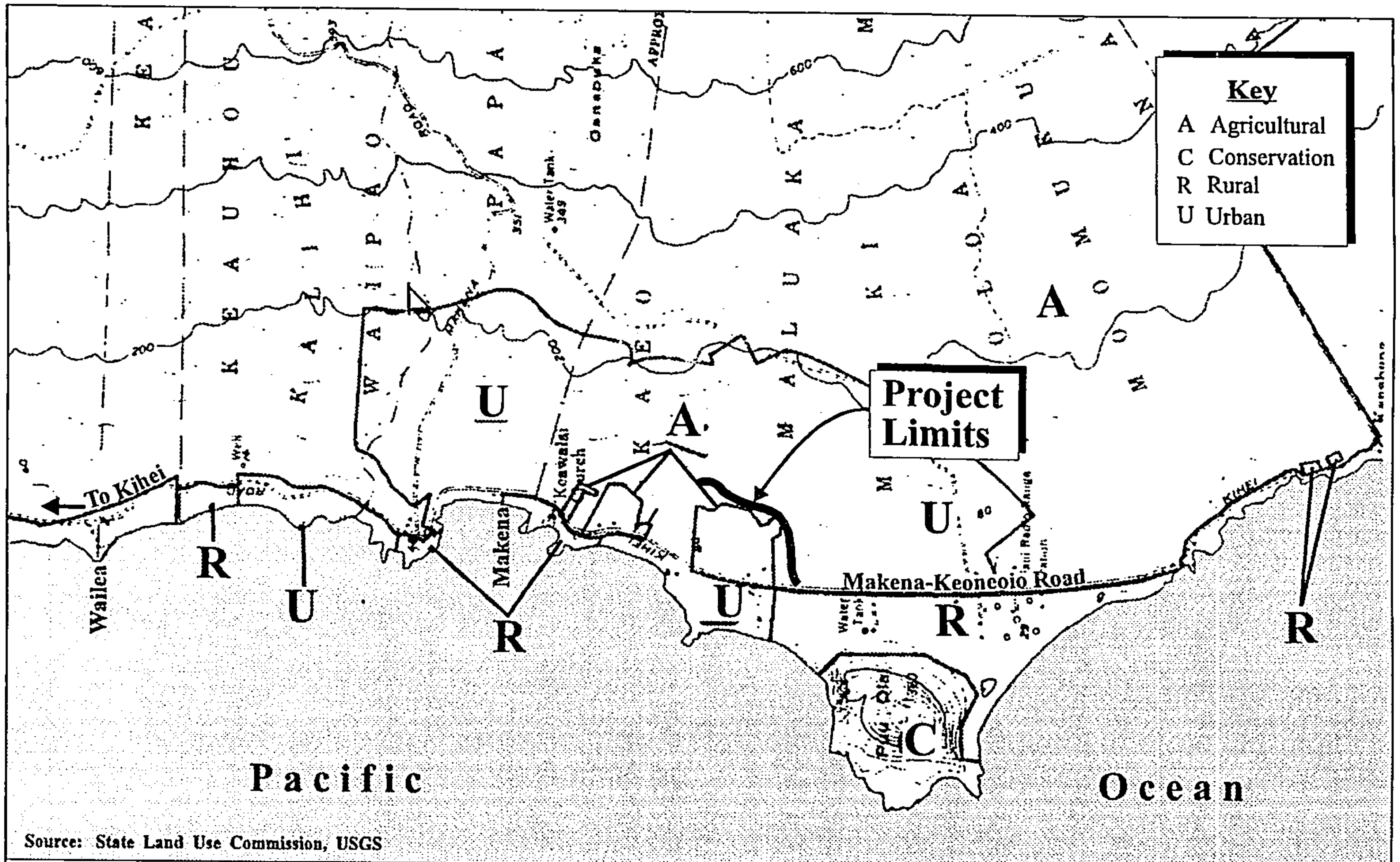


Figure 7

Makena Alanui Improvements
State Land Use Classifications

Prepared for: Makena Resort Corp.

Policy:

Ensure that transportation facilities are anticipated and programmed for construction in order to support planned growth.

C. *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 subject roadway segment is bordered by lands designated "Hotel" and "Park (Golf Course)" in the Kihei-Makena Community Plan. See Figure 8. The proposed roadway improvement project is consistent with the Kihei-Makena Community Plan.

D. *ZONING*

The subject roadway segment is bordered by lands zoned "Interim", "Golf Course" and "Open" by the County of Maui.

E. *SPECIAL MANAGEMENT AREA*

The proposed project limits are 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.

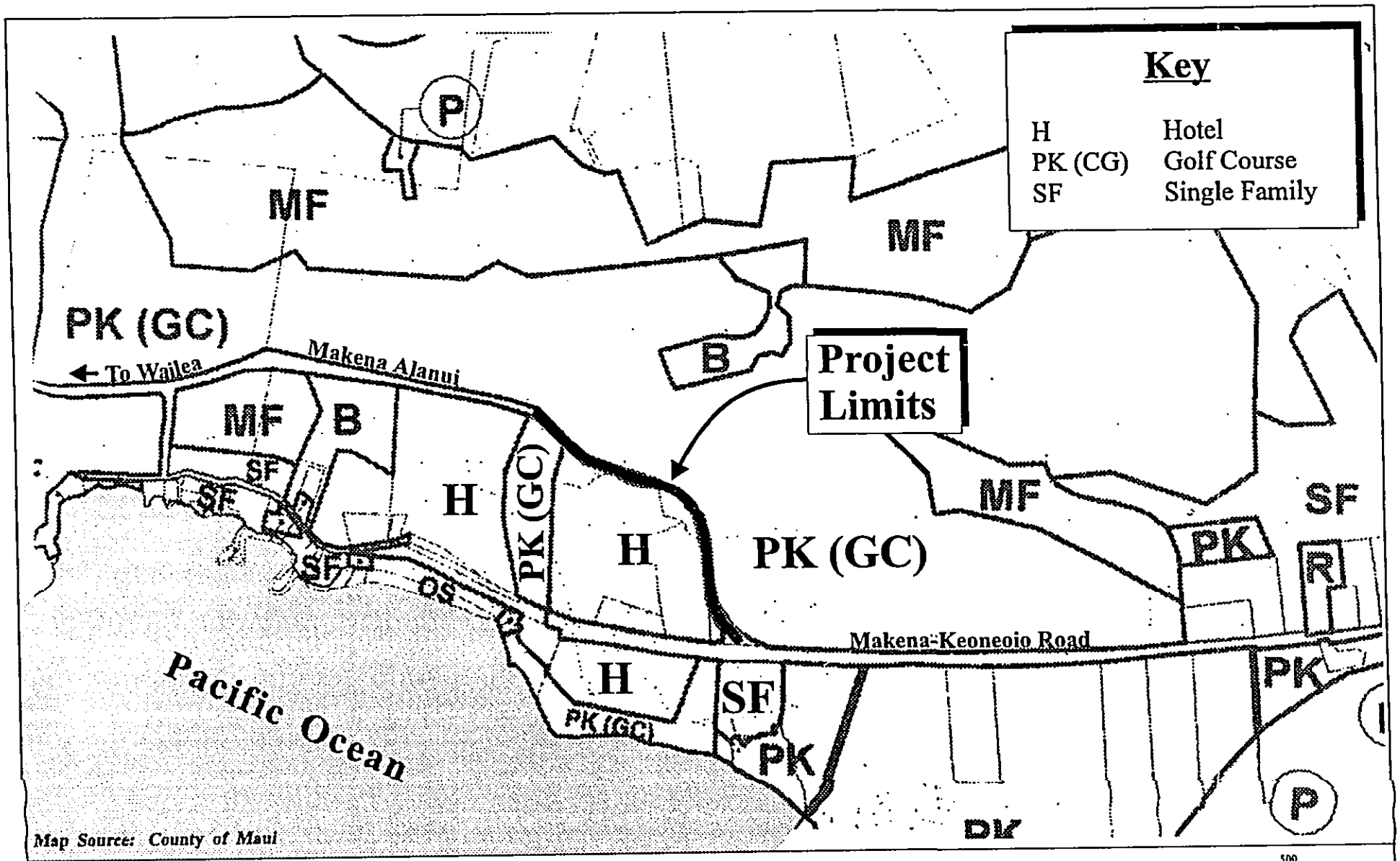


Figure 8

Makena Alanui Improvements
Community Plan Land Use Map

Prepared for: Makena Resort Corp.

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.

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

Response: The proposed action is not anticipated to affect existing coastal recreational resources. Access to the shoreline areas will remain unaffected by the proposed roadway improvements.

(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: With the exception of two (2) culvert outlets, work will be confined to the existing County right-of-way. Archaeological monitoring will be undertaken as required, in accordance with the accepted monitoring plan. Should archaeological remains be encountered during construction, work will cease in the area of the

find and SHPD will be contacted to establish an appropriate mitigation strategy.

(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 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: The proposed roadway improvements are not expected to adversely impact coastal ecosystems. 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.

Response: The project 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 Makena Resort's Master Plan, as reflected 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", which is defined as areas of minimal flooding. 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.

(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 the Special Management Area Rules for the Maui Planning Commission, required documentation for the project will be filed with the County Department of Planning and will undergo public review, public hearing, and decision by the Maui Planning Commission.

In addition, this document shall be reviewed and processed pursuant to Chapter 343, Hawaii Revised Statutes (HRS).

(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 medications 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 SMA and Chapter 343, HRS procedures. A public hearing is required as part of the SMA process.

(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.

Response: Improvements to Makena Alanui will not adversely impact ocean resources. Construction activities will be limited to the existing County right-of-way.

Chapter V

Summary of Environmental Effects Which Cannot Be Avoided

V. SUMMARY OF ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED

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 proposed project is not anticipated to create any significant, long-term adverse environmental effects.

Chapter VI

Alternatives Analysis

VI. ALTERNATIVES ANALYSIS

There were no alternatives to the proposed action considered. Any roadway improvement would require compliance with County design standards, and therefore the scope of the proposed work is fixed accordingly. The "no-action" alternative was not considered since provision of an adequate infrastructure system is necessary for the long-term implementation of the Makena Resort Master Plan.

Chapter VII

Irreversible and Irretrievable Commitments of Resources

VII. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

The proposed roadway improvements would involve the commitment of lands within an existing County right-of-way. However, this commitment is consistent with infrastructure upgrade requirements of the Makena Resort. There are no other significant irreversible and irretrievable commitment of resources associated with the proposed action.

Chapter VIII

Findings and Conclusions

VIII. FINDINGS AND CONCLUSIONS

The "Significance Criteria", Section 12 of the Administrative Rules, Title 11, Chapter 200, "Environmental Impact Statement Rules", were reviewed and analyzed to determine whether the proposed project will have significant impacts to the environment. The following analysis is provided:

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

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

   Adverse archaeological and cultural resource impacts are not anticipated with the proposed action. Should any artifacts or human remains be encountered during construction, work will stop in the immediate vicinity of the find and the SHPD will be immediately notified to establish an appropriate mitigation strategy.

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

   The proposed project and the commitment of land within the County right-of-way would not curtail the range of beneficial uses of the environment.

3. ***The Proposed Action Does Not Conflict with the State's Long-term Environmental Policies or Goals or Guidelines as Expressed in Chapter 334, Hawaii Revised Statutes***

   The State's Environmental Policy and Guidelines are set forth in Chapter 344, Hawaii Revised Statutes (HRS). The proposed action is not contrary to the policies and guidelines set forth in Chapter 344, HRS.

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

The proposed project would have a direct beneficial effect on the local economy during construction. There are no adverse long-term economic or social welfare impacts anticipated from project implementation.

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

No impacts to the public's health and welfare are anticipated as a result of the proposed action.

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

No significant secondary impacts such as population changes are anticipated as a result of the proposed project.

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 project will be developed in a single phase and does not involve a commitment to larger actions.

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, avifauna or their habitats which will be affected by the proposed action.

10. ***Air Quality, Water Quality or Ambient Noise Levels Would Not be Detrimentally Affected by the Proposed Project***

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.

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

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 area is not located within and would not affect environmentally sensitive areas. The project site is not subject to flooding or tsunami inundation. There are no geologically hazardous or erosion-prone lands, estuaries, or coastal waters within or adjacent to the project site.

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

The segment of Makena Alanui proposed for improvement 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. In the long term, the project will create an additional demand for electricity required for street lighting purposes. However, this demand is not deemed substantial or excessive within the context of the region's overall energy consumption.

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

Chapter IX

List of Permits and Approvals

IX. LIST OF PERMITS AND APPROVALS

The following permits and approvals will be required prior to the implementation of the project.

County of Maui

1. SMA Use Permit
2. Construction Permits (Grubbing, Grading, Work to Perform on County Highway)

Chapter X

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

X. AGENCIES CONSULTED DURING THE PREPARATION OF THE DRAFT ENVIRONMENTAL ASSESSMENT; LETTERS RECEIVED AND RESPONSES TO SUBSTANTIVE 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. Neal Fujiwara, Soil Conservationist
Natural Resources Conservation Service
U.S. Department of Agriculture
210 Imi Kala Street, Suite 209
Wailuku, Hawaii 96793-2100

2. George Young, Chief Regulatory Branch
Department of the Army
U.S. Army Engineer District, Hnl.
Attn: Operations Division
Bldg. T-1, Room 105
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. Gary Gill, Deputy Director
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. Gilbert Coloma-Agaran
State of Hawaii
Department of Land and Natural Resources
P. O. Box 621
Honolulu, Hawaii 96809

7. Don Hibbard
State of Hawaii
Department of Land and Natural Resources
State Historic Preservation Division
601 Kamokila Blvd., Room 555
Kapolei, Hawaii 96707

8. Robert Siarot, Maui District Engineer
State of Hawaii
Department of Transportation Highways Division
650 Palapala Drive
Kahului, Hawaii 96732

9. Colin Kippen, Deputy Administrator
Office of Hawaiian Affairs
711 Kapiolani Boulevard, Suite 500
Honolulu, Hawaii 96813

10. Clayton Ishikawa, Chief
County of Maui
Department of Fire Control
200 Dairy Road
Kahului, Hawaii 96732

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

12. Tom Phillips, Chief
County of Maui
Police Department
55 Mahalani Street
Wailuku, Hawaii 96793

13. David Goode, Director
County of Maui
Department of Public Works and Waste Management
200 South High Street
Wailuku, Hawaii 96793

14. David Craddick, Director
County of Maui
Department of Water Supply
200 South High Street
Wailuku, Hawaii 96793

15. Bill Overton
Wailea Community Association
3750 Wailea Alanui, Suite F-21
Kihei, Hawaii 96753

16. Rudy Luuwai
Makena Homeowners Assoc.
5100 Makena Road
Kihei, Hawaii 96753

MAR 2 9 2001

United States
Department of
Agriculture

Natural
Resources
Conservation
Service

50 Imi Kala St.
Suite 209
Wailuku, HI 96793

USDA

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

DATE: March 27, 2001

Mr. Dean K. Frampton, Planner
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Mr. Frampton,

SUBJECT: Proposed Makena Alanui Road Widening Project – Phase II

We do not have any structural comments on the project. However, depending upon the brackish content of the irrigation water system, landscape plants should be carefully specified to be resistant to brackish water. Also, seashore paspalum grass may be more suitable than manenie grass to the brackish water.

Sincerely,

Neal S. Fujiwara
District Conservationist

MUNEKIYO HIRAGA, INC.

October 26, 2001

Neal Fujiwara
Natural Resources Conservation Service
210 Imi Kala Street, Suite 209
Wailuku, Hawaii 96793

SUBJECT: Makena Alanui Improvements, SM1 2001/0012
TMK (2) 2-1-05:85 (por.) & 108 (por.)

Dear Mr. Fujiwara:

Thank you very much for your comment letter dated March 27, 2001 regarding the subject project. In response to the comments provided, we would like to note the following.

Proposed plants to be utilized for roadside landscaping will be carefully selected to ensure compatibility with brackish water. Further, the applicant will continue to utilize brackish and reclaimed water for irrigation purposes in order to conserve potable water resources.

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

Very truly yours,

D. K. F.
Dean K. Frampton, Planner

DKF:cc
cc: Roy Figueiroa, Makena Resort Corp.
Mike Ishikawa, Sato & Associates, Inc.
makenart\alanui\usda ltr

305 High Street, Suite 104 Wailuku, Hawaii 96793 ph (808)244-2015 fax (808)244-8729 planning@munekiyo.com

APR 0 5 2001

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

REPLY TO
ATTENTION OF

April 4, 2001

Regulatory Branch

Mr. Dean K. Frampton, Planner
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Mr. Frampton:

This letter responds to your request for a jurisdictional determination on the proposed road widening project in Makena, Maui, dated March 23, 2001. The information summary is not sufficiently detailed to determine if a Department of the Army (DA) permit will be required for this project. Please include us on the mailing list for the Draft Environmental Assessment and include in the document information concerning the presence or absence of streams or wetlands in the project area.

If you have any questions concerning this determination, please contact William Lennan of my staff at 438-6986 or FAX 438-4060, and reference File No. 200100173.

Sincerely,

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

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BENJAMIN J. CAYETANO
GOVERNOR

BRIAN K. MINAAI
DIRECTOR

DEPUTY DIRECTORS
GLENN M. OKIMOTO
JADINE Y. URASAKI

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
MAUI DISTRICT
650 PALAPALA DRIVE
KAHULUI, HAWAII 96732

IN REPLY REFER TO:

HWY-M 2.113-01

April 9, 2001

MEMORANDUM

TO: Dean K. Frampton, Planner
Munekiyo & Hiraga, Inc.

FROM: Paul M. Chung
State Highways

SUBJECT: PROPOSED MAKENA ALANUI ROAD WIDENING PROJECT-PHASE 2

Thank you for the opportunity to review and comment on the proposed project. Based on our review of the project summary, we have no comments to offer at this time.

Please call me at 873-3535 if you have any questions regarding this matter.

PMC:dmf

APR 1 1 2001

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

BRUCE S. ANDERSON, Ph.D., M.P.H.
DIRECTOR OF HEALTH

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

In reply, please refer to:
File:

EPO

April 9, 2001

Mr. Dean K. Frampton, Planner
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Mr. Frampton:

Subject: Makena Alanui Road Widening Project – Phase 2
Makena, Maui, Hawaii

Thank you for allowing us to review and comment on the subject proposal. We do not have any comments to offer at this time. However, we look forward to reviewing and commenting on the Draft Environmental Assessment and/or the Special Management Area Use Permit, once those documents are forwarded to this office.

Sincerely,

GARY GILL
Deputy Director
Environmental Health Administration

APR 2 5 2001

PHONE (808) 594-1888

FAX (808) 594-1865

STATE OF HAWAI'I
OFFICE OF HAWAIIAN AFFAIRS
711 KAPI'OLANI BOULEVARD, SUITE 500
HONOLULU, HAWAI'I 96813

April 9, 2001

Dean Frampton
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

Subject: Proposed Makena Alanui Road Widening Project – Phase 2
Makena, Maui, Hawai'i

Dear Mr. Frampton:

Thank you for the opportunity to comment on the above referenced project.

The Office of Hawaiian Affairs has the following concerns about this project.

- Since the project will involve ground-disturbing activities, it would be appropriate to utilize a cultural monitor to assist with the handling of native Hawaiian remains found inadvertently during construction. The cultural monitor should have some understanding and practice in the use of Hawaiian cultural protocol, ability to relate with sensitivity to the handling of Native Hawaiian remains, and possess traditional knowledge of families, the history and genealogy of the area. The cultural monitor should also have the ability to keep accurate records, including a daily log, draw site plans, maps, and write descriptions.

- If the project receives Federal funding or requires a permit from a Federal agency, you have obligations to fulfill under Section 106 of the National Historic Preservation Act. You must consult with OHA and other Native Hawaiian organizations on the project's effects on historic and traditional and cultural properties.

We look forward to completing a thorough review of the environmental assessment and special management area use permit application.

If you have questions, please contact Sharla Manley, assistant policy analyst at 594-1944.

Sincerely,

Colin C. Kippen, Jr.
Deputy Administrator

CK: sam

cc: Board of Trustees
Randall K. Ogata, Administrator
Maui CAC

MUNEKIYO & HIRAGA, INC.

