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PLANNING DEPARTMENT
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March 5, 1987

Mr. Mark Hastert, AICP
Helber, Hastert, Van Horn & Kimura
Grosvenor Center, PRI Tower
733 Bishop Street, Suite 2590
Honolulu, Hawaii 96813

Dear Mr. Hastert:

Final EIS - Awake'e Resort Community
Determination of Acceptability

We have reviewed the Final EIS for the proposed Awake'e Resort Community.

Chapter 343, HRS, requirements were triggered with the filing of a petition to amend the County General Plan from Conservation and Open designations to Resort, Medium Density Urban and Open designations.

It should be noted that since the Final EIS is to serve as an informational document for the General Plan stage. Since the development plans at this stage are conceptual and specific site plans have not been determined, evaluation of the impacts were made at the General Plan level of review.

We find that the Final EIS adequately addresses both the content and procedural requirements of Chapter 343, HRS, and therefore determine the document to be acceptable.

Acceptance of the Final EIS is with the understanding, however, that the following issues are to be resolved in the context of subsequent regulatory approvals.

1. Approval of the access easement over State-owned lands through the Department of Land and Natural Resources.

Mr. Mark Hastert
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2. Coordination of a regional coastal water quality monitoring program.
3. Detailed description of a shoreline access plan showing number and location of public accessways and facilities, such as comfort stations and parking spaces, public mauka-makai vehicular access and beach parking areas makai of Pu'u Kuili.
4. Other issues as is outlined in the Final EIS, Pages I-8 and I-9, which remain unresolved at this early conceptual planning stage.

We note that should there be major changes to the project from that which is described in the Final EIS, supplemental environmental impact statements may be required.

Sincerely,


for ALBERT LONO LYMAN
Planning Director

AK/VKG:aeb

cc: Office of Environmental Quality Control

OFFICE OF ENVIRONMENTAL QUALITY CONTROL
MAR 11 1987

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RECEIVED

AWAKE'E RESORT

North Kona, Hawaii

FINAL
ENVIRONMENTAL
IMPACT STATEMENT
JANUARY 1987



Prepared for: Kahala Capital Corporation
Prepared by: Helber, Hastert, Van Horn & Kimura, Planners
For Submission to: Planning Department, County of Hawaii
Prepared Pursuant to: Chapter 343, Hawaii Revised Statutes

**FINAL
ENVIRONMENTAL
IMPACT STATEMENT**

FEBRUARY 1987

**Prepared for:
Kahala Capital Corporation**

**Prepared by:
Helber, Hastert, Van Horn & Kimura, Planners**

**For Submission to:
Planning Department, County of Hawaii**

**Prepared Pursuant to:
Chapter 343, Hawaii Revised Statutes**

Submitted by:


Mark H. Hastert

**Awake'e Resort
North Kona, Hawaii**

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CHAPTER I



CHAPTER I

INTRODUCTION

Development Summary

<i>Applicant:</i>	Kahala Capital Corporation
<i>Property Owner:</i>	Long & Malone, Trustee
<i>Property Location:</i>	North Kona Judicial District, County of Hawaii Awake'e Ahupua'a, north of the Keahole Airport and approximately eleven miles north of Kailua-Kona.
<i>Tax Map Key:</i>	Division 3, Zone 7, Section 2, Plat 04, Parcel 3.
<i>Size:</i>	349.05 acres
<i>Existing Land Use Regulations:</i>	State Land Use District: Conservation County General Plan: Open and Conservation County Zoning: Open Special Management Area: Entire Site Shoreline Setback: 40' Coastal Setback
<i>Existing Land Uses:</i>	Vacant with no physical improvements on site other than poorly maintained access and coastal jeep trails. Existing land use is limited to recreational use of the coastal areas of the site.
<i>Proposed Land Uses:</i>	Intermediate Resort, including approximately 600 hotel rooms and 900 resort condominium units, resort commercial, and an 18-hole golf course and clubhouse.
<i>Proposed Changes to the General Plan:</i>	Requested changes to the General Plan are: (1) to add the proposed Awake'e resort development to the list of Intermediate Resorts found on pages 78 and 79 of the General Plan, and (2) to amend the existing LUPAG Maps from the existing LUPAG designations of Open and Conservation to Open, Resort, and Medium Density Urban. The proposed LUPAG Map is shown in this EIS (see Figure 7).
<i>EIS Approving Agency:</i>	County of Hawaii Planning Department