May 7, 2001

Colin C. Kippen, Jr.
Deputy Administrator
State of Hawaii
Office of Hawaiian Affairs
711 Kapiolani Boulevard, Suite 500
Honolulu, Hawaii 96813

SUBJECT: Makena Alanui Improvements

Dear Mr. Kippen:

Thank you for your letter of April 9, 2001 regarding the subject matter. We appreciate the comments provided and offer the following additional information to address and clarify the comments noted.

1. Should a cultural monitor be utilized during construction, the selected monitor will be one who is experienced in monitoring protocol and field documentation procedures.

2. The project will be funded by Makena Resort Corp. Federal, State and County funding will not be used for this action.

Your interest in the project is very much appreciated. If there are any questions or if additional information is needed, please do not hesitate to call.

Very truly yours,

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

MTM:to
cc: Roy Figueiroa, Makena Resort Corp.
makenart/alanui/ohaltr.001

305 High Street, Suite 104 Wailuku, Hawaii 96793 ph: (808)244-2015 fax: (808)244-8729 planning@mhinconline.com

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

MAY 1 4 2001

GILBERT S. COLOMA-AGARAN, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

DEPUTIES
JANET E. KAWELO
LINNEL NISHIOKA

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

HISTORIC PRESERVATION DIVISION
Kakuhihewa Building, Room 555
601 Kamokila 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

May 10, 2001

Mr. Dean K. Frampton
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

LOG NO: 27455
DOC NO: 0105CD06

Dear Mr. Frampton,

SUBJECT: Chapter 6E-42 Historic Preservation Review Pertaining to the Early Consultation Regarding the Proposed Makena – Alanui Road Widening Project – Phase 2, Makena Ka`eo & Maluaka Ahupua`a, Makawao District, Island of Maui
TMK: 2-1-05:

Thank you for the opportunity to comment on the proposed Makena-Alanui Road Widening Project. Based on the submitted document, we understand the proposed improvements are intended to upgrade a section of Makena-Alanui Road to County Roadway Standards, and are part of a long-range master plan for the resort area.

The proposed undertaking will begin on the Makena – Alanui Road, just past the Maui Prince Hotel's southern boundary and will extend approximately 2100 feet. The improvements will include pavement widening from 12 to 20 feet, and the addition of curbs, gutters, and a six-foot wide sidewalk to be located on the makai side of the roadway. Additional improvements include the installation of street lighting, fire hydrants, landscaping, and a brackish water irrigation system, catch basins, and small diameter culverts. We also understand that as the proposed undertaking will involve work in an existing County-Right-of – Way, our comments are for early consultation purposes and that an Environmental Assessment is being prepared, as specified by Title 11, Chapter 200, Section 9, of the Administrative Rules of the Department of Health.

The proposed project location has been included in several archaeological inventory surveys (Clark and Kelly 1985; Schilt 1988; Gosser et al. 1996, Cordy 1978, Cleghorn Kawachi, and Sinoto 1988). In 1998, Aki Sinoto Consulting in association with Garcia and Associates conducted an inventory survey which included parcels 83, 85, and a portion of 108. During this subsequent work, a total of 11 previously unidentified sites, including rock shelters, modified outcrops, terraces, and enclosures, were recorded. The report (McIntosh, Pantaleo, Sinoto 1998) documenting the findings of the inventory survey was reviewed and accepted by this office (SHPD DOC NO.: 9807BD09/LOG NO.: 27121). However, none of these sites appear to be in close proximity to the proposed project area.

Given the known cultural sensitivity of the Makena area, in general, we recommend that an archaeological monitor be present during all ground-altering activities in order to identify, record and document any historic sites which may be inadvertently encountered during construction, and to provide the appropriate mitigation measures, if necessary. An acceptable monitoring plan has been reviewed and accepted by this office (SHPD DOC NO.: 9808BD07/LOG NO.: 22087).

As an acceptable monitoring plan for the proposed project area is currently in effect and in place, we believe the proposed undertaking will have "no adverse effect" on significant historic sites, provided the directives stated in the above mentioned monitoring plan are followed.

Please call Cathleen Dagher, at 692-8023, if you have any questions.

Aloha,

Don Hibbard, Administrator
State Historic Preservation Division

CD:jen

MUNEKIYO & HIRAGA, INC.

May 30, 2001

Don Hibbard, Administrator
Department of Land and Natural Resources
State Historic Preservation Division
Kakuhihewa Building, Room 555
601 Kamokila Boulevard
Kapolei, Hawaii 96707

SUBJECT: Makena Alanui Road Widening Project
LOG NO: 27455
DOC NO: 0105CD06

Dear Mr. Hibbard:

Thank you for your comment letter dated May 10, 2001 regarding the subject project. The applicant will continue to comply with the established monitoring plan for the proposed project area (SHPD DOC NO.: 9808BD07/LOG NO.: 22087).

If you have any questions or require additional information, please do not hesitate to call me at 244-2015.

Very truly yours,

D. K. F.
Dean K. Frampton, Planner

DKF:to
makenart/alanui/shpdltr.001

305 High Street, Suite 104 Wailuku, Hawaii 96793 ph: (808)244-2015 fax: (808)244-8729 planning@mhuraonline.com

MAR 3 0 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 • www.mauiwater.org

March 28, 2001

Dean K. Frampton, Planner
MUNEKIYO & HIRAGA, INC.
305 High Street - Suite 104
Wailuku, Hawaii 96793

Dear Mr. Frampton:

Subject: Proposed Makena Alanui Road Widening Project - Phase 2, Makena, Maui

Thank you for the opportunity to review and comment on the proposed Makena Alanui improvements by Makena Resort Corp.

We have completed our review and have no comments as you indicated non potable water will be used for irrigation.

Sincerely,

David Craddick, Director
DC/jaw
copy: Ellen Kraftsow, Planning Pgm Mgr

JAMES "KIMO" APANA
Mayor

JOHN E. MIN
Director

CLAYTON I. YOSHIDA
Deputy Director

APR 16 2001

COUNTY OF MAUI
DEPARTMENT OF PLANNING

April 10, 2001

Mr. Dean K. Frampton
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Maui, Hawaii 96793

Dear Mr. Frampton:

RE: Proposed Makena Alanui Road Widening Project - Phase 2 Makena, Maui, Hawaii

The Maui Planning Department has reviewed the above road widening project. In addition to the Environmental Assessment, the proposed project would require a Special Management Area Use Permit.

Thank you for the opportunity to comment. If further clarification is required, please contact Ms. Ann Cua, Staff Planner, of this office at 270-7735.

Very truly yours,

JOHN E. MIN
Planning Director

JEM:ATC:cmb
c: Clayton I. Yoshida, AICP, Deputy Planning Director
Ann T. Cua, Staff Planner
Project File
General File
S:\all\ann\makenawideningphase2ltr.

MAY 0 2 2001

JAMES "KIMO" APANA
Mayor

JOHN E. MIN
Director

CLAYTON I. YOSHIDA
Deputy Director

COUNTY OF MAUI
DEPARTMENT OF PLANNING

April 27, 2001

Mr. Dean K. Frampton, Planner
Munekiyo & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Mr. Frampton:

RE: Early Consultation in the Matter of the Proposed Makena Alanui Road Widening Project - Phase 2, Makena, Maui

The Maui Planning Department (Department) has reviewed the information submitted relative to the above project.

The proposed project will require a Special Management Area Use Permit from the Maui Planning Commission as was similarly approved for the Phase I road-widening improvements.

Thank you for the opportunity to comment. If further clarification is required, please contact Ms. Ann T. Cua, Staff Planner, of this office at 270-7735.

Very truly yours,

JOHN E. MIN
Planning Director

JEM:ATC:cmb
c: Clayton I. Yoshida, AICP, Deputy Planning Director
Ann T. Cua, Staff Planner
Project File (w/Enclosure)
General File
(s:\all\ann\makenardphase2improve)

Chapter XI

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

XI. LETTERS RECEIVED DURING THE DRAFT ENVIRONMENTAL ASSESSMENT PUBLIC COMMENT PERIOD AND RESPONSES TO COMMENTS

Pursuant to the requirements of the environmental review process, letters received during the Draft Environmental Assessment public comment period, as well as responses to substantive comments, are included in this section.

13227

United States
Department of
Agriculture

Natural
Resources
Conservation
Service

210 Imi Kala St.
Suite 209
Wailuku, HI 96793

'01 JUL 31 P3:14

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

DEPT OF PLANNING
COUNTY OF MAUI
RECEIVED

DATE: July 30, 2001

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

Dear Mr. Min,

SUBJECT: Makena Alanui Improvements; TMK: 2-1-005: por. 85, por. 108
I.D. SM1 2001/0012

We do not have any comment to the subject application.

Thank you for the opportunity to comment.

Sincerely,

Neal S. Fujiwara
District Conservationist

JUL 2 4 2001

BENJAMIN J. CAYETANO
GOVERNOR

GENEVIEVE SALMONSON
DIRECTOR

STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
235 SOUTH BERETANIA STREET
SUITE 702
HONOLULU, HAWAII 96813
TELEPHONE (808) 586-4185
FACSIMILE (808) 586-4186

July 20, 2001

Mr. David Goode, Director
Department of Public Works and Waste Management
County of Maui
200 South High Street
Wailuku, Hawai'i 96793

Dear Mr. Goode:

Subject: Makena Alanui Improvements, Maui

Thank you for the opportunity to review the subject document. We have the following comments and questions.

1. This project should comply with sections 103D-407 and 408 of Hawaii Revised Statutes concerning the use of indigenous plants and recycled glass.

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

Sincerely,

Genevieve Salmonson
Director

c: Munekiyo & Hiraga, Inc.

MUNEKIYO & HIRAGA, INC.

October 26, 2001

Genevieve Salmonson
Office of Environmental
Quality Control
235 S. Beretania Street #702
Honolulu, Hawaii 96813

SUBJECT: Makena Alanui Roadway Improvements

Dear Ms. Salmonson:

Thank you for your comment letter dated July 20, 2001 regarding the subject project. In response to the comments provided, we note that the applicant will comply with Sections 103D-407 and 408 of HRS, concerning indigenous plants and recycled glass. Should you have any questions or require additional information, please do not hesitate to call me at 244-2015.

Very truly yours,

D. K. F.
Dean K. Frampton, Planner

DKF:to
cc: Roy Figueiroa, Makena Resort Corp.
Ann Cua, Department of Planning
makenart/alanui oeqcltr 002

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

13138

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII

RAYNARD C. SOON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

July 25, 2001

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

Dear Mr. Min:

Subject: Makena Alanui Improvements
County of Maui Right-of-Way
TMK 2-1-5: 85 (por) and 108 (por)
I.D. No. SM1 2001/0012

Thank you for the opportunity to review the subject application. The Department of Hawaiian Home Lands has no comment to offer.

If you have any questions, please call Mr. Daniel Ornellas at 586-3836.

Aloha,

Raynard C. Soon, Chairman
Hawaiian Homes Commission

1345b

PHONE (808) 594-1888

FAX (808) 594-1865

STATE OF HAWAI'I
OFFICE OF HAWAIIAN AFFAIRS
711 KAPI'OLANI BOULEVARD, SUITE 500
HONOLULU, HAWAI'I 96813

'01 AUG -7 P3:19

DEPT OF PLANNING
COUNTY OF MAUI
RECEIVED

August 3, 2001

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

Subject: Makena Alanui Improvements
County of Maui Right of Way
Applications for Special Management Area Use
TMK: 2-1-005: 85 (por) and 108 (por)
Makena, Maui, Hawai'i

Dear Mr. Min:

Thank you for the opportunity to comment on the above referenced project. At this time, the Office of Hawaiian Affairs has no comments to the proposed project. If you have any questions, please contact Mark A. Mararagan, policy analyst at 594-1756, or e-mail him at markmararagan@hotmail.com.

Sincerely,

Colin C. Kippen, Jr.
Deputy Administrator

cc: OHA Board of Trustees
Maui CAC
OEQC

BENJAMIN J. CAYETANO
GOVERNOR

WAYNE H. KIMURA
COMPTROLLER

'01 AUG 22 P3:03

DEPT OF PLANNING
COUNTY OF MAUI
RECEIVED

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING
AND GENERAL SERVICES
SURVEY DIVISION
P. O. BOX 119
HONOLULU, HAWAII 96810

RESPONSE REFER TO:

FILE NO. _____

August 20, 2001

MEMORANDUM

TO: Mr. John E. Min, Planning Director
Maui County Planning Department

ATTN.: Ms. Ann T. Cua, Staff Planner

FROM: Randall M. Hashimoto, State Land Surveyor

SUBJECT: SM1 2001/0012
TMK: County of Maui Right-of-Way, 2-1-5:85(por) and 108(por)
Project Name: Makena Alanui Improvements
Applicant: Makena Resort Corp. Roy Figueiroa, General Manager

The subject proposal has been reviewed and confirmed that no Government Survey Triangulation Stations and Benchmarks are affected. The Survey Division has no objections to the proposed project.

Should you have any questions, please call me at 586-0390.

Randall M. Hashimoto

RANDALL M. HASHIMOTO
State Land Surveyor

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

GILBERT S. COLOMA-AGARAN, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

DEPUTIES
JANET E. KAWELO
LINNEL NISHIOKA

'01 OCT -5 P3:05

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

DEPT OF PLANNING
COUNTY OF MAUI
RECEIVED

HISTORIC PRESERVATION DIVISION
Kakuhihewa Building, Room 555
601 Kamokila Boulevard
Kapolei, Hawaii 96707

September 26, 2001

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

LOG NO: 28253
DOC NO: 0109CD25

Dear Mr. Min,

SUBJECT: **Chapter 6E-42 Historic Preservation Review Pertaining to the Application for a Special Management Area Use Permit for the Proposed Makena – Alanui Road Improvements**
Ka`eo & Maluaka Ahupua`a, Makawao District, Island of Maui
TMK: 2-1-05:

Thank you for the opportunity to comment on the application for a Special Management Area Use permit (SMA) for the proposed Makena-Alanui Road Widening Project. Based on the submitted SMA and the included Draft Environment Assessment (DEA), we understand the proposed improvements are intended to upgrade a section of Makena-Alanui Road to County Roadway Standards, and are part of a long-range master plan for the resort area.

The DEA states the following:

1) The segment of Makena - Alanui Road scheduled for improvement extends approximately from the southern boundary of the Maui Prince Hotel to a point just before the Makena - Alanui and Makena – Keoneoio Road intersection.
2) The proposed improvements will include pavement widening from 12 to 20 feet, and the addition of curbs, gutters, and a six-foot wide sidewalk to be located on the makai side of the roadway.
3) Additional improvements will include the installation of a bike lane, street lighting, fire hydrants, roadway drainage improvements, and landscaping.
4) The proposed undertaking will involve work in an existing 60-foot County-Right-of – Way.
5) The drainage culvert outlets at two roadway culvert crossings will extend makai of the roadway right-of-way into TMK: 2-1-05:083 & 085, which are owned by Makena Corporation.

6) The first drainage outlet will be located approximately 500 feet south of the project's north terminus. A 24-inch culvert outlet will be installed adjacent to and immediately makai of the right-of-way. Portions of this outlet structure will be located within TMK: 2-1-05:085.
7) The second outlet structure will be located approximately 1100 feet south of the project's north terminus. This outlet structure will be extended to accommodate the roadway widening and will be located within TMK: 2-1-08:83.

The proposed project location has been included in several archaeological inventory surveys (Clark and Kelly 1985; Schilt 1988; Gosser et al. 1996, Cordy 1978, Cleghorn, Kawachi, and Sinoto 1988). In 1998, Aki Sinoto Consulting in association with Garcia and Associates conducted an inventory survey which included parcels 83, 85, and a portion of 108. During this subsequent work, a total of 11 previously unidentified sites, including rock shelters, modified outcrops, terraces, and enclosures, were recorded. The report (McIntosh, Pantaleo, Sinoto 1998) documenting the findings of the inventory survey was reviewed and accepted by this office (SHPD DOC NO.: 9807BD09/LOG NO.: 27121). However, none of these sites appear to be in close proximity to the proposed project area.

Given the known cultural sensitivity of the Makena area, in general, we recommend that an archaeological monitor be present during all ground-altering activities in order to identify, record and document any historic sites which may be inadvertently encountered during construction, and to provide the appropriate mitigation measures, if necessary. An acceptable monitoring plan has been reviewed and accepted by this office (SHPD DOC NO.: 9808BD07/LOG NO.: 22087).

As an acceptable monitoring plan for the proposed project area is currently in effect and in place, we believe the proposed undertaking will have "no adverse effect" on significant historic sites, provided the directives stated in the above mentioned monitoring plan are followed.

Please call Cathleen Dagher, at 692-8023, if you have any questions.

Aloha,

Don Hibbard, Administrator
State Historic Preservation Division

CD:jen

MUNEKIYO & HIRAGA, INC.

October 26, 2001

Don Hibbard, Administrator
State Historic Preservation Division
Department of Land and Natural
Resources
601 Kamokila Boulevard, Room 555
Kapolei, Hawaii 96707

SUBJECT: Makena Alanui Improvements, SM1 2001/0012
TMK (2) 2-1-5:85 (por.) and 108 (por.)

Dear Mr. Hibbard:

Thank you for your letter dated September 26, 2001 regarding the subject project. In response to the comments provided, we note the following.

An existing monitoring plan for the project area is currently in effect and has been reviewed and accepted by your office. (SHPD DOC NO.:9808BD07/LOG NO.:22087).

As suggested, an archaeological monitor will be present during all ground-altering activities in order to identify, record and document any historic sites which may be inadvertently encountered during project construction. In addition, the archaeological monitor will provide appropriate mitigation measures should they be necessary.

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

Very truly yours,

Dean K. Frampton, Planner

DKF:to
cc: Roy Figueiroa, Makena Resort Corp.
Mike Ishikawa, Sato & Associates, Inc.
makenari/alanui-shpdltr 002

305 High Street, Suite 104 Wailuku, Hawaii 96793 ph (808)244-2015 fax (808)244-8729 planning@mhpacific.com

CORRECTION

MUNEKIYO & HIRAGA, INC.

October 26, 2001

Don Hibbard, Administrator
State Historic Preservation Division
Department of Land and Natural
Resources
601 Kamokila Boulevard, Room 555
Kapolei, Hawaii 96707

SUBJECT: Makena Alanui Improvements, SM1 2001/0012
TMK (2) 2-1-5:85 (por.) and 108 (por.)

Dear Mr. Hibbard:

Thank you for your letter dated September 26, 2001 regarding the subject project. In response to the comments provided, we note the following.

An existing monitoring plan for the project area is currently in effect and has been reviewed and accepted by your office. (SHPD DOC NO.:9808BD07/LOG NO.:22087).

As suggested, an archaeological monitor will be present during all ground-altering activities in order to identify, record and document any historic sites which may be inadvertently encountered during project construction. In addition, the archaeological monitor will provide appropriate mitigation measures should they be necessary.

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

Very truly yours,

Dean K. Frampton, Planner

DKF:to
cc: Roy Figueiroa, Makena Resort Corp.
Mike Ishikawa, Sato & Associates, Inc.
makenart/alanui/shpdltr 002

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

14007

JAMES "KIMO" APANA
MAYOR

OUR REFERENCE
ty
YOUR REFERENCE

POLICE DEPARTMENT
COUNTY OF MAUI

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

'01 AUG 28 P3:34

DEPT OF PLANNING
COUNTY OF MAUI
RECEIVED

THOMAS M. PHILLIPS
CHIEF OF POLICE

KEKUHAUPIO R. AKANA
DEPUTY CHIEF OF POLICE

August 20, 2001

MEMORANDUM

TO : JOHN E. MIN, PLANNING DIRECTOR

FROM : THOMAS M. PHILLIPS, CHIEF OF POLICE

SUBJECT : I.D. SM1 2001/0012
TMK: County of Maui Right-of-Way, 2-1-5:85 (por) and 108 (por)
Project Name: Makena Alanui Improvements
Applicant: Makena Resort Corp. Roy Figueiroa, General Manager

_X_ No further recommendation or comment is necessary or desired.

___ Refer to enclosed comments and/or recommendations.

Thank you for giving us the opportunity to comment on this project. We are returning the Application and Project Assessment Booklet which was submitted for our review.

for
Assistant Chief Robert Tam Ho
For: THOMAS M. PHILLIPS
Chief of Police

Enclosure

JAMES "KIMO" APANA
MAYOR

CLAYTON T. ISHIKAWA
CHIEF

FRANK E. FERNANDEZ, JR.
DEPUTY CHIEF

COUNTY OF MAUI
DEPARTMENT OF FIRE CONTROL

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

August 31, 2001

Ann Cua
Staff Planner
Department of Planning
County of Maui
250 S. High Street
Wailuku, Hi. 96793

Subject: I.D. SM1 2001/0012
TMK: 2-1-005:85 and 108
Project Name: Makena Alanui Improvements

Dear Mrs. Cua:

Thank you for the opportunity to comment on the Makena Alanui project.

The Department of Fire Control has reviewed the literature for the expansion project and has no comment at this time, however, the department wishes to reserve the right to comment upon submittal of plans and specifications.

If you have any questions, please call me at 270-7122.

Sincerely,

Lance Wendel
Fire Plans Examiner

JAMES "KIMO" APANA
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

Solid Waste Division

COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS AND WASTE MANAGEMENT
200 SOUTH HIGH STREET
WAILUKU, MAUI, HAWAII 96793

September 12, 2001

MEMO TO: JOHN E. MIN
PLANNING DIRECTOR

FROM: DAVID GOODE
DIRECTOR OF PUBLIC WORKS AND WASTE MANAGEMENT

SUBJECT: SPECIAL MANAGEMENT AREA PERMIT APPLICATION
MAKENA ALANUI IMPROVEMENTS
TMK: (2) 2-1-005:085 AND POR. 108
SM1 2001/0012

We reviewed the subject applications and have the following comments:

1. Submit the Makena Drainage Master Plan for our review and comments.

2. The included drainage report shall be stamped and signed by a licensed Civil P.E.

3. The subject project shall comply with the provisions of the grading ordinance by requiring the design and installation of erosion-control measures, and the new drainage system shall comply with the provisions of the County drainage rules.

If you have any questions, please feel free to call me at Ext. 7845.

DG:jso
S:\LUCA\CZM\makenaalanui.wpd

MUNEKIYO HIRAGA, INC.

October 26, 2001

David Goode, Director
Department of Public Works
and Waste Management
200 South High Street
Wailuku, Hawaii 96793

SUBJECT: Makena Alanui Improvements, SM1 2001/0012
TMK(2) 20105:85 (por.) & 108 (por.)

Dear Mr. Goode:

Thank you for your letter dated September 12, 2001 regarding the subject project. In response to the comments provided, we note the following.

1. R.M. Towill Corporation is assisting the applicant in the preparation of the Makena Drainage Master Plan. Upon its completion, the applicant will submit a copy of the master plan to the Department of Public Works and Waste Management for review and comment.

2. The proposed project will comply with the provisions of the County of Maui grading ordinances, including the design and installation of erosion control measures. Further, the proposed drainage system will comply with the provisions of Maui County drainage rules.

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

Very truly yours,

D. K. F.

Dean K. Frampton, Planner

DKF:to
cc: Roy Figueiroa, Makena Resort Corp.
Mike Ishikawa, Sato & Associates, Inc.
makenaal/alanui:dpwwmltr.001

305 High Street, Suite 104 Wailuku, Hawaii 96793 ph (808)244-2015 fax (808)244-8729 planning@mhinoac.com

AUG 3 1 2001

R-2

DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
P.O. BOX 1109
WAILUKU, MAUI, HAWAII 96793-7109
Telephone (808) 270-7816 • Fax (808) 270-7833

August 20, 2001

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

Project Name: Makena Alanui Improvements
TMK: 2-1-05:85(por) and 108(por) - County of Maui Right-of -Way
ID : SM1 2001/0012

Dear Mr Min:

Thank you for the opportunity to review the above-referenced application. The Department of Water Supply has the following comments:

There is a 16" waterline within the subject right-of-way. Attached is a section of our fire protection map showing the alignment of waterlines and fire hydrants around the project are for your reference (not to scale). The applicant should submit construction plans to our engineering division and coordinate construction to minimize any water service disruption. The proposed improvements include installation of fire hydrants. Required fire hydrant spacing for proposed hotel zoning along the subject roadway is 500 feet.

Landscaping is an important aspect of the proposed improvement. The project is located in the Maui County Planting Plan - Plant Zones 3 and 5. We encourage the applicant to utilize appropriate native and climate-adapted species and avoid the use of potentially invasive plants. Native plants adapted to the natural rainfall of the area conserve water and protect the watershed from degradation due to invasive alien species. Attached is a list of appropriate plants for the zones as well as potentially invasive plants to avoid.

To conserve water resources, the applicant should refer to the attached documents and consider the following conservation measures:

1. Brackish and/or reclaimed water should be used for irrigation and dust control where possible;

2. 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.

DWS strives to protect the integrity of surface water and groundwater resources by encouraging applicants to adopt Best Management Practices (BMPs) relevant to potentially polluting activities. We have attached a few BMPs for your reference. Additional information can be obtained from the State Department of Health.

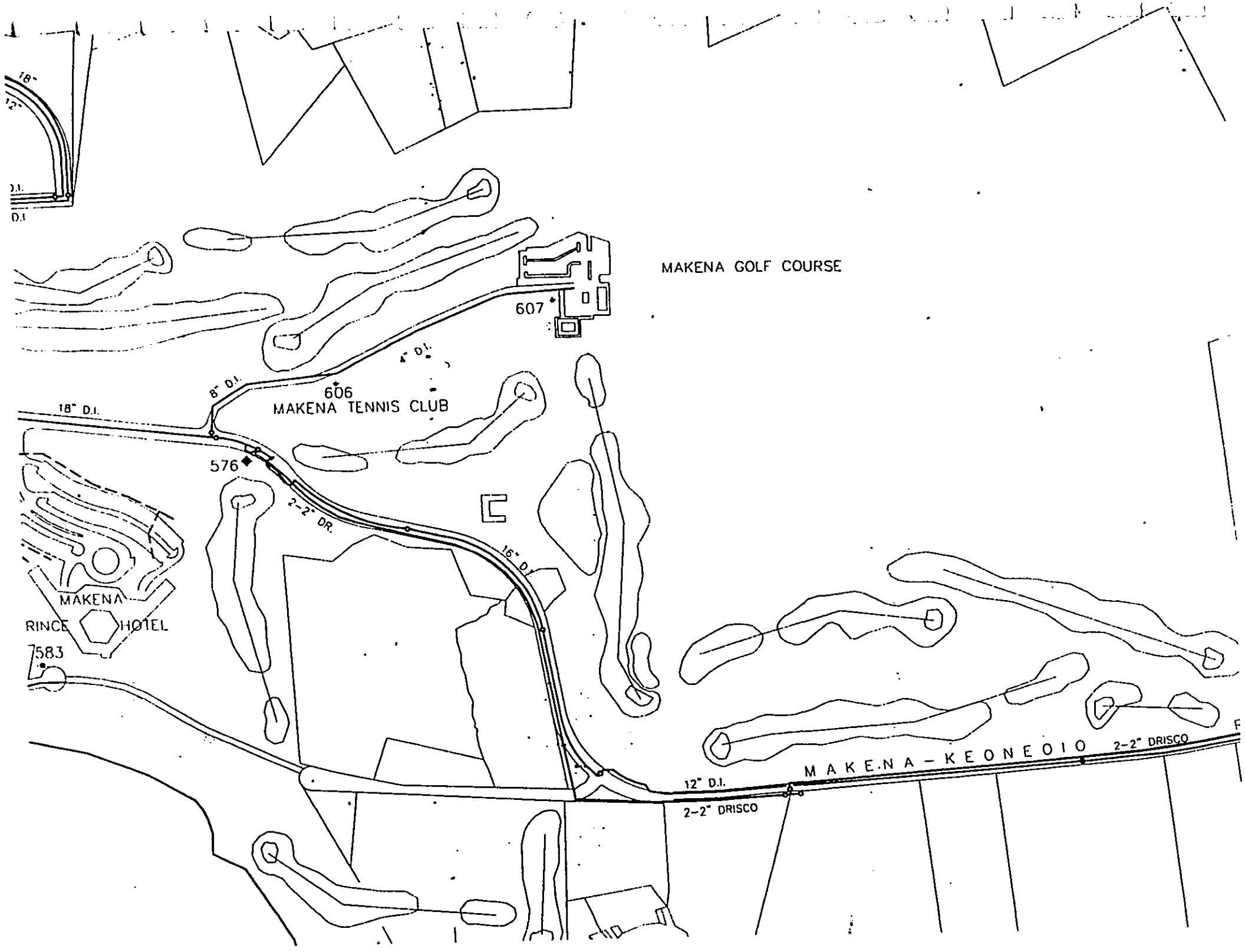
Should you have any questions, please contact our Water Resources and Planning Division at 270-7199.

Sincerely,

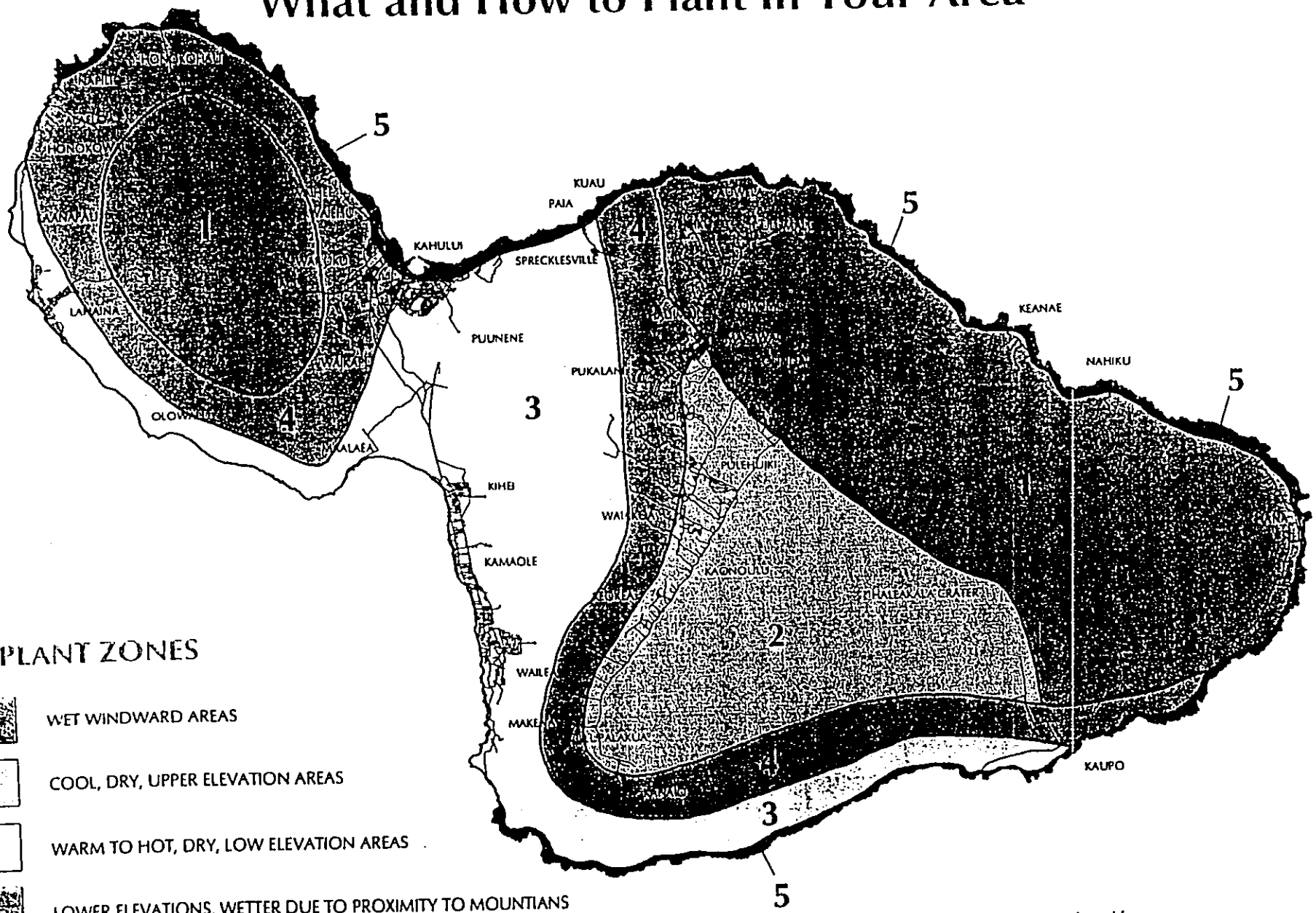
David Craddick
Director

emb/eam

c: engineering division
applicant ,with attachments:
Portion of DWS Fire Protection Map pertaining to project site
Maui County Plating Plan-Plant Zones 3 & 5- "Saving Water in the Yard: What & How to Plant in Your Area"
Guidance Specifying Management Measures for Sources of Nonpoint Pollution In Coastal Water - EPA


MAKENA GOLF COURSE
607
606
MAKENA TENNIS CLUB
576
583
18" D.I.
8" D.I.
4" D.I.
2-2" DR.
16" D.I.
MAKENA
RINCE HOTEL
12" D.I.
2-2" DRISCO
MAKENA-KEONEOIO
2-2" DRISCO

Saving Water in The Yard
What and How to Plant In Your Area



PLANT ZONES

- 1 — WET WINDWARD AREAS
- 2 — COOL, DRY, UPPER ELEVATION AREAS
- 3 — WARM TO HOT, DRY, LOW ELEVATION AREAS
- 4 — LOWER ELEVATIONS, WETTER DUE TO PROXIMITY TO MOUNTIANS
- 5 — SALT SPRAY ZONES IN WINDWARD COASTAL AREAS

Map Adapted from:
Maui County Planting Plan

From the Maui County Department of Water Supply

Zone-specific Native and Polynesian plants for Maui County

Zone 3

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	Psilotum nudum	moa, moa kula	1'	1'	sea to 3,000'	Dry to Wet
G	Colubrina asiatica	'anapanapa	3'	10'	sea to 1,000'	Dry to Wet
G	Eragrostis monticola	kalamalo	1'	2'	sea to 3,000'	Dry to Medium
G	Eragrostis variabilis	'emo-loa	1'	2'	sea to 3,000'	Dry to Medium
G	Fimbristylis cymosa ssp. spathacea	mau'u'aki'aki fimbristylis	0.5'	1'	sea to 1,000'	Dry to Medium
Gr	Boerhavia repens	alena	0.5'	4'	sea to 1,000'	Dry to Medium
Gr	Chamaesyce celastroides var. laehiensis	'akoko	2'	3'	sea to 1,000'	Dry to Medium
Gr	Cressa truxillensis	cressa	0.5'	1'	sea to 1,000'	Dry to Medium
Gr	Heliotropium anomalum var. argenteum	hinahina ku kahakai	1'	2'	sea to 1,000'	Dry to Medium
Gr	Ipomoea tuboides	Hawaiian moon flower, 'uala	1'	10'	sea to 3,000'	Dry to Medium
Gr	Jacquemontia ovalifolia ssp. sandwicensis	pa'u o hi'iaka	0.5'	6'	sea to 1,000'	Dry to Medium
Gr	Lipochaeta integrifolia	nehe	1'	5'	sea to 1,00'	Dry to Medium
Gr	Peperomia leptostachya	'ala'ala-wai-nui	1'	1'	sea to 3,000'	Dry to Medium
Gr	Plumbago zeylanica	'ilie'e	1'			
Gr	Sesuvium portulacastrum	'akulikuli, sea-purslane	0.5'	2'	sea to 1,000'	Dry to Wet
Gr	Sida fallax	'ilima	0.5'	3'	sea to 1,000'	Dry to Medium
Gr	Tephrosia purpurea var. purpurea	'auhuhu	2'	2'	sea to 1,000'	Dry to Medium
Gr - Sh	Hibiscus calyphyllus	ma'o hau hele, Rock's hibiscus	3'	2'	sea to 3,000'	Dry to Medium
Gr - Sh	Lipochaeta rockii	nehe	2'	2'	sea to 3,000'	Dry to Medium
Gr - Sh	Lipochaeta succulenta	nehe	2'	5'	sea to 1,000'	Dry to Wet
Gr - Sh	Lycium sandwicense	'ohelo-kai, 'ae'ae	2'	2'	sea to 1,000'	Dry to Medium
P	Cocos nucifera	coconut, niu	100'	30'	sea to 1,000'	Dry to Wet
P	Pritchardia hillebrandii	lo'ulu, fan palm	25'	15'	sea to 1,000'	Dry to Wet
S	Mariscus javanicus	marsh cypress, 'ahu'awa	0.5'	0.5'	sea to 1,000'	Dry to Medium

Zone-specific Native and Polynesian plants for Maui County

Zone 3

Type	Scientific Name	Common Name	Height	Spread	Elevation	Water req.
Sh	Argemone glauca var. deciplens	pua kala	3'	2'	sea to 3,000'	Dry to Medium
Sh	Bidens mauiensis	ko'oko'olau	1'	3'	sea to 1,000'	Dry to Medium
Sh	Bidens menziesii ssp. menziesii	ko'oko'olau	1'	3'		
Sh	Bidens micrantha ssp. micrantha	ko'oko'olau	1'	3'		
Sh	Chenopodium oahuense	'aheahea, 'aweoweo	6'		sea to higher	Dry to Medium
Sh	Dianella sandwicensis	'uki	2'	2'	1,000' to higher	Dry to Medium
Sh	Gossypium tomentosum	mao, Hawaiian cotton	5'	8'	sea to 1,000'	Dry to Medium
Sh	Hedyotis spp.	au, pilo	3'	2'	1,000' to 3,000'	Dry to Wet
Sh	Lipochaeta lavarum	nehe	3'	3'	sea to 3,000'	Dry to Medium
Sh	Osteomeles anthyllidifolia	'ulei, eluehe	4'	6'	sea to 3,000'	Dry to Medium
Sh	Scaevola sericea	naupaka, naupaka-kahakai	6'	8'	sea to 1,000'	Dry to Medium
Sh	Senna gaudichaudii	kolomana	5'	5'	sea to 3,000'	Dry to Medium
Sh	Solanum nelsonii	'akia, beach solanum	3'	3'	sea to 1,00'	Dry to Medium
Sh	Styphelia tameiameiae	pukiawe	6'	6'	1,000' to higher	Dry to Medium
Sh	Vitex rotundifolia	pohinahina	3'	4'	sea to 1,000'	Dry to Medium
Sh	Wikstroemia uva-ursi kauaiensis kauaiensis	'akia, Molokai osmanthus				
Sh - Tr	Broussonetia papyrifera	wauke, paper mulberry	8'	6'	sea to 1,000'	Dry to Medium
Sh - Tr	Myoporum sandwicense	naio, false sandalwood	10'	10'	sea to higher	Dry to Medium
Sh - Tr	Nototrichium sandwicense	kulu'i	8'	8'	sea to 3,000'	Dry to Medium
Sh-Tr	Dodonaea viscosa	'a'ali'i	6'	8'	sea to higher	Dry to Medium
Tr	Aleurites moluccana	candlenut, kukui	50'	50'	sea to 3,000'	Medium to Wet
Tr	Calophyllum inophyllum	kamani, alexandrian laurel	60'	40'	sea to 3,000'	Medium to Wet
Tr	Canthium odoratum	Alahe'e, 'ohe'e, walahe'e	12'	8'	sea to 3,000'	Dry to Medium
Tr	Cordia subcordata	kou	30'	25'	sea to 1,000'	Dry to Wet
Tr	Diospyros sandwicensis	lama	12'	15'	sea to 3,000'	Dry to Medium
Tr	Erythrina sandwicensis	wiliwili	20'	20'	sea to 1,000'	Dry
Tr	Metrosideros polymorpha var. macrophylla	ohi'a lehua	25'	25'	sea to 1,000'	Dry to Wet

Zone-specific Native and Polynesian plants for Maui County

Zone 3

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 3,00'	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	hao	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	milo	30'	30'	sea to 3,000'	Dry to Wet

CORRECTION

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

Zone-specific Native and Polynesian plants for Maui County

Zone 3

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 3,00'	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	hao	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	milo	30'	30'	sea to 3,000'	Dry to Wet