1.1 Intended Uses of this Document

This (draft) environmental impact statement (EIS) has been prepared in support of a request to amend the County of Hawaii General Plan and Land Use Pattern Allocation Guide (LUPAG) Map. On July 16, 1986, Kahala Capital Corporation submitted a request for an amendment to the Hawaii County General Plan involving a 349.05-acre property known as Awake'e located north of the Keahole Airport. Specifically, the application requested the addition of Awake'e to the list of Intermediate Resorts found on page 79 of the General Plan and a change in the existing Land Use Pattern Allocation Guide (LUPAG) Map from the present Open and Conservation designations to Open, Intermediate Resort, and Medium Density Urban designations.

Given the potentially significant consequences of the project, the Hawaii County Planning Department found that a full environmental impact statement (EIS) was warranted pursuant to Chapter 343, Hawaii Revised Statutes (HRS). An EIS Preparation Notice (EISPN) was subsequently published in the August 8, 1986 issue of the Environmental Quality Commission Bulletin. Eighteen responses were received during the 30-day comment period. The concerns raised have been addressed and/or comments incorporated into this document to ensure an evaluation that is as comprehensive as possible. In addition, minor changes have been made to the project scope and preliminary land use plan from the original General Plan Amendment application as a result of recommendations made by consultants who have prepared studies in conjunction with this draft EIS.

This EIS is intended to comply with Chapter 343, HRS and the EIS regulations promulgated by Chapter 200 of Title 11, Department of Health. The purposes of this EIS are to provide information to public officials and members of the community about the nature of the subject action; to assess the existing environmental conditions of the property and surrounding areas; to evaluate potential impacts of the proposed Awake'e development and to present mitigating actions for those impacts; and to consider alternatives to the subject action.

In addition to the General Plan amendment petition, this EIS has been prepared to fulfill the the environmental requirements for a state land use district boundary amendment, a County of Hawaii Special Management Area (SMA) Use permit and rezoning, a State Department of Land and Natural Resources Conservation District Use permit, and other permits required to implement the project.

1.2 Description of Proposed Action

Kahala Capital Corporation proposes to develop a multi-use complex that includes a self-contained "intermediate resort" area. Facilities to be developed on the site include a hotel, multi-family residential units, resort commercial, and an 18-hole golf course and clubhouse.

Public access from Queen Kaahumanu Highway to the shoreline will be provided via the development's internal boulevard and a parking area adjacent to the commercial area at the south end of the property near Awake'e Bay. A system of trails will allow pedestrian access to the coastal area fronting the property. Existing access to the adjacent beach areas at Makalawena will be maintained at least until other alternatives become available.

Approximate acreages for each of the major land uses and the planned number of units are as follows:

<u>Land Use</u>	<u>Gross Acreage</u>	<u>Density</u>	<u>Units</u>
Resort Hotel	33 ac.	18/ac.	600
Resort Condominium	79 ac.	11/ac.	900
Resort Commercial	5 ac.		
Golf Course/Clubhouse	166 ac.		
Beach Parking/Open/ Roads/STP	<u>66 ac.</u>		
Total	349 ac.		1500

1.3 Rationale for Action

A market study prepared by Peat, Marwick, Mitchell & Co. identified potential markets which could support an intermediate resort area that would contain a "first-class" hotel of about 600 rooms, and be sited close to the shoreline; about 900 condominium apartments positioned throughout the property; an 18-hole championship golf course; and two retail commercial areas offering shopping, dining and services for resort and regional guests and residents. Key factors which influenced the identification of potential markets are:

Hotel

1. The extensive ocean frontage offered by the hotel site and planned 18-hole championship golf course is expected to attract visitors who seek at least a first-class level of service.
2. The proximity of the Resort to affordably priced shopping, dining and other recreational amenities of Kailua Town as well as the higher priced amenities of the South Kohala resorts would provide additional attractions to the first-class market.
3. The reputation and widespread market recognition of the South Kohala luxury resorts would also attract travelers with lower budgets to the area.
4. The resort and hotel sites lack a quality sandy swimming beach. Good swimming beaches are offered by other existing luxury resorts as well as some planned resorts.
5. Competition in the luxury hotel market on the island as well as the state is expected to be intense over the next decade due to the expected completion of the Hyatt Regency Waikoloa as well as the large number of planned and proposed developments throughout the state which are oriented to this market.