Zone-specific Native and Polynesian plants for Maui County

Zone 5

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	Colubrina asiatica	'anapanapa	3'	10'	sea to 1,000'	Dry to Wet
G	Eragrostis variabilis	'emo-loa	1'	2'	sea to 3,000'	Dry to Medium
G	Fimbristylis cymosa ssp. spathacea	mau'u'aki'aki fimbristylis	0.5'	1'	sea to 1,000'	Dry to Medium
Gr	Boerhavia repens	alena	0.5'	4'	sea to 1,000'	Dry to Medium
Gr	Chamaesyce celastroides var. laehiensis	'akoko	2'	3'	sea to 1,000'	Dry to Medium
Gr	Cressa truxillensis	cressa	0.5'	1'	sea to 1,000'	Dry to Medium
Gr	Heliotropium anomalum var. argenteum	hinahina ku kahakai	1'	2'	sea to 1,000'	Dry to Medium
Gr	Jacquemontia ovalifolia ssp. sandwicensis	pa'u o hi'iaka	0.5'	6'	sea to 1,000'	Dry to Medium
Gr	Lipochaeta integrifolia	nehe	1'	5'	sea to 1,00'	Dry to Medium
Gr	Sesuvium portulacastrum	'akulikuli, sea-purslane	0.5'	2'	sea to 1,000'	Dry to Wet
Gr	Sida fallax	'ilima	0.5'	3'	sea to 1,000'	Dry to Medium
Gr	Tephrosia purpurea var. purpurea	'auhuhu	2'	2'	sea to 1,000'	Dry to Medium
Gr - Sh	Hibiscus calyphyllus	ma'o hau hele, Rock's hibiscus	3'	2'	sea to 3,000'	Dry to Medium
Gr - Sh	Lycium sandwicense	'ohelo-kai, 'ae'ae	2'	2'	sea to 1,000'	Dry to Medium
P	Cocos nucifera	coconut, niu	100'	30'	sea to 1,000'	Dry to Wet
P	Pritchardia hillebrandii	lo'ulu, fan palm	25'	15'	sea to 1,000'	Dry to Wet
S	Mariscus javanicus	marsh cypress, 'ahu'awa	0.5'	0.5'	sea to 1,000'	Dry to Medium
Sh	Argemone glauca var. decipiens	pua kala	3'	2'	sea to 3,000'	Dry to Medium
Sh	Artemisia australis	'ahinahina	2'	3'	sea to 3,000'	Dry to Medium
Sh	Bidens hillebrandiana ssp. hillebrandiana	ko'oko'olau	1'	2'	sea to 1,000'	Dry to Wet
Sh	Bidens maulensis	ko'oko'olau	1'	3'	sea to 1,000'	Dry to Medium
Sh	Chenopodium oahuense	'aheahea, 'aweoweo	6'		sea to higher	Dry to Medium
Sh	Dianella sandwicensis	'uki	2'	2'	1,000' to higher	Dry to Medium
Sh	Gossypium tomentosum	mao, Hawaiian cotton	5'	8'	sea to 1,000'	Dry to Medium

Zone-specific Native and Polynesian plants for Maui County

Zone 5

Type	Scientific Name	Common Name	Height	Spread	Elevation	Water req.
Sh	Hedyotis spp.	au, pilo	3'	2'	1,000' to 3,000'	Dry to Wet
Sh	Lipochaeta lavarum	nehe	3'	3'	sea to 3,000'	Dry to Medium
Sh	Osteomeles anthyllidifolia	'ulei, eluehe	4'	6'	sea to 3,000'	Dry to Medium
Sh	Scaevola sericea	naupaka, naupaka-kahakai	6'	8'	sea to 1,000'	Dry to Medium
Sh	Senna gaudichaudii	kolomana	5'	5'	sea to 3,000'	Dry to Medium
Sh	Solanum nelsonii	'akia, beach solanum	3'	3'	sea to 1,00'	Dry to Medium
Sh	Vitex rotundifolia	pohinahina	3'	4'	sea to 1,000'	Dry to Medium
Sh	Wikstroemia uva-ursi kauaiensis kauaiensis	'akia, Molokai osmanthus				
Sh - Tr	Myoporum sandwicense	naio, false sandalwood	10'	10'	sea to higher	Dry to Medium
Sh-Tr	Dodonaea viscosa	'a'ali'i	6'	8'	sea to higher	Dry to Medium
Tr	Aleurites moluccana	candlenut, kukui	50'	50'	sea to 3,000'	Medium to Wet
Tr	Calophyllum inophyllum	kamani, alexandrian laurel	60'	40'	sea to 3,000'	Medium to Wet
Tr	Cordia subcordata	kou	30'	25'	sea to 1,000'	Dry to Wet
Tr	Hibiscus furcellatus	'akiohala, hau-hele	8'			
Tr	Morinda citrifolia	indian mulberry, noni	20'	15'	sea to 1,000'	Dry to Wet
Tr	Pandanus tectorius	hala, puhala (HALELIST)	35'	25'	sea to 1,000'	Dry to Wet
Tr	Thespesia populnea	milo	30'	30'	sea to 3,000'	Dry to Wet
V	Ipomoea pes-caprae	beach morning glory, pohuehue	1			

DO NOT PLANT THESE PLANTS !!!

Common name	Scientific name	Plant family
black wattle	Acacia mearnsii	Mimosaceae
blackberry	Rubus argulus	Rosaceae
blue gum	Eucalyptus globulus	Myrtaceae
bocconia	Bocconia frutescens	Papaveraceae
broad-leaved cordia	Cordia glabra	Boraginaceae
broomsedge, yellow bluestem	Andropogon virginicus	Poaceae
bulfelgrass	Cenchrus ciliaris	Poaceae
butterfly bush, smoke bush	Buddleja madagascariensis	Buddlejaceae
cats claw, Mysore thorn, wait-a-bit	Caesalpinia decapetala	Caesalpiniaceae
common ironwood	Casuarina equisetifolia	Casuarinaceae
common velvet grass, Yorkshire fog	Holcus lanatus	Poaceae
fiddlewood	Citharexylum spinosum	Verbenaceae
fire tree, faya tree	Myrica faya	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
klu, popinac	Acacia farnesiana	Mimosaceae
logwood, bloodwood tree	Haematoxylon campechianum	Caesalpiniaceae
loquat	Eriobotrya japonica	Rosaceae
meadow ricegrass	Ehrharta stipoides	Poaceae
melaleuca	Melaleuca quinquenervia	Myrtaceae
miconia, velvet leaf	Miconia calvescens	Melastomataceae
narrow-leaved carpetgrass	Axonopus fissifolius	Poaceae
oleaster	Elaeagnus umbellata	Elaeagnaceae
oriental mangrove	Bruguiera gymnorrhiza	Rhizophoraceae
padang cassia	Cinnamomum burmanii	Lauraceae
palmgrass	Setaria palmifolia	Poaceae
pearl flower	Heterocentron subtriplinervium	Melastomataceae
quinine tree	Cinchona pubesens	Rubiaceae
satin leaf, caimitillo	Chrysophyllum oliviforme	Sapotaceae
silkwood, Queensland maple	Flindersia brayleyana	Rutaceae
silky oak, silver oak	Grevillea robusta	Proteaceae
strawberry guava	Psidium cattleianum	Myrtaceae
swamp oak, saltmarsh, longleaf ironwood	Casuarina glauca	Casuarinaceae
sweet vernalgrass	Anthoxanthum odoratum	Poaceae
tree of heaven	Ailanthus altissima	Simaroubaceae
trumpet tree, guarumo	Cecropia obtusifolia	Cecropiaceae
white ginger	Hedychium coronarium	Zingiberaceae
white moho	Heliocarpus popayanensis	Tiliaceae
yellow ginger	Hedychium flavescens	Zingiberaceae

DO NOT PLANT THESE PLANTS !!!

Common name	Scientific name	Plant family
	Jasminum fluminense	Oleaceae
	Arthroslema ciliatum	Melastomataceae
	Dissotis rotundifolia	Melastomataceae
	Erigeron karvinskianus	Asteraceae
	Eucalyptus robusta	Myrtaceae
	Hedychium gardnerianum	Zingiberaceae
	Juncus planifolius	Juncaceae
	Lophostemon confertus	Myrtaceae
	Medinilla cumingii	Melastomataceae
	Medinilla magnifica	Melastomataceae
	Medinilla venosa	Melastomataceae
	Melastoma candidum	Melastomataceae
	Melinis minutiflora	Poaceae
	Olea europaea	
	Oxyspora paniculata	Melastomataceae
	Panicum maximum	Poaceae
	Paspalum urvillei	Poaceae
	Passiflora edulis	Passifloraceae
	Phormium tenax	Agavaceae
	Pinus taeda	Pinaceae
	Prosopis pallida	Fabaceae
	Pterolepis glomerata	Melastomataceae
	Rhodomyrtus tomentosa	Myrtaceae
	Schefflera actinophylla	Araliaceae
	Syzygium jambos	Myrtaceae
Australian blackwood	Acacia melanoxylon	Mimosaceae
Australian tree fern	Cyathea cooperi	Cyatheaceae
Australian tree fern	Sphaeropteris cooperi	Cyatheaceae
Beggar's tick, Spanish needle	Bidens pilosa	Asteraceae
California grass	Brachiaria mutica	Poaceae
Chinese banyon, Maylayan banyon	Ficus microcarpa	Moraceae
Chinese violet	Asystasia gangetica	Acanthaceae
Christmasberry, Brazilian pepper	Schinus terebinthifolius	Anacardiaceae
Formosan koa	Acacia confusa	Mimosaceae
German ivy	Senecio mikanioides	Asteraceae
Japanese honeysuckle	Lonicera japonica	Caprifoliaceae
Kosler's curse	Clidemia hirta	Melastomataceae
Lantana	Lantana camara	Verbenaceae
Mauritius hemp	Furcraea foetida	Agavaceae
Mexican ash, tropical ash	Fraxinus uhdei	Oleaceae
Mexican tulip poppy	Hunnemannia fumariifolia	Papaveraceae
Mules foot, Madagascar tree fern	Angiopteris evecta	Marattiaceae
New Zealand laurel, karakaranut	Corynocarpus laevigatus	Corynocarpaceae
New Zealand tea	Leptospermum scoparium	Myrtaceae
Pampas grass	Cortaderia jubata	Poaceae
Panama rubber tree, Mexican rubber tree	Castilloa elastica	Moraceae
Shoebutton ardisia	Ardisia elliptica	Myrsinaceae
banana poka	Passiflora mollissima	Passifloraceae

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.[1] 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 porus 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.[2] 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, it's 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.[3] 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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[1] K. Nagata, P.6

[2] K. Nagata, P.9

[3] Nagata, P.9

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 preform 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.[4] 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.[5]

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.[6] 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*:

WATER REQUIREMENT	WATERING FREQUENCY
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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[4] Nagata, p. 6

[5] Nagata, p. 8

[6] Nagata, p. 8

Propagation

There are many ways to propagate and plant-out native Hawaiian species. One of the most thourough 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, trimm off some of the leaves to compensate for the loss.[9]

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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[9] Bornhorst, p.20-21

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 Pl, Hana, Hawaii, 96713 — 248-8912
9. Kahului Library Courtyard, 20 School Street, Kahului, Hawaii — 873-3097

PLACES TO BUY NATIVES ON:

Maui:

1. Hoolawa Farms, P.O. Box 731, Haiku, Hawaii, 96708 — 572-4835
   - 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 — 878-2557
   - Many natives in stock
   - Get most of their plants from Hoolawa farms
   - They take special requests

3. Kihei Garden and Landscape — 244-3804

4. Maui Garden and Hardware — 877-0447
   - Will bring in special orders

5. Kihana Nursery, Kihei — 879-1165

6. Pukalani Plant Company, Jimmy Jones — 572-8950
   - Commercial wholesale only

7. The Hawaiian Collection — 878-1701
   - Specialize in Sandalwood propagation
   - Will propagate special requests

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

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Reauthorization Amendments of 1990

VII. ROADS, HIGHWAYS, AND BRIDGES

NOTE: Management Measures II.A and II.B of this chapter also apply to planning, siting, and developing roads and highways.[6]

A. Management Measure for Planning, Siting, and Developing Roads and Highways

Plan, site, and develop roads and highways to:

(1) Protect areas that provide important water quality benefits or are particularly susceptible to erosion or sediment loss;

(2) Limit land disturbance such as clearing and grading and cut and fill to reduce erosion and sediment loss; and

(3) Limit disturbance of natural drainage features and vegetation.

1. Applicability

This measure is intended to be applied by States to site development and land disturbing activities for new, relocated, and reconstructed (widened) roads (including residential streets) and highways in order to reduce the generation of nonpoint source pollutants and to mitigate the impacts of urban runoff and associated pollutants from such activities. 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 some 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 best time to address control of NPS pollution from roads and highways is during the initial planning and design phase. New roads and highways should be located with consideration of natural drainage patterns and planned to avoid encroachment on surface waters and wet areas. Where this is not possible, appropriate controls will be needed to minimize the impacts of NPS runoff on surface waters.

This management measure emphasizes the importance of planning to identify potential NPS problems early in the design process. This process involves a detailed analysis of environmental features most associated with NPS pollution, erosion and sediment problems such as topography, drainage patterns, soils, climate, existing land use, estimated traffic volume, and sensitive land areas. Highway locations selected, planned, and designed with consideration of these features will greatly minimize erosion and sedimentation and prevent NPS pollutants from entering watercourses during and after construction. An important consideration in planning is the distance between

[6] Management measure II.A applies only to runoff that emanates from the road, highway, and bridge right-of-way. This management measure does not apply to runoff and total suspended solid loadings from upland areas outside the road, highway, or bridge project.

a highway and a watercourse that is needed to buffer the runoff flow and prevent potential contaminants from entering surface waters. Other design elements such as project alignment, gradient, cross section, and the number of stream crossings also must be taken into account to achieve successful control of erosion and nonpoint sources of pollution. (Refer to Chapter 3 of this guidance for details on road designs for different terrains.)

The following case study illustrates some of the problems and associated costs that may occur due to poor road construction and design. These issues should be addressed in the planning and design phase.

CASE STUDY - ANNAPOLIS, MARYLAND

Poor road siting and design resulted in concentrated runoff flows and heavy erosion that threatened several house foundations adjacent to the road. Sediment-laden runoff was also discharged into Herring Bay. To protect the Chesapeake Bay and the nearby houses, the county corrected the problem by installing diversions, a curb-and-drain urban runoff conveyance, and a rock wall filtration system, at a total cost of $100,000 (Munsey, 1992).

3. Management Measure Selection

This management measure was selected because it follows the approach to highway development recommended by the American Association of State Highway and Transportation Officials (AASHTO), Federal Highway Administration (FHWA) guidance, and highway location and design guidelines used by the States of Virginia, Maryland, Washington, and others.

Additionally, AASHTO has location and design guidelines (AASHTO, 1990, 1991) available for State highway agency use that describe the considerations necessary to control erosion and highway-related pollutants. Federal Highway Administration policy (FHWA, 1991) requires that Federal-aid highway projects and highways constructed under direct supervision of the FHWA be located, designed, constructed, and operated according to standards that will minimize erosion and sediment damage to the highway and adjacent properties and abate pollution of surface water and ground-water resources.

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. Consider type and location of permanent erosion and sediment controls (e.g., vegetated filter strips, grassed swales, pond systems, infiltration systems, constructed urban runoff wetlands, and energy dissipators and velocity controls) during the planning phase of roads, highway, and bridges. (AASHTO, 1991; Hartigan et al., 1989)*

- *b. All wetlands that are within the highway corridor and that cannot be avoided should be mitigated. These actions will be subject to Federal Clean Water Act section 404 requirements and State regulations.*

c. *Assess and establish adequate setback distances near wetlands, waterbodies, and riparian areas to ensure protection from encroachment in the vicinity of these areas.*

Setback distances should be determined on a site-specific basis since several variables may be involved such as topography, soils, floodplains, cut-and-fill slopes, and design geometry. In level or gently sloping terrain, a general rule of thumb is to establish a setback of 50 to 100 feet from the edge of the wetland or riparian area and the right-of-way. In areas of steeply sloping terrain (20 percent or greater), setbacks of 100 feet or more are recommended. Right-of-way setbacks from major waterbodies (oceans, lakes, estuaries, rivers) should be in excess of 100 to 1000 feet.

d. *Avoid locations requiring excessive cut and fill. (AASHTO, 1991)*

e. *Avoid locations subject to subsidence, sink holes, landslides, rock outcroppings, and highly erodible soils. (AASHTO, 1991; TRB, Campbell, 1988)*

f. *Size rights-of-way to include space for siting runoff pollution control structures as appropriate. (AASHTO, 1991; Hartigan, et al., 1989)*

Erosion and sediment control structures (extended detention dry ponds, permanent sediment traps, catchment basins, etc.) should be planned and located during the design phase and included as part of the design specifications to ensure that such structures, where needed, are provided within the highway right-of-way.

g. *Plan residential roads and streets in accordance with local subdivision regulations, zoning ordinances, and other local site planning requirements (International City Managers Association, Model Zoning/Subdivision Codes). Residential road and street pavements should be designed with minimum widths.*

Local roads and streets should have right-of-way widths of 36 to 50 feet, with lane widths of 10 to 12 feet. Minimum pavement widths for residential streets where street parking is permitted range from 24 to 28 feet between curbs. In large-lot subdivisions (1 acre or more), grassed drainage swales can be used in lieu of curbs and gutters and the width of paved road surface can be between 18 and 20 feet.

h. *Select the most economic and environmentally sound route location. (FHWA, 1991)*

i. *Use appropriate computer models and methods to determine urban runoff impacts with all proposed route corridors. (Driscoll, 1990)*

Computer models to determine urban runoff from streets and highways include TR-55 (Soil Conservation Service model for controlling peak runoff); the P-8 model to determine storage capacity (Palmstrom and Walker); the FHWA highway runoff model (Driscoll et al., 1990); and others (e.g., SWMM, EPA's stormwater management model; HSP continuous simulation model by Hydrocomp, Inc.).

j. *Comply with National Environmental Policy Act requirements including other State and local requirements. (FHWA, T6640.8A)*

k. *Coordinate the design of pollution controls with appropriate State and Federal environmental agencies. (Maryland DOE, 1983)*

l. Develop local official mapping to show location of proposed highway corridors.

Official mapping can be used to reserve land areas needed for public facilities such as roads, highways, bridges, and urban runoff treatment devices. Areas that require protection, such as those which are sensitive to disturbance or development-related nonpoint source pollution, can be reserved by planning and mapping necessary infrastructure for location in suitable areas.

5. Effectiveness Information and Cost Information

The most economical time to consider the type and location of erosion, sediment, and NPS pollution control is early in the planning and design phase of roads and highways. It is much more costly to correct polluted runoff problems after a road or highway has already been built. The most effective and often the most economical control is to design roads and highways as close to existing grade as possible to minimize the area that must be cut or filled and to avoid locations that encroach upon adjacent watercourses and wet areas. However, some portions of roads and highways cannot always be located where NPS pollution does not pose a threat to surface waters. In these cases, the impact from potential pollutant loadings should be mitigated. Interactive computer models designed to run on a PC are available (e.g., FHWA's model, Driscoll et al., 1990) and can be used to examine and project the runoff impacts of a proposed road or highway design on surface waters. Where controls are determined to be needed, several cost-effective management practices, such as vegetated filter strips, grassed swales, and pond systems, can be considered and used to treat the polluted runoff. These mitigating practices are described in detail in the discussion on urban developments (Management Measure IV.A).

B. Management Measure for Bridges

Site, design, and maintain bridge structures so that sensitive and valuable aquatic ecosystems and areas providing important water quality benefits are protected from adverse effects.

1. Applicability

This management measure is intended to be applied by States to new, relocated, and rehabilitated bridge structures in order to control erosion, streambed scouring, and surface runoff from such activities. 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 some 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

This measure requires that NPS runoff impacts on surface waters from bridge decks be assessed and that appropriate management and treatment be employed to protect critical habitats, wetlands, fisheries, shellfish beds, and domestic water supplies. The siting of bridges should be a coordinated effort among the States, the FHWA, the U.S. Coast Guard, and the Army Corps of Engineers. Locating bridges in coastal areas can cause significant erosion and sedimentation, resulting in the loss of wetlands and riparian areas. Additionally, since bridge pavements are extensions of the connecting highway, runoff waters from bridge decks also deliver loadings of heavy metals, hydrocarbons, toxic substances, and deicing chemicals to surface waters as a result of discharge through scupper drains with no overland buffering. Bridge maintenance can also contribute heavy loads of lead, rust particles, paint, abrasive, solvents, and cleaners into surface waters. Protection against possible pollutant overloads can be afforded by minimizing the use of scuppers on bridges traversing very sensitive waters and conveying deck drainage to land for treatment. Whenever practical, bridge structures should be located to avoid crossing over sensitive fisheries and shellfish-harvesting areas to prevent washing polluted runoff through scuppers into the waters below. Also, bridge design should account for potential scour and erosion, which may affect shellfish beds and bottom sediments.

3. Management Measure Selection

This management measure was selected because of its documented effectiveness and to protect against potential pollution impacts from siting bridges over sensitive waters and tributaries in the coastal zone. There are several examples of siting bridges to protect sensitive areas. The Isle of Palms Bridge near Charleston, South Carolina, was designed without scupper drains to protect a local fishery from polluted runoff by preventing direct discharge into the waters below. In another example, the Louisiana Department of Transportation and Development specified stringent requirements before allowing the construction of a bridge to protect destruction of fragile wetlands near New Orleans. A similar requirement was specified for bridge construction in the Tampa Bay area in Florida (ENR, 1991).

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.

Additional erosion and sediment control management practices are listed in the construction section for urban sources of pollution (Management Measure IV.A).

a. Coordinate design with FHWA, USCG, COE, and other State and Federal agencies as appropriate.

b. Review National Environmental Policy Act requirements to ensure that environmental concerns are met (FHWA, T6640.8A and 23 CFR 771).

c. Avoid highway locations requiring numerous river crossings. (AASHTO, 1991)

d. Direct pollutant loadings away from bridge decks by diverting runoff waters to land for treatment.

Bridge decks should be designed to keep runoff velocities low and control pollutant loadings. Runoff waters should be conveyed away from contact with the watercourse and directed to a stable storm drainage, wetland, or detention pond. Conveyance systems should be designed to withstand the velocities of projected peak discharge.

e. Restrict the use of scupper drains on bridges less than 400 feet in length and on bridges crossing very sensitive ecosystems.

Scupper drains allow direct discharge of runoff into surface waters below the bridge deck. Such discharges can be of concern where the waterbody is highly susceptible to degradation or is an outstanding resource such as a spawning area or shellfish bed. Other sensitive waters include water supply sources, recreational waters, and irrigation systems. Care should be taken to protect these areas from contaminated runoff.

f. Site and design new bridges to avoid sensitive ecosystems.

Pristine waters and sensitive ecosystems should be protected from degradation as much as possible. Bridge structures should be located in alternative areas where only minimal environmental damage would result.

g. On bridges with scupper drains, provide equivalent urban runoff treatment in terms of pollutant load reduction elsewhere on the project to compensate for the loading discharged off the bridge.

5. Effectiveness Information and Cost Information

Effectively controlling NPS pollutants such as road contaminants, fugitive dirt, and debris and preventing accidental spills from entering surface waters via bridge decks are necessary to protect wetlands and other sensitive ecosystems. Therefore, management practices such as minimizing the use of scupper drains and diverting runoff waters to land for treatment in detention ponds and infiltration systems are known to be effective in mitigating pollutant loadings. Tables 4-7 and 4-8 in Section II provide cost and effectiveness data for ponds, constructed wetlands, and filtration devices.

C. Management Measure for Construction Projects

(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 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 new, replaced, restored, and rehabilitated road, highway, and bridge construction projects in order to control erosion and offsite movement of sediment from such project sites. 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 some 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

Erosion and sedimentation from construction of roads, highways, and bridges, and from unstabilized cut-and-fill areas, can significantly impact surface waters and wetlands with silt and other pollutants including heavy metals, hydrocarbons, and toxic substances. Erosion and sediment control plans are effective in describing procedures for mitigating erosion problems at construction sites before any land-disturbing activity begins. Additional relevant practices are described in Management Measures III.A and III.B of this chapter.

Bridge construction projects include grade separations (bridges over roads) and waterbody crossings. Erosion problems at grade separations result from water running off the bridge deck and runoff waters flowing onto the bridge deck during construction. Controlling this runoff can prevent erosion of slope fills and the undermining failure of the concrete slab at the bridge approach. Bridge construction over waterbodies requires careful planning to limit the disturbance of streambanks. Soil materials excavated for footings in or near the water should be removed and relocated to prevent the material from being washed back into the waterbody. Protective berms, diversion ditches, and silt fences parallel to the waterway can be effective in preventing sediment from reaching the waterbody.

Wetland areas will need special consideration if affected by highway construction, particularly in areas where construction involves adding fill, dredging, or installing pilings. Highway development is most disruptive in wetlands since it may cause increased sediment loss, alteration of surface drainage patterns, changes in the subsurface water table, and loss of wetland habitat. Highway structures should not restrict tidal flows into salt marshes and other coastal wetland areas because this might allow the intrusion of freshwater plants and reduce the growth of salt-tolerant species. To safeguard these fragile areas, the best practice is to locate roads and highways with sufficient setback distances between the highway right-of-way and any wetlands or riparian areas. Bridge construction also can impact water circulation and quality in wetland areas, making special techniques necessary to accommodate construction. The following case study provides an example of a construction project where special considerations were given to wetlands.

CASE STUDY - BRIDGING WETLANDS IN LOUISIANA

To provide protection for an environmentally critical wetland outside New Orleans, the Louisiana Department of Transportation and Development (DOTD) required a special construction technique to build almost 2 miles of twin elevated structures for the Interstate 310 link between I-10 and U.S. Route 90. A technique known as "end-on" construction was devised to work from the decks of the structures, building each section of the bridge from the top of the last completed section and using heavy cranes to push each section forward one bay at a time. The cranes were also used to position steel platforms, drive in support pilings, and lay deck slabs, alternating this procedure between each bay. Without this technique, the Louisiana DOTD would not have been permitted to build this structure. The twin 9,200-foot bridges took 485 days to complete at a cost of $25.3 million (*Engineering News Record*, 1991).

3. Management Measure Selection

This management measure was selected because it supports FHWA's erosion and sediment control policy for all highway and bridge construction projects and is the administrative policy of several State highway departments and local governmental agencies involved in land development activity. Examples of erosion and sediment controls and NPS pollutant control practices are described in AASHTO guidelines and in several State erosion control manuals (AASHTO, 1991; North Carolina DOT, 1991; Washington State DOT, 1988). A detailed discussion of cost-effective management practices is available in the urban development section (Section II) of this chapter. These example practices are also effective for highway construction projects.

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.

Additional erosion and sediment control management practices are listed in the construction section (Section III) of this chapter.

a. *Write erosion and sediment control requirements into plans, specifications, and estimates for Federal aid construction projects for highways and bridges (FHWA, 1991) and develop erosion control plans for earth-disturbing activities.*

Erosion and sediment control decisions made during the planning and location phase should be written into the contract, plans, specifications, and special provisions provided to the construction contractor. This approach can establish contractor responsibility to carry out the explicit contract plan recommendations for the project and the erosion control practices needed.

b. *Coordinate erosion and sediment controls with FHWA, AASHTO, and State guidelines.*

Coordination and scheduling of the project work with State and local authorities are major considerations in controlling anticipated erosion and sediment problems. In addition, the contractor should submit a general work schedule and plan that indicates planned implementation of temporary and permanent erosion control practices, including shutdown procedures for winter and other work interruptions. The plan also should include proposed methods of control on restoring borrow pits and the disposal of waste and hazardous materials.

c. *Install permanent erosion and sediment control structures at the earliest practicable time in the construction phase.*

Permanent or temporary soil stabilization practices should be applied to cleared areas within 15 days after final grade is reached on any portion of the site. Soil stabilization should also be applied within 15 days to denuded areas that may not be at final grade but will remain exposed to rain for 30 days or more. Soil stabilization practices protect soil from the erosive forces of raindrop impact and flowing water. Temporary erosion control practices usually include seeding, mulching, establishing general vegetation, and early application of a gravel base on areas to be paved. Permanent soil stabilization practices include vegetation, filter strips, and structural devices.

Sediment basins and traps, perimeter dikes, sediment barriers, and other practices intended to trap sediment on site should be constructed as a first step in grading and should be functional before upslope land disturbance takes place. Structural practices such as earthen dams, dikes, and diversions should be seeded and mulched within 15 days of installation.

d. *Coordinate temporary erosion and sediment control structures with permanent practices.*

All temporary erosion and sediment controls should be removed and disposed of within 30 days after final site stabilization is achieved or after the temporary practices are no longer needed. Trapped sediment and other disturbed soil areas resulting from the disposition of temporary controls should be permanently stabilized to prevent further erosion and sedimentation (AASHTO, 1991).

e. *Wash all vehicles prior to leaving the construction site to remove mud and other deposits. Vehicles entering or leaving the site with trash or other loose materials should be covered to prevent transport of dust, dirt, and debris. Install and maintain mud and silt traps.*

f. *Mitigate wetland areas destroyed during construction.*

Marshes and some types of wetlands can often be developed in areas where fill material was extracted or in ponds designed for sediment control during construction. Vegetated strips of native marsh grasses established along highway embankments near wetlands or riparian areas can be effective to protect these areas from erosion and sedimentation (FHWA, 1991).

g. *Minimize the area that is cleared for construction.*

h. *Construct cut-and-fill slopes in a manner that will minimize erosion.*

Cut-and-fill slopes should be constructed in a manner that will minimize erosion by taking into consideration the length and steepness of slopes, soil types, upslope drainage areas, and ground-water conditions. Suggested recommendations are as follows: reduce the length of long steep slopes by adding diversions or terraces; prevent concentrated runoff from flowing down cut-and-fill slopes by containing these flows within flumes or slope drain structures; and create roughened soil surfaces on cut-and-fill slopes to slow runoff flows. Wherever a slope face crosses a water seepage plane, thereby endangering the stability of the slope, adequate subsurface drainage should be provided.

i. *Minimize runoff entering and leaving the site through perimeter and onsite sediment controls.*

j. *Inspect and maintain erosion and sediment control practices (both on-site and perimeter) until disturbed areas are permanently stabilized.*

- k. *Divert and convey offsite runoff around disturbed soils and steep slopes to stable areas in order to prevent transport of pollutants off site.*

- l. *After construction, remove temporary control structures and restore the affected area. Dispose of sediments in accordance with State and Federal regulations.*

- m. *All storm drain inlets that are made operable during construction should be protected so that sediment-laden water will not enter the conveyance system without first being filtered or otherwise treated to remove sediment.*

5. Effectiveness Information and Cost Information

The detailed cost and effectiveness information presented under the construction measure for urban development is also applicable to road, highway, and bridge construction. See Tables 4-15 and 4-16 in Section III.

D. Management Measure for Construction Site Chemical Control

(1) Limit the 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 water.

1. Applicability

This management measure is intended to be applied by States to new, resurfaced, restored, and rehabilitated road, highway, and bridge construction projects in order to reduce toxic and nutrient loadings from such project sites. 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 some 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 objective of this measure is to guard against toxic spills and hazardous loadings at construction sites from equipment and fuel storage sites. Toxic substances tend to bind to fine soil particles; however, by controlling sediment mobilization, it is possible to limit the loadings of these pollutants. Also, some substances such as fuels and solvents are hazardous and excess applications or spills during construction can pose significant environmental impacts. Proper management and control of toxic substances and hazardous materials should be the adopted procedure for all construction projects and should be established by erosion and sediment control plans. Additional relevant practices are described in Management Measure III.B of this chapter.

3. Management Measure Selection

This management measure was selected because of existing practices that have been shown to be effective in mitigating construction-generated NPS pollution at highway project sites and equipment storage yards. In addition, maintenance areas containing road salt storage, fertilizers and pesticides, snowplows and trucks, and tractor mowers have the potential to contribute NPS pollutants to adjacent watercourses if not properly managed (AASHTO, 1988, 1991a). This measure is intended to safeguard surface waters and ground water from toxic and hazardous pollutants generated at construction sites. Examples of effective implementation of this measure are presented in the section on construction in urban areas. Several State environmental agencies are using this approach to regulate toxic and hazardous pollutants (Florida DER, 1988; Puget Sound Basin, 1991).

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.

The practices that are applicable to this management measure are described in Section III.B.

5. Effectiveness Information and Cost Information

The detailed cost and effectiveness data presented in the Section III.A of this chapter describing NPS controls for construction projects in urban development areas are also applicable to highway construction projects.

E. Management Measure for Operation and Maintenance

Incorporate pollution prevention procedures into the operation and maintenance of roads, highways, and bridges to reduce pollutant loadings to surface waters.

1. Applicability

This management measure is intended to be applied by States to existing, restored, and rehabilitated roads, highways, and bridges. 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 measures and will have some flexibility in doing so. The application of 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

Substantial amounts of eroded material and other pollutants can be generated by operation and maintenance procedures for roads, highways, and bridges, and from sparsely vegetated areas, cracked pavements, potholes, and poorly operating urban runoff control structures. This measure is intended to ensure that pollutant loadings from roads, highways, and bridges are minimized by the development and implementation of a program and associated practices to ensure that sediment and toxic substance loadings from operation and maintenance activities do not impair coastal surface waters. The program to be developed, using the practices described in this management measure, should consist of and identify standard operating procedures for nutrient and pesticide management, road salt use minimization, and maintenance guidelines (e.g., capture and contain paint chips and other particulates from bridge maintenance operations, resurfacing, and pothole repairs).

3. Management Measure Selection

This management measure for operation and maintenance was selected because (1) it is recommended by FHWA as a cost-effective practice (FHWA, 1991); (2) it is protective of the human environment (Puget Sound Water Quality Authority, 1989); (3) it is effective in controlling erosion by revegetating bare slopes (AASHTO, 1991b); (4) it is helpful in minimizing polluted runoff from road pavements (Transportation Research Board, 1991); and (5) both Federal (Richardson, 1974) and State highway agencies (Minnesota Pollution Control Agency, 1989; Pitt, 1973) advocate highway maintenance as an effective practice for minimizing pollutant loadings.

Maintenance of erosion and sediment control practices is of critical importance. Both temporary and permanent controls require frequent and periodic cleanout of accumulated sediment. Any trapping or filtering device, such as silt fences, sediment basins, buffers, inlets, and check dams, should be checked and cleaned out when approximately 50 percent of their capacity is reached, as determined by the erodible nature of the soil, flow velocity, and quantity of runoff. Seasonal and climatic differences may require more frequent cleanout of these structures. The sediments removed from these control devices should be deposited in permanently stabilized areas to prevent further erosion and sediment from reaching drainages and receiving streams. After periods of use, control devices may require replacement of deteriorated materials such as straw bales and silt fence fabrics, or restoration and reconstruction of sediment basins and riprap installations.

Permanent erosion controls such as vegetated filter strips, grassed swales, and velocity dissipators should be inspected periodically to determine their integrity and continued effectiveness. Continual deterioration or damage to these controls may indicate a need for better design or construction.

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 apply to achieve the management measure described above.

- *a. Seed and fertilize, seed and mulch, and/or sod damaged vegetated areas and slopes.*

- *b. Establish pesticide/herbicide use and nutrient management programs.*

Refer to the Management Measure for Construction Site Chemical Control in this chapter.

- *c. Restrict herbicide and pesticide use in highway rights-of-way to applicators certified under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) to ensure safe and effective application.*

- *d. The use of chemicals such as soil stabilizers, dust palliatives, sterilants, and growth inhibitors should be limited to the best estimate of optimum application rates. All feasible measures should be taken to avoid excess application and consequent intrusion of such chemicals into surface runoff.*

- *e. Sweep, vacuum, and wash residential/urban streets and parking lots.*

- *f. Collect and remove road debris.*

- *g. Cover salt storage piles and other deicing materials to reduce contamination of surface waters. Locate them outside the 100-year floodplain.*

- *h. Regulate the application of deicing salts to prevent oversalting of pavement.*

- *i. Use specially equipped salt application trucks.*

- *j. Use alternative deicing materials, such as sand or salt substitutes, where sensitive ecosystems should be protected.*

- *k. Prevent dumping of accumulated snow into surface waters.*

- *l. Maintain retaining walls and pavements to minimize cracks and leakage.*

- *m. Repair potholes.*

- *n. Encourage litter and debris control management.*

o. *Develop an inspection program to ensure that general maintenance is performed on urban runoff and NPS pollution control facilities.*

To be effective, erosion and sediment control devices and practices must receive thorough and periodic inspection checks. The following is a suggested checklist for the inspection of erosion and sediment controls (AASHTO Operating Subcommittee on Design, 1990):

- Clean out sediment basins and traps; ensure that structures are stable.
- Inspect silt fences and replace deteriorated fabrics and wire connections; properly dispose of deteriorated materials.
- Renew riprapped areas and reapply supplemental rock as necessary.
- Repair/replace check dams and brush barriers; replace or stabilize straw bales as needed.
- Regrade and shape berms and drainage ditches to ensure that runoff is properly channeled.
- Apply seed and mulch where bare spots appear, and replace matting material if deteriorated.
- Ensure that culverts and inlets are protected from siltation.
- Inspect all permanent erosion and sediment controls on a scheduled, programmed basis.

p. *Ensure that energy dissipators and velocity controls to minimize runoff velocity and erosion are maintained.*

q. *Dispose of accumulated sediment collected from urban runoff management and pollution control facilities, and any wastes generated during maintenance operations, in accordance with appropriate local, State, and Federal regulations.*

r. *Use techniques such as suspended tarps, vacuums, or booms to reduce, to the extent practicable, the delivery to surface waters of pollutants used or generated during bridge maintenance (e.g., paint, solvents, scrapings).*

s. *Develop education programs to promote the practices listed above.*

5. Effectiveness Information and Cost Information

Preventive maintenance is a time-proven, cost-effective management approach. Operation schedules and maintenance procedures to restore vegetation, proper management of salt and fertilizer application, regular cleaning of urban runoff structures, and frequent sweeping and vacuuming of urban streets have effective results in pollution control. Litter control, clean-up, and fix-up practices are a low-cost means for eliminating causes of pollution, as is the proper handling of fertilizers, pesticides, and other toxic materials including deicing salts and abrasives. Table 4-30 presents summary information on the cost and effectiveness of operation and maintenance practices for roads, highways, and bridges. Many States and communities are already implementing several of these practices within their budget limitations. As shown in Table 4-30, the use of road salt alternatives such as calcium magnesium acetate (CMA) can be very costly. Some researchers have indicated, however, that reductions in corrosion of infrastructure, damage to roadside vegetation, and the quantity of material that needs to be applied may offset the higher cost of CMA. Use of road salt minimization practices such as salt storage protection and special salt spreading equipment reduces the amount of salt that a State or community must purchase. Consequently, implementation of these practices can pay for itself through savings in salt purchasing costs. Similar programs such as nutrient and pesticide management can also lead to decreased expenditures for materials.

CMA Eligible for Matching Funds

Calcium magnesium acetate (CMA) is now eligible for Federal matching funds under the Bridge Program of the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991. The Act provides 80 percent funding for use of CMA on salt-sensitive bridges in order to protect against corrosion and to extend their useful life. CMA can also be used to protect vegetation from salt damage in environmentally sensitive areas.