Condominiums

1. The first-class quality of the proposed hotel development at the Resort.
2. The long ocean frontage but lack of sandy beaches at the site.
3. The favorable location of the proposed condominium sites with respect to ocean and golf course views and frontage. In many areas, views are enhanced by the sloping terrain of the site.
4. Proposed competitive developments elsewhere on the island.

Commercial

The market study also estimates market support for about 37,000 square feet of commercial space based on the projected retail expenditures of three identified market segments.

1.4 Summary of Impacts

Access

There is currently no developed access to the site from the Queen Kaahumanu Highway. As a result of the projects being constructed, access to the property will improve substantially with the construction of paved roads and upgrading of the Queen Kaahumanu Highway intersection. In addition, access to the shoreline will be improved.

Natural Hazards

The Awake's property is sited within Zone DE for overall relative risk associated with volcanic activity. The U.S. Geological Survey classification system contains six zones, increasing in risk level from A through F. As with other lands on the Big Island, the subject property lies in seismic Zone 3. The Flood Insurance Rate Maps identify coastal high hazard areas in terms of areas susceptible to flooding from tsunami high wave run-up and storm surge. As shown in Figure 12 the 100-year boundary closely follows the coastline except near Kawikohale Point where the boundary extends inland.

Topography

Elevations of the Awake's property range from sea level at the coastline to approximately 200 feet MSL at the northern-mauka boundary. The Kuili cinder cone in the northwest portion of the site reaches a height of 342 feet MSL. Average slopes on the site range from 5 to 7 percent. The predominant land type consists of A'a lava and rock outcrops. A newer A'a lava flow runs along the southern boundary. Because of the moderate slope of the site, some grading and reshaping of the ground surface will be required, especially with respect to construction of the golf course.

Soils

The Soil Survey indicates that the property is not suitable for agricultural use. Because of this, development of this property will not reduce the inventory of agriculturally significant lands. However, the lack of sufficient soil cover will require soil to be imported for the golf course and other landscaped areas.

Shoreline and Near-shore Environment

With respect to aquatic resources, the major potential impact parameters would be: (1) increased sedimentation from wind or run-off due to grading; (2) changes in ground water discharge and surface runoff, especially discharge containing high nutrient loads; and (3) impacts from herbicides and pesticides used on the golf course. Normally run-off is expected to enter the ocean following percolation through the surface rock layers which acts as a filter to remove sediment from the rain water. The fraction of windblown sediment likely to be carried into the ocean would be fine-grained and remain in suspension for some time. Off-shore marine communities have developed a relatively high degree of tolerance to natural stresses, such as storm wave action, so that the incremental changes of development activity are expected to be minimal. In general, sediment and nutrients entering the water are subject to off-shore circulation by tides, current, wind, and wave action which promotes rapid dilution and water exchange.

Anchialine Ponds

Potential impacts to the pond resources include the potential for development related surface runoff to inundate the pond area, the effect of increased dissolved nutrient levels in the groundwater (resulting from the use of treated effluent to irrigate golf course fairways and the application of fertilizers and herbicides to landscaped areas), and the impact of direct physical intrusion into the pond area. However, the potential for direct impact as a result of development appears to be very small. Actual development activities will not encroach into or require modification of the ponds. Also, pond communities are not nutrient limited, so increased nutrient levels would probably have no adverse affect.

Flora

A botanical survey inventoried a total of 45 plant species on the site. None of the native species on the project area are listed as rare, threatened, or endangered by the U.S. Fish and Wildlife Service. Five major vegetation types are found on the site. Because the proposed development will cover a majority of the site, much of the existing vegetation will be removed. However, certain areas, such as the grasslands located on Pu'u Kuili and areas within the shoreline setback, consisting primarily of coastal strand vegetation, will be preserved.

Fauna

A faunal study conducted for this study identified six major faunal habitats on the project area. Because