Table 4-30. Effectiveness and Cost Summary for Roads, Highways, and Bridges Operation and Maintenance Management Practices

Management Practice	% Removal TSS	TP	TN	COD	Pb	Zn	Cost
MAINTAIN VEGETATION							
For Sediment Control							Natural succession allowed to occur -
Average:	90	NA	NA	NA	NA	NA	Avg: $100/ac/year
Reported Range:	50-100	NA	NA	NA	NA	NA	Reported Range: $50-$200/ac/year
Probable Range:	80-100	-	-	-	-	-	
For Pollutant Removal							Natural succession not allowed to occur -
Average:	60	40	40	50	50	50	Avg: $800/ac/year
Reported Range	0-100	0-100	0-70	20-80	0-100	50-60	Reported Range: $700-$900/ac/year
Probable Range:	0-100	0-100	0-100	0-100	0-100	0-100	
PESTICIDE/HERBICIDE USE MANAGEMENT							Generally accepted as an economical program to control excessive use
Average:	NA						
Reported Range:	NA						
Probable Range:							
STREET SWEEPING							
Smooth Street, Frequent Cleaning (One or More Passes Per Week)							Avg: $20/curb mile
Average:	20	NA	NA	5	25	NA	Reported Range: $10-$30/curb mile
Reported Range:	20	NA	NA	0-10	5-35	NA	
Probable Range:	20-50	-	-	0-10	20-50	10-30	
Infrequent Cleaning (One Pass Per Month or Less)							
Average:	NA	NA	NA	NA	5	NA	
Reported Range:	NA	NA	NA	NA	0-10	NA	
Probable Range:	0-20	-	-	-	0-20	0-10	
LITTER CONTROL							Generally accepted as an economical approach to control excessive use
Average:	NA						
Reported Range:	NA						
Probable Range:							

Table 4-30. (Continued)

Management Practice	% Removal TSS	TP	TN	COD	Pb	Zn	Cost
GENERAL MAINTENANCE (e.g., pothole and roadside repairs)							Generally accepted as an economical preventive maintenance program by local and State agencies
Average:	NA						
Reported Range:	NA						
Probable Range:							
PROTECTION OF SALT PILES							For salt storage building - Ave: $30/ton salt Reported Range: $10-$70/ton salt
Average:	NA						
Reported Range:	NA						
Probable Range:	90-100[a]						
MINIMIZATION OF APPLICATION OF DEICING SALTS							Generally accepted as an economical preventive maintenance program by local and State agencies
Average:	NA						
Reported Range:	NA						
Probable Range:	Deicing salts that are not applied to roads will not enter runoff[a]						
SPECIALLY EQUIPPED SALT APPLICATION TRUCKS							For spread rate control on truck - Ave: $6,000/truck Reported Range: $6,000/truck
Average:	NA						
Reported Range:	NA						
Probable Range:	Deicing salts that are not applied to roads will not enter runoff[a]						
USE OF ALTERNATIVE DEICING MATERIALS							CMA - Ave: $650/ton Reported Range: $650/ton (note: cost of salt $30/ton)
Average:	NA						
Reported Range:	NA						
Probable Range:	Deicing salts that are not applied to roads will not enter runoff[a]						
CONTAIN POLLUTANTS GENERATED DURING BRIDGE MAINTENANCE							Varies with method of containment use
Average:	NA						
Reported Range:	NA						
Probable Range:	50-100[b]						

NA = Not applicable.
[a]Measured as reduction in salt.
[b]Measured as reduction of all pollutants.

F. Management Measure for Road, Highway, and Bridge Runoff Systems

Develop and implement runoff management systems for existing roads, highways, and bridges to reduce runoff pollutant concentrations and volumes entering surface waters.

(1) Identify priority and watershed pollutant reduction opportunities (e.g., improvements to existing urban runoff control structures; and

(2) Establish schedules for implementing appropriate controls.

1. Applicability

This management measure is intended to be applied by States to existing, resurfaced, restored, and rehabilitated roads, highways, and bridges that contribute to adverse effects in surface waters. 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 some 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

This measure requires that operation and maintenance systems include the development of retrofit projects, where needed, to collect NPS pollutant loadings from existing, reconstructed, and rehabilitated roads, highways, and bridges. Poorly designed or maintained roads and bridges can generate significant erosion and pollution loads containing heavy metals, hydrocarbons, sediment, and debris that run off into and threaten the quality of surface waters and their tributaries. In areas where such adverse impacts to surface waters can be attributed to adjacent roads or bridges, retrofit management projects to protect these waters may be needed (e.g., installation of structural or nonstructural pollution controls). Retrofit projects can be located in existing rights-of-way, within interchange loops, or on adjacent land areas. Areas with severe erosion and pollution runoff problems may require relocation or reconstruction to mitigate these impacts.

Runoff management systems are a combination of nonstructural and structural practices selected to reduce nonpoint source loadings from roads, highways, and bridges. These systems are expected to include structural improvements to existing runoff control structures for water quality purposes; construction of new runoff control devices, where necessary to protect water quality; and scheduled operation and maintenance activities for these runoff control practices. Typical runoff controls for roads, highways, and bridges include vegetated filter strips, grassed swales, detention basins, constructed wetlands, and infiltration trenches.

3. Management Measure Selection

This management measure was selected because of the demonstrated effectiveness of retrofit systems for existing roads and highways that were constructed with inadequate nonpoint source pollution controls or without such controls. Structural practices for mitigating polluted runoff from existing highways are described in the literature (Silverman, 1988).

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. Locate runoff treatment facilities within existing rights-of-way or in medians and interchange loops.*
- *b. Develop multiple-use treatment facilities on adjacent lands (e.g., parks and golf courses).*
- *c. Acquire additional land for locating treatment facilities.*
- *d. Use underground storage where no alternative is available.*
- *e. Maximize the length and width of vegetated filter strips to slow the travel time of sheet flow and increase the infiltration rate of urban runoff.*

5. Effectiveness Information and Cost Information

Cost and effectiveness data for structural urban runoff management and pollution control facilities are outlined in Tables 4-15 and 4-16 in Section III and discussed in Section IV of this chapter and are applicable to determine the cost and effectiveness of retrofit projects. Retrofit projects can often be more costly to construct because of the need to locate the required structures within existing space or the need to locate the structures within adjacent property that requires purchase. However, the use of multiple-use facilities on adjacent lands, such as diverting runoff waters to parkland or golf courses, can offset this cost. Nonstructural practices described in the urban section also can be effective in achieving source control. As with other sections of this document, the costs of loss of habitat, fisheries, and recreational areas must be weighed against the cost of retrofitting control structures within existing rights-of-way.

6. Pollutants of Concern

Table 4-31 lists the pollutants commonly found in urban runoff from roads, highways, and bridges and their sources. The disposition and subsequent magnitude of pollutants found in highway runoff are site-specific and are affected by traffic volume, road or highway design, surrounding land use, climate, and accidental spills.

The FHWA conducted an extensive field monitoring and laboratory analysis program to determine the pollutant concentration in highway runoff from 31 sites in 11 States (Driscoll et al., 1990). The event mean concentrations (EMCs) developed in the study for a number of pollutants are presented in Table 4-32. The study also indicated that for highways discharging into lakes, the pollutants of major concern are phosphorus and heavy metals. For highways discharging into streams, the pollutants of major concern are heavy metals—cadmium, copper, lead, and zinc.

Table 4-31. Highway Runoff Constituents and Their Primary Sources

Constituents	Primary Sources
Particulates	Pavement wear, vehicles, atmosphere, maintenance
Nitrogen, Phosphorus	Atmosphere, roadside fertilizer application
Lead	Leaded gasoline (auto exhaust), tire wear (lead oxide filler material, lubricating oil and grease, bearing wear)
Zinc	Tire wear (filler material), motor oil (stabilizing additive), grease
Iron	Auto body rust, steel highway structures (guard rails, bridges, etc.), moving engine parts
Copper	Metal plating, bearing and bushing wear, moving engine parts, brake lining wear, fungicides and insecticides
Cadmium	Tire wear (filler material), insecticide application
Chromium	Metal plating, moving engine parts, break lining wear
Nickel	Diesel fuel and gasoline (exhaust), lubricating oil, metal plating, bushing wear, brake lining wear, asphalt paving
Manganese	Moving engine parts
Cyanide	Anticake compound (ferric ferrocyanide, sodium ferrocyanide, yellow prussiate of soda) used to keep deicing salt granular
Sodium, Calcium, Chloride	Deicing salts
Sulphate	Roadway beds, fuel, deicing salts
Petroleum	Spills, leaks or blow-by of motor lubricants, antifreeze and hydraulic fluids, asphalt surface leachate

In colder regions where deicing agents are used, deicing chemicals and abrasives are the largest source of pollutants during winter months. Deicing salt (primarily sodium chloride, NaCl) is the most commonly used deicing agent. Potential pollutants from deicing salt include sodium chloride, ferric ferrocyanide (used to keep the salt in granular form), and sulfates such as gypsum. Table 4-33 summarizes potential environmental impacts caused by road salt. Other chemicals used as a salt substitute include calcium magnesium acetate (CMA) and, less frequently, urea and glycol compounds. Researchers have differing opinions on the environmental impacts of CMA compared to those of road salt (Chevron Chemical Company, 1991; Salt Institute, undated; Transportation Research Board, 1991).

Table 4-32. Pollutant Concentrations in Highway Runoff (Driscoll et al., 1990)

Pollutant	Event Mean Concentration for Highways With Fewer Than 30,000 Vehicles/Day[a] (mg/L)	Event Mean Concentration for Highways With More Than 30,000 Vehicles/Day[a] (mg/L)
Total Suspended Solids	41	142
Volatile Suspended Solids	12	39
Total Organic Carbon	8	25
Chemical Oxygen Demand	49	114
Nitrite and Nitrate	0.46	0.76
Total Kjeldahl Nitrogen	0.87	1.83
Phosphate Phosphorus	0.16	0.40
Copper	0.022	0.054
Lead	0.080	0.400
Zinc	0.080	0.329

[a]Event mean concentrations are for the 50% median site.

Table 4-33. Potential Environmental Impacts of Road Salts

Environmental Resource	Potential Environmental Impact of Road Salt (NaCl)
Soils	May accumulate in soil. Breaks down soil structure, increases erosion. Causes soil compaction that results in decreased permeability.
Vegetation	Osmotic stress and soil compaction harm root systems. Spray causes foliage dehydration damage. Many plant species are salt-sensitive.
Ground Water	Mobile Na and Cl ions readily reach ground water. Increases NaCl concentration in well water, as well as alkalinity and hardness.
Surface Water	Causes density stratification in ponds and lakes that can prevent reoxygenation. Increases runoff of heavy metals and nutrients through increased erosion.
Aquatic Life	Monovalent Na and Cl ions stress osmotic balances. Toxic levels: Na - 500 ppm for stickleback; Cl - 400 ppm for trout.
Human/Mammalian	Sodium is linked to heart disease and hypertension. Chlorine causes unpleasant taste in drinking water. Mild skin and eye irritant. Acute oral LD_{50} in rats is approximately 3,000 mg/kg (slightly toxic).

MUNEKIYO HIRAGA, INC.

October 5, 2001

David Craddick
Department of Water Supply
200 South High Street
Wailuku, Hawaii 96793

SUBJECT: Makena Alanui Improvements, SM1 2001/0012
TMK (2) 2-1-05:85 (por.) & 108 (por.)

Dear Mr. Craddick:

Thank you for your letter dated August 20, 2001 regarding the subject project. In response to the comments provided, we note the following.

Construction plans will be submitted to the Department of Water Supply Engineering Division in order to coordinate construction so as to minimize potential disruptions to water service in the area.

The applicant is aware that the required fire hydrant spacing for the proposed hotel zoning along the subject roadway is 500 feet.

The applicant will continue to use brackish water and reclaimed water for roadside landscaping in order to conserve potable water resources, and will utilize Best Management Practices (BMP's) during project implementation to prevent any potential polluting activities of groundwater resources.

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

Very truly yours,

Dean K. Frampton, Planner

DKF:cc
cc: Roy Figueiroa, Makena Resort Corp.
Mike Ishikawa, Sato & Associates, Inc.
makenan alanui dws ltr

Maui Electric Company, Ltd. • 210 West Kamehameha Avenue • PO Box 398 • Kahului, Maui, HI 96733-6898 • (808) 871-8461

'01 AUG 10 P4:04

DEPT OF PLANNING
COUNTY OF MAUI
RECEIVED

August 7, 2001

Mr. John E. Min
Planning Director
Maui Planning Department
250 S. High Street
Wailuku, HI 96793

Dear Mr. Min:

Subject: Makena Alanui Improvements
TMK: County if Maui Right-of-Way, 2-1-5:85(por) and 108(por)
I.D.: SM1 2001/0012

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

MUNEKIYO HIRAGA, INC.

October 26, 2001

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

SUBJECT: Makena Alanui Improvements, SM1 2001/0012
TMK(2) 2-1-5:85 (por.) & 108 (por.)

Dear Mr. Shinyama:

Thank you for your letter dated August 7, 2001 regarding the subject project. In response to the comments provided, we note the following.

The applicant's electrical consultant will coordinate with MECO as soon as practical to facilitate the timely delivery of the project's electrical requirements.

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

Very truly yours,

Dean K. Frampton, Planner

DKF:to
cc: Roy Figueiroa, Makena Resort Corp.
Mike Ishikawa, Sato & Associates, Inc.
makenart/alanui/mecoltr 001

305 High Street, Suite 104 · Wailuku, Hawaii 96793 · ph: (808)244-2015 · fax: (808)244-8729 · planning@mhmconline.com

Verizon Hawaii Inc.

verizon

60 So. Church Street
Wailuku, HI 96793

Phone 808.242.5276

August 17, 2001

County of Maui
Department of Planning
250 South High Street
Wailuku, Maui, HI 96793

Attn: Mr. John Min, Planning Director

Subject: Special Management Area (SMA)
Use permit application
SM1 2001/0012, TMK: 2-1-5:85(por) and 108(por)
Applicant: Makena Resort Corp.

Dear Sir:

Thank you for forwarding a copy of the proposed SMA filing as prepared by Munekiyo & Hiraga, Inc. in behalf of its principal Makena Resort Corp. for the planned roadway improvements, as described by the subject tax map key affecting a portion of Makena Alanui, dated 6/2001.

The following is Verizon Hawaii Inc.'s comment(s) regarding this application:

Reference: Document, section 8, "preliminary engineering plans" dwg no. C-4 & C-5, from Sta. 3 + 90.27 to Sta. 20 + 00.

Comment: Approximately five (5) joint utility poles and appurtenances (aerial cables, anchors, Etc.) are in conflict with the improvements. However, these conflicts will be resolved privately with Makena Resort Corp., regarding necessary easements and the cost to relocate, as required by Verizon and MECo.; should the developer by choice not by statute elect to place the utilities underground, then all infra-structure, as approved by the utility company(s), will be provided by the developer @ no cost to the utilities.

In closing, Verizon Hawaii Inc. is in support of Makena Resort Corp.'s efforts past, present, and in the Future to improve the Makena area.

If you have any questions, please call me at (808) 242-5258.

Sincerely,

Sheri Ann Tihada
Verizon Hawaii, Inc.
Senior Engineer

Cc: Makena Resort Corp, Roy Figueiroa
MECo, Greg Kauhi
Munekiyo & Hiraga, Inc., Dean Fampton

MUNEKIYO HIRAGA, INC.

August 31, 2001

Sheri Ann Tihada, Senior Engineer
Verizon Hawaii, Inc.
60 So. Church Street
Wailuku, Hawaii 96793

SUBJECT: Special Management Area (SMA) Use Permit Application
TMK (2) 2-1-5:85 (por) and 108(por)
SM1 2001/0012

Dear Ms. Tihada:

On behalf of the applicant, Makena Resort Corporation, thank you for your comment letter dated August 17, 2001 regarding the subject project. In response to the comments provided, we note the following.

Approximately five (5) joint utility poles and appurtenances (aerial cables, anchors, etc.) are in conflict with the proposed improvements. Conflicts regarding necessary easements and the cost to relocate the existing overhead utilities will be resolved privately between Makena Resort Corp. and Verizon Hawaii, Inc.

Further, should Makena Resort Corp. by choice, not by statute, elect to place the existing utilities underground, all related infrastructure will be provided by the developer at no cost to Verizon, Inc.

We thank you for your interest in this important project. Should you have any questions or require additional information, please do not hesitate to call me at 244-2015.

Very truly yours,

Dean K. Frampton, Planner

DKF:to
cc: Roy Figueiroa, Makena Resort Corp.
Mike Ishikawa, Sato & Associates, Inc.
makenart alanuvverizon ltr

References

References

Austin, Tsutsumi & Associates, Inc., Wailea Resort Revised Master Plan Traffic Impact Analysis Report, October 1997.

Community Resources, Inc., Maui County Community Plan Update Program Sock-Economic Forecast Report, January 1994.

County of Maui, Maui County Data Book 1998, June 1998.

First Hawaiian Bank, Supplement to Economic Indicators, Maui County Profiles, July/August, 1993.

Garcia and Associates, Archaeological Procedures in Six Petition Areas Proposed for State Land Use District Boundary Amendment by the Makena Resort Corp., Makena, Makawao, Maui Island, Draft Report prepared March 1997.

Munekiyo & Arakawa, Inc., Draft Environmental Assessment, Wailea Resort Land Use Amendments, October 1996.

Munekiyo, Arakawa & Hiraga, Inc., Applications for Change in Zoning, Project District Phase I and Phase II Approvals, and Special Management Area Use Permit - Palauea Subdivision, October 1999.

Munekiyo, Arakawa & Hiraga, Inc., Wailea Business Center and Wailea Tennis Center Parking Improvements - Applications for Change in Zoning, Special Management Area Use Permit, Conditional Permit, Off-Site Parking and Project District Approval, March 1999.

State Department of Labor and Industrial Relations, personal communication from Ray Domingo, June 6, 2000.

State of Hawaii, Department of Business, Economic Development, and Tourism, Hawaii Census 2000.

University of Hawaii, Department of Geography, Atlas of Hawaii, Second Edition, 1983.

University of Hawaii, Land Study Bureau, Detailed Land Classification - Island of Maui, 1967.

U. S. Department of Agriculture, Soil Conservation Service, Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii, 1972.

Appendix A

Drainage Report for Makena Alanui Road Widening

DRAINAGE REPORT

FOR

MAKENA ALANUI ROAD WIDENING

PREPARED FOR:

MAKENA RESORT CORP.
5415 MAKENA ALANUI ROAD
KIHEI, MAUI, HAWAII 96753

PREPARED BY:

SATO & ASSOCIATES, INC.
2046 SOUTH KING STREET
HONOLULU, HAWAII 96826

MAY 2001

DRAINAGE REPORT

FOR

MAKENA ALANUI ROAD WIDENING

PREPARED FOR:

MAKENA RESORT CORP.
5415 MAKENA ALANUI ROAD
KIHEI, MAUI, HAWAII 96753

PREPARED BY:

SATO & ASSOCIATES, INC.
2046 SOUTH KING STREET
HONOLULU, HAWAII 96826

MAY 2001

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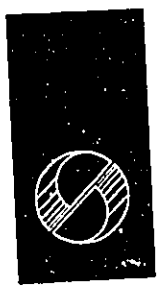


I. INTRODUCTION:

Makena Resort land area is approximately 1,843 acres and are divided into various proposed land uses. Approximately 39.5 acres have been set aside for hotel use, 23.3 acres for business, 222.2 acres for multifamily, 365.1 acres for single family, 431.4 acres for golf course, 32.9 acres for park, and 25.8 acres for public/quasi public use. The remaining 702 acres have no proposed land use designation at this time or have been set aside for future road corridors.

II. PROJECT LOCATION:

Makena Resort is situated in Kihei on the southern end of the island of Maui. The property is bound to the north by Wailea Golf Course and to the south and east by Ulupalakua Ranch. The Pacific Ocean and various private land owners abut the resort to the west. See EXHIBITS 1 and 2.

III. PROJECT DESCRIPTION:

Makena Resort Corp. plans to widen a portion of Makena Alanui Road from an existing 24 feet wide pavement to a 44 feet wide curb to curb roadway with a 6 feet wide concrete sidewalk. The widening length is approximately 2,100 feet long. This work will complete the widening of Makena Alanui Road to Makena Keoneoio Road. See EXHIBIT 3.

The existing drain culverts crossing Makena Alanui Road will remain and continue to convey storm water towards the shoreline. The existing flow line will not be altered.

IV. FLOOD AND TSUNAMI HAZARD:

According to the flood insurance rate map, the majority of the resort's property is located on land designated as Zone "C," which is defined as areas that may be subjected to minimal flooding.

The proposed road widening site is located within the Zone "C" area. See EXHIBIT 4.

V. METHOD OF HYDROLOGIC COMPUTATIONS:

Storm runoff was calculated using the rational method (Q = CiA). Runnoff coefficient "C" is based on a weighted calculation as a function of land area and terrain type. Rainfall intensity (i) is taken from Muroda and Associates, Inc.'s "Master Drainage Plan" for Makena Resort. Roadway flows were based on a 10-year, 1-hour storm for the existing terrain conditions. Flows for culvert crossings were based on a 50-year, 1-hour design storm, with developed conditions according to the Makena Resort's Master Plan taken into consideration.

VI. EXISTING STORM RUNOFF CONDITIONS:

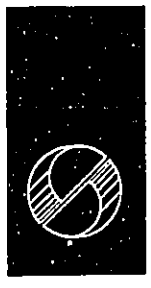
According to the "Master Drainage Plan" prepared by Muroda and Associates, Inc., the proposed road widening will affect drainage basin number 20. The existing peak flow for this basin is 210 cubic feet per second (cfs).

Storm flow from this basin runs from east to west via natural gullies and gulches. Existing culverts in Makena Alanui Road then allows the flow to cross the road where they eventually sheet flow into the ocean. See EXHIBIT 5.

VII. DEVELOPED RUNOFF CONDITIONS:

After the road widening improvements are completed, the 50-year, 1-hour runoff for basin number 20 will increase by approximately 15.90 cfs. This increase is due to the addition of impervious surfaces created from the widening of the existing road. To minimize impacts caused by this increase, improvements will be designed to maintain drainage patterns set in the "Master Drainage Plan." See EXHIBIT 6.

The drainage system for the road widening will accommodate existing runoff flowing onto the roadway and flows from the roadway itself. The existing culverts along Makena Alanui Road were sized and located according to the "Master Drainage Plan."



VIII. CONCLUSION:

Construction of the road widening improvements is not expected to cause any adverse effects to the adjacent or downstream properties. The proposed improvements will increase runoff by 15.90 cfs. This represents a 7.6 percent increase in comparison to the existing 210 cfs. Runoff generated by the road widening will be collected and piped to drainage ways defined in the "Master Drainage Plan."

IX. REFERENCES:

1. Department of Public Works and Waste Management, County of Maui, Chapter 4, "Rules for the Design of Storm Drainage Facilities in the County of Maui," July 1995.

2. Federal Emergency Management Agency, Federal Insurance Administration, "Flood Insurance Rate Map," Maui County, Hawaii, effective date: June 1, 1981.

3. Muroda and Associates, Inc., "Master Drainage Plan - Proposed Developments for Seibu Hawaii, Inc.," Makena, Maui, Hawaii.

Sato & Associates, Inc.
Consulting Engineers

Sheet: ____ Of: ____
By: ____ Date: 5/10/01
Chkd. by: ____ Date: ____

PROJECT: Makena Alanui Road Widening

HYDROLOGIC CALCULATION (Roadway)

Rational Method

$Q = CiA$

C: Infiltration 0.20
Relief 0.00
Vegetal Cover 0.07
Devel. Type 0.55
0.83

Say C = 0.95 (For Roads)

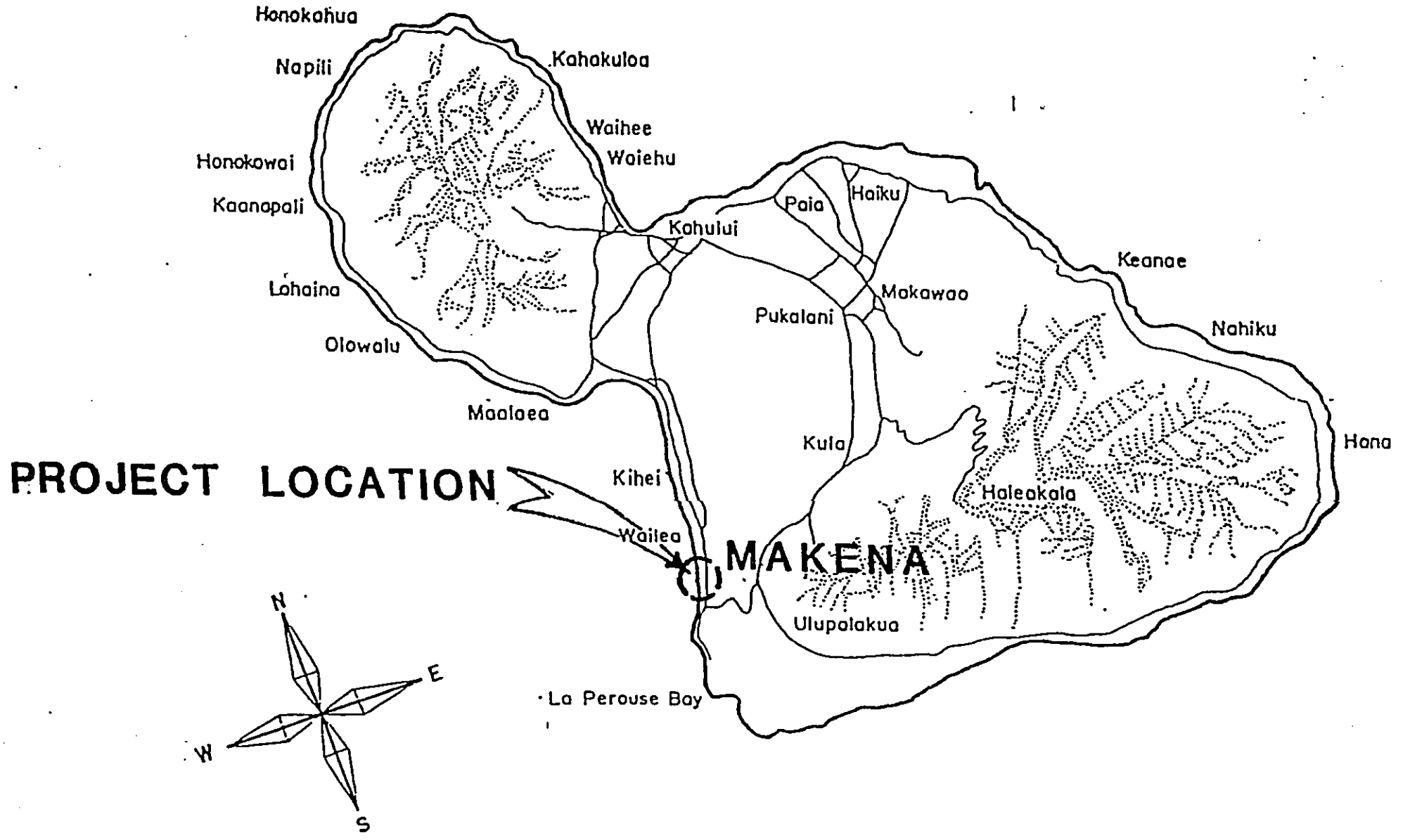
i = 2.5 inches
50 yr - 1 hour storm

T_c = 10 min.

i_{50} = 5.20

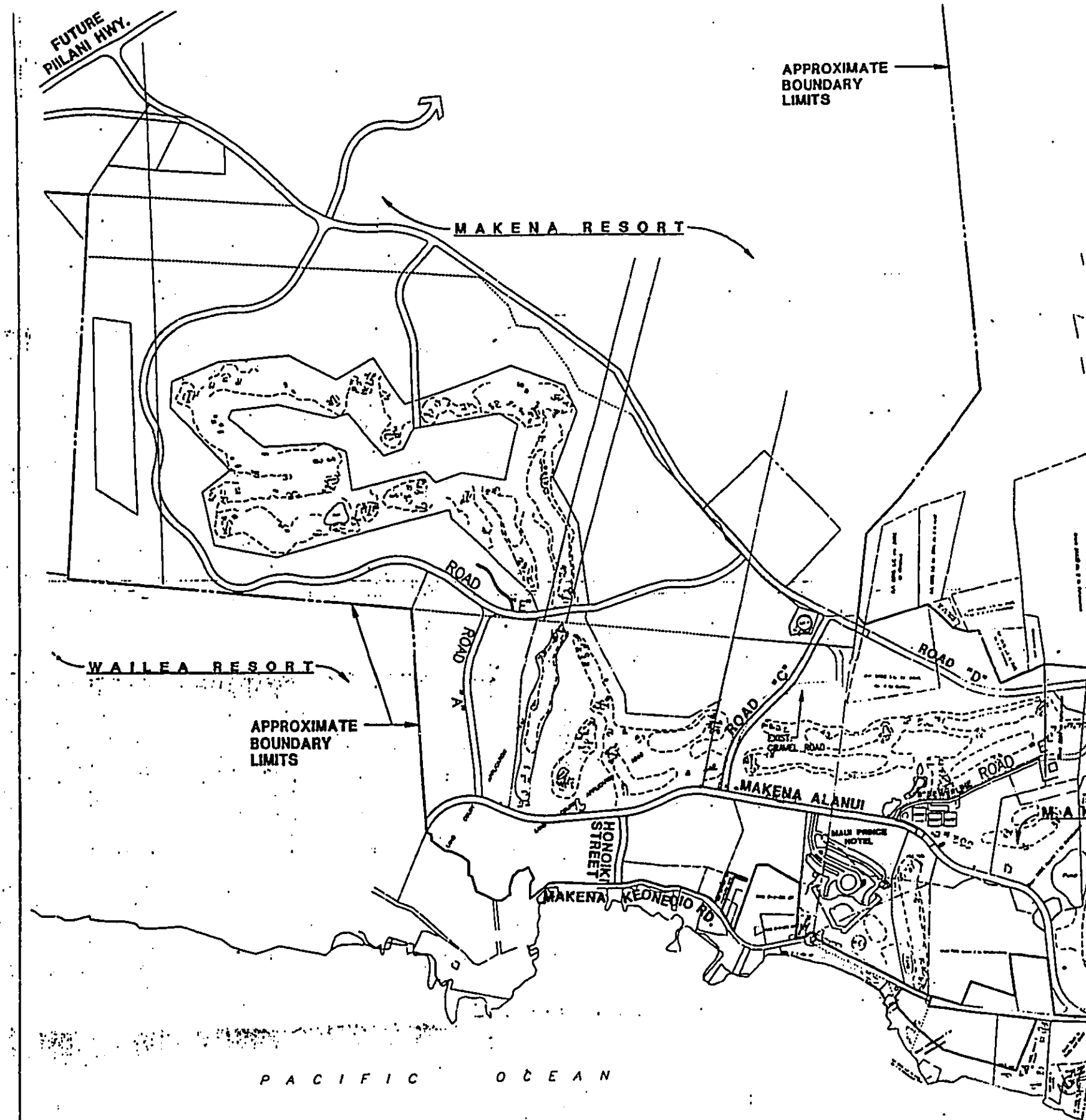
AREA	ACRES	Q_{50} CFS
A-1	0.51	2.52
B-1	0.51	2.52
A-2	0.52	2.57
B-2	0.52	2.57
C-1	0.58	2.86
D-1	0.58	2.86

APPENDIX

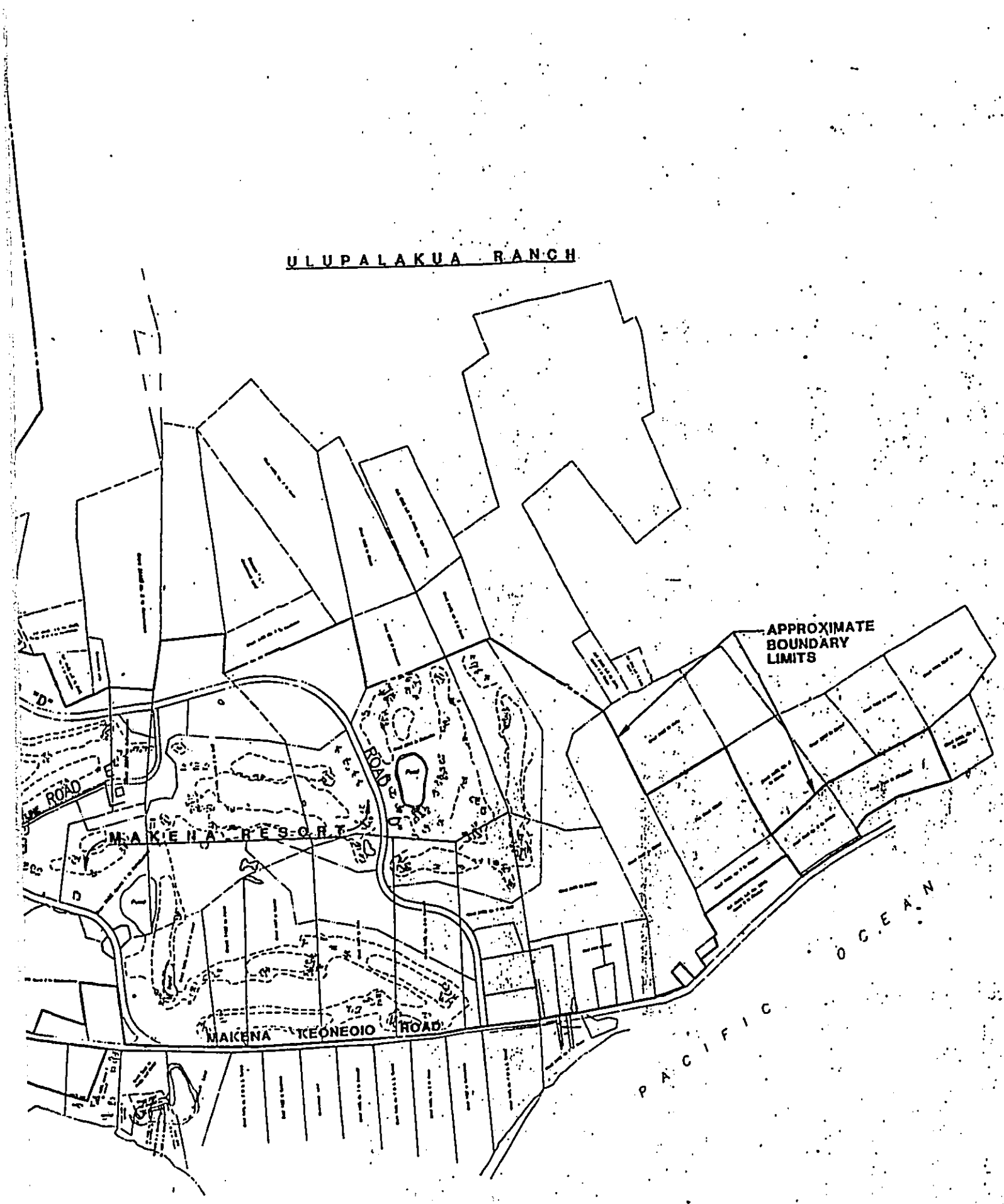


PROJECT LOCATION

EXHIBIT 1
ISLAND OF MAUI



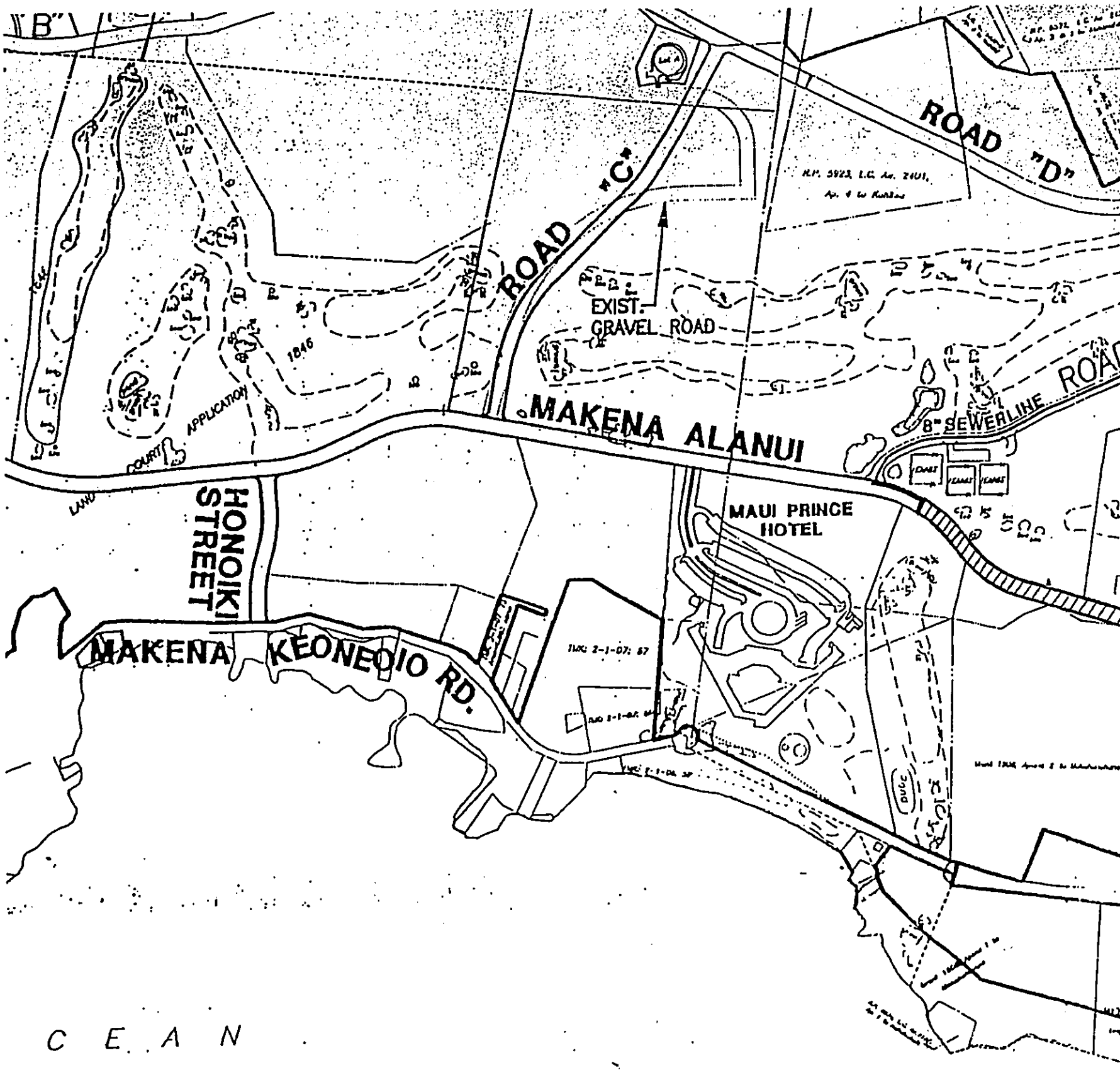
SITE LOCATION M



CATION MAP

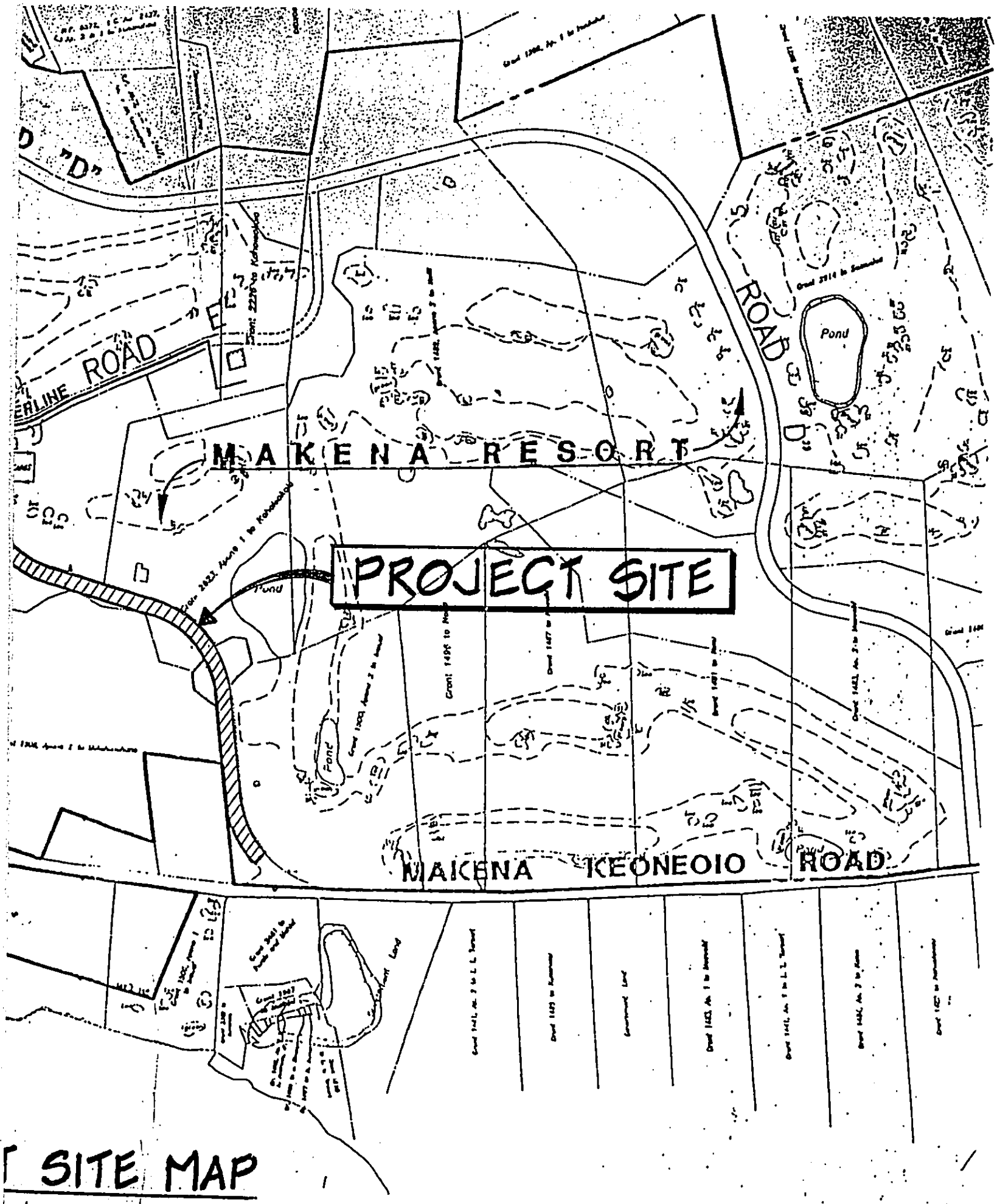
1"=500'

EXHIBIT 2



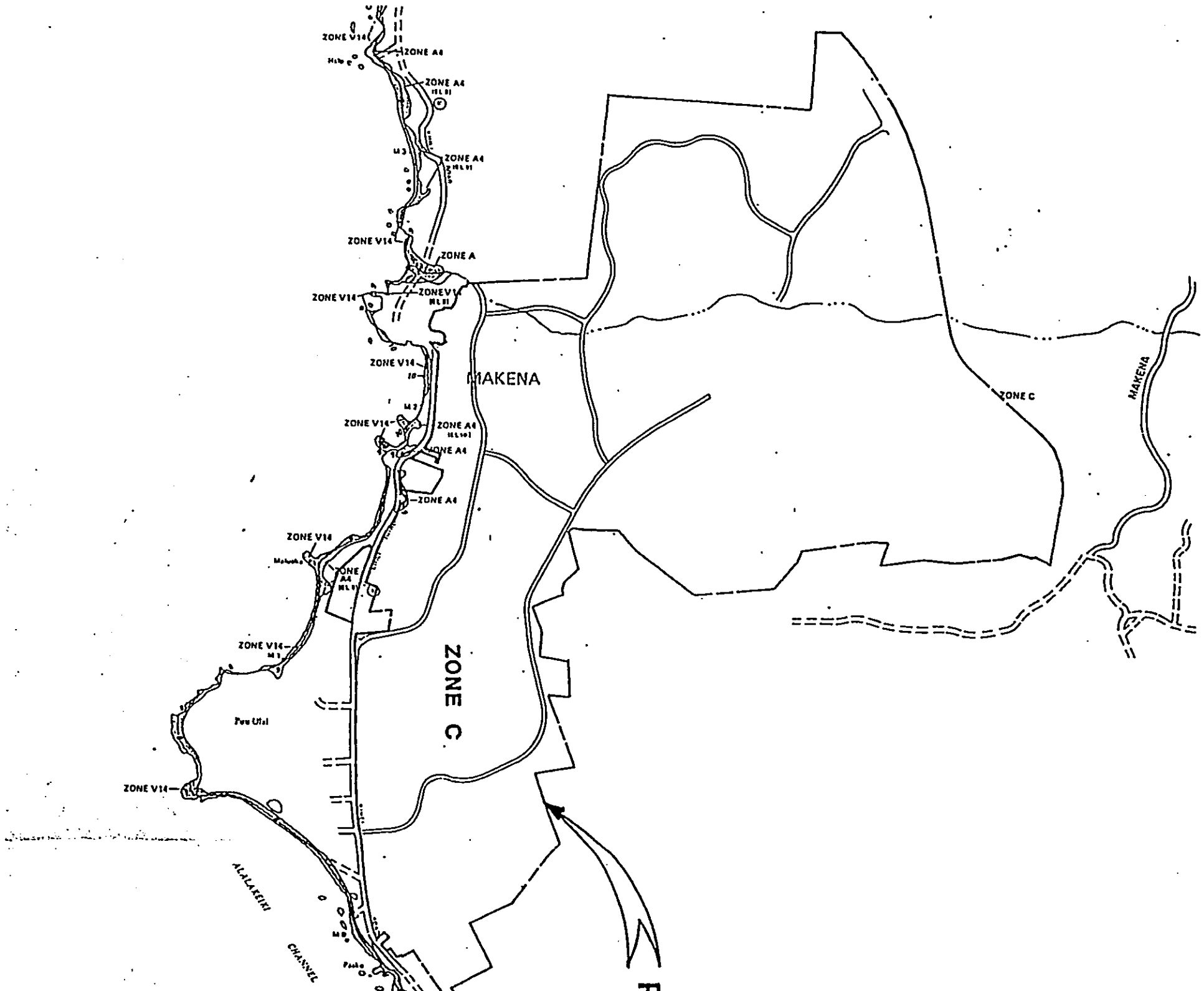
PROJECT SITE

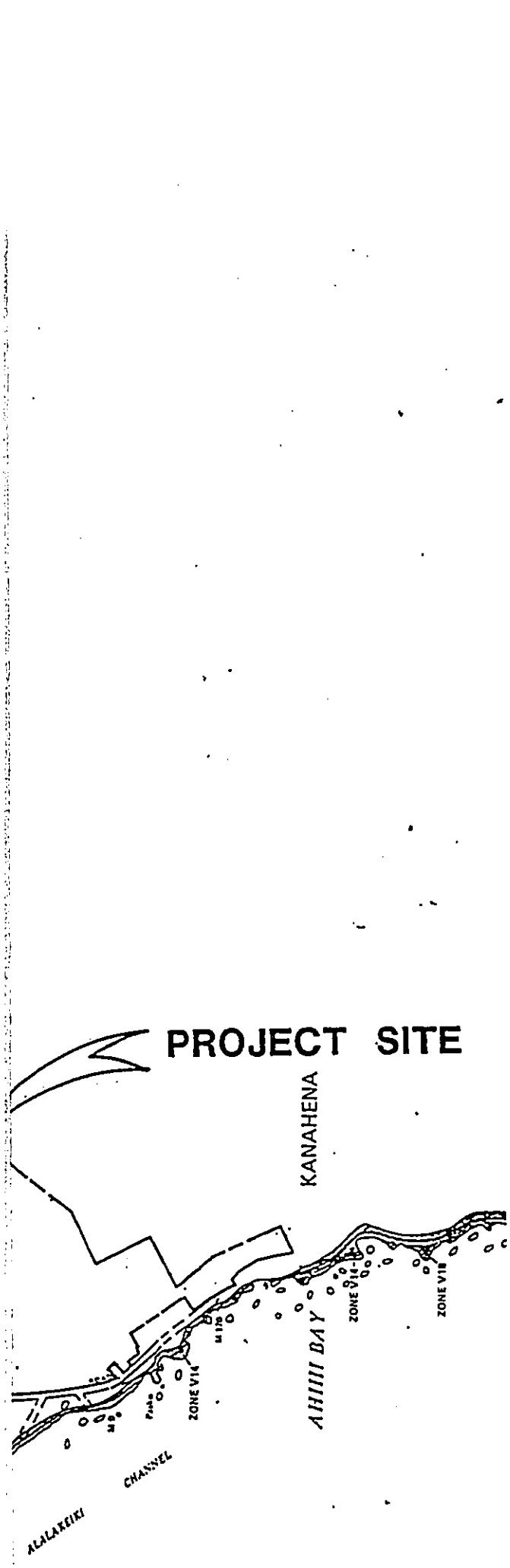
SCALE: 1" = 500'



SITE MAP

EXHIBIT 3


ZONE V14
ZONE A4
ZONE A4
ZONE A4
ZONE V14
ZONE A
ZONE V14
ZONE V14
ZONE V14
ZONE A4
ZONE A4
ZONE A4
ZONE V14
ZONE A4
ZONE V14
ZONE V14
Pou Ufai
ZONE V14
MAKENA
ZONE C
ZONE C
MAKENA
ALALAKEIKI
CHANNEL



NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

MAUI COUNTY, HAWAII

PANEL 330 OF 400
(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
150003 0330 B

EFFECTIVE DATE:
JUNE 1, 1981

federal emergency management agency
federal insurance administration

APPROXIMATE SCALE

EXHIBIT 4

FLOOD INSURANCE RATE MAP

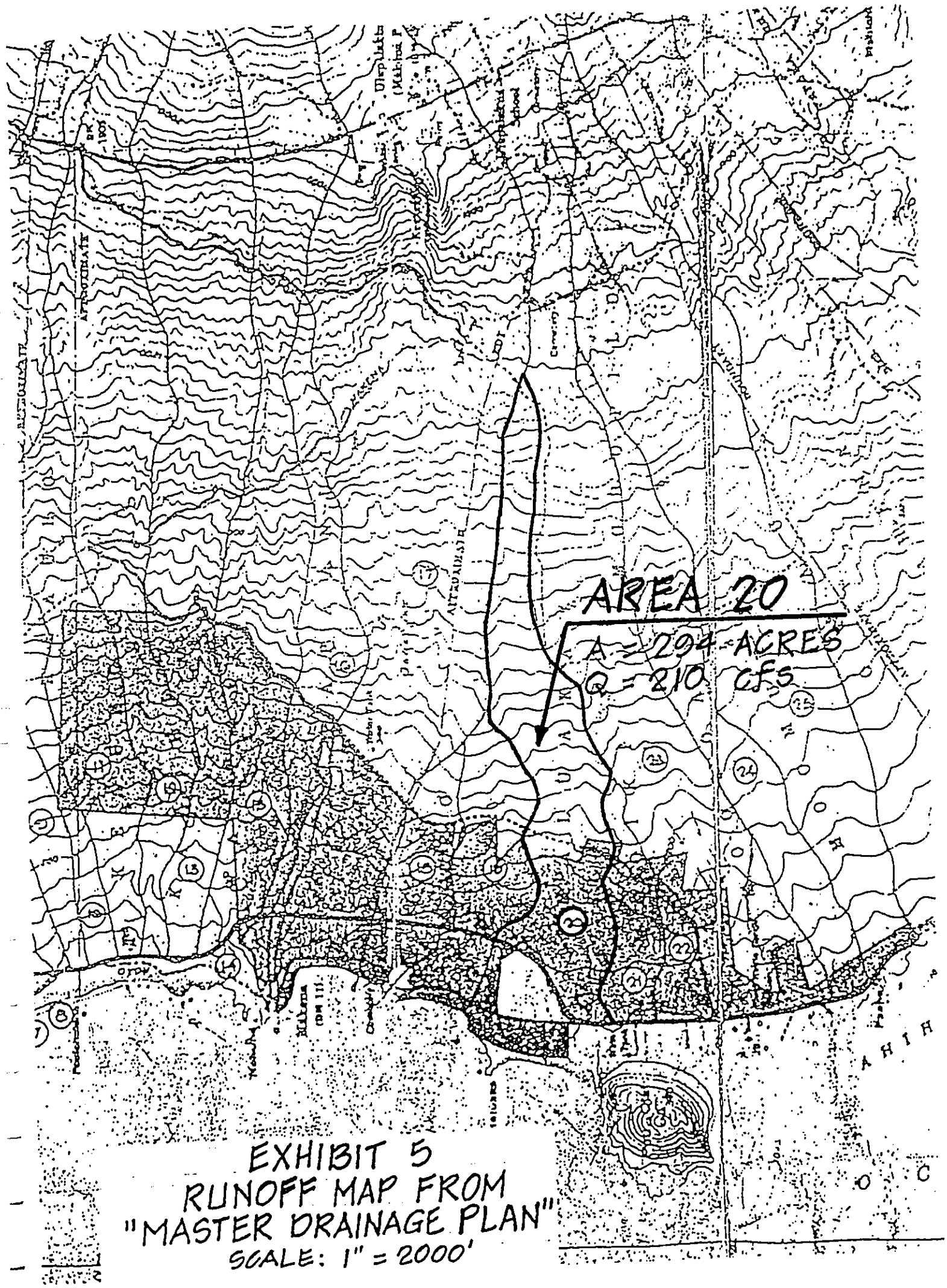
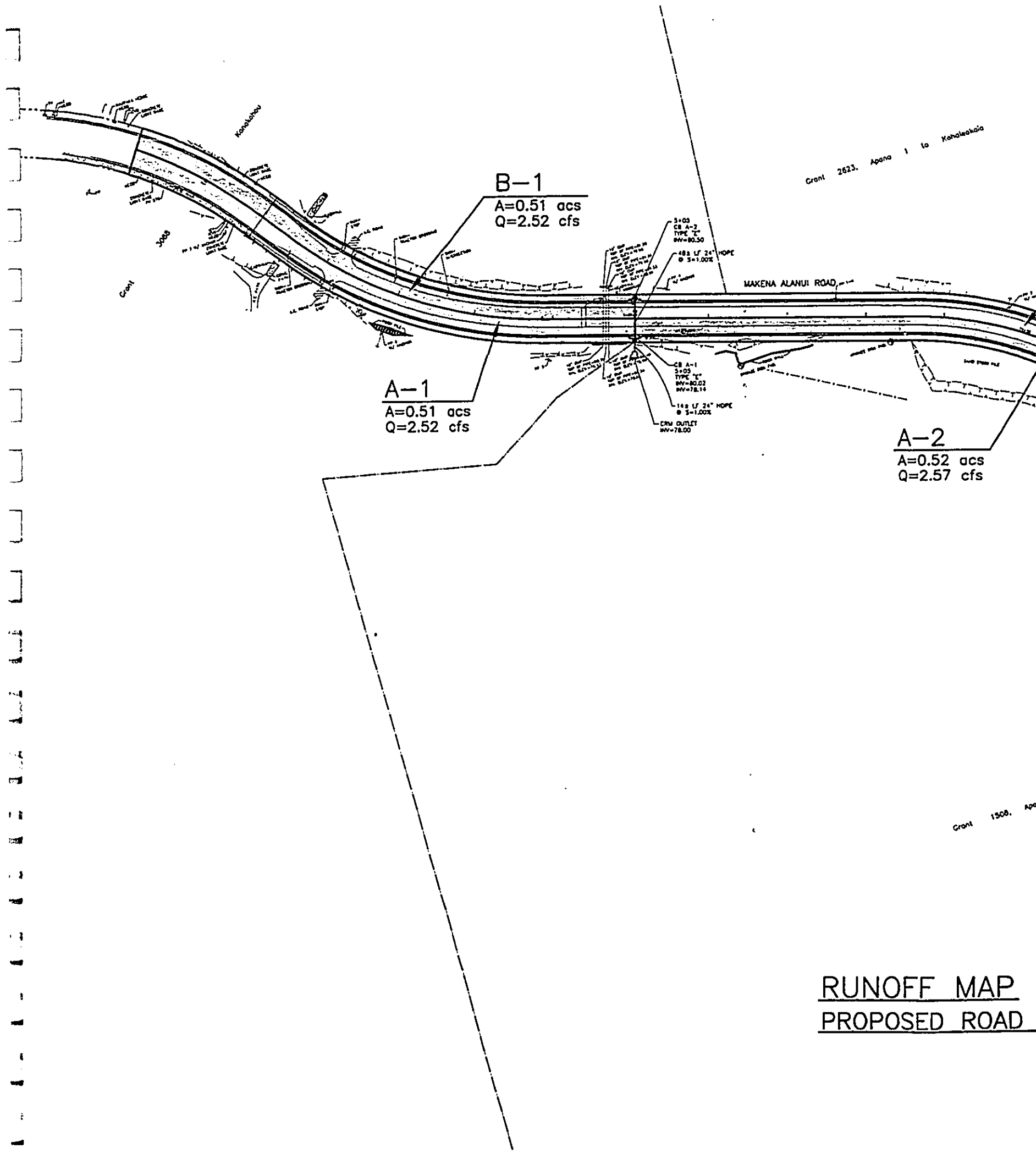
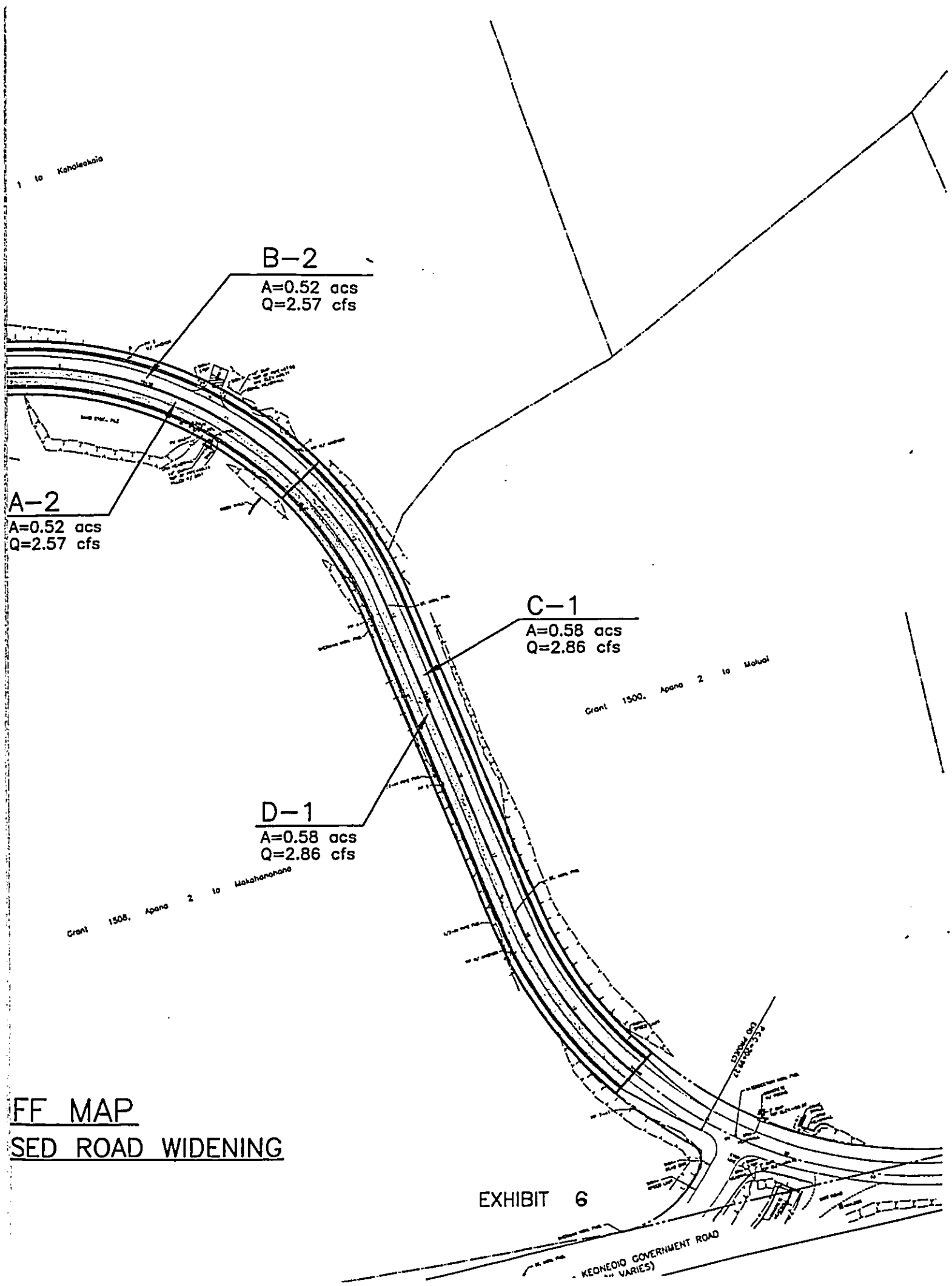


EXHIBIT 5
RUNOFF MAP FROM
"MASTER DRAINAGE PLAN"
SCALE: 1" = 2000'



RUNOFF MAP
PROPOSED ROAD



FF MAP
SED ROAD WIDENING

EXHIBIT 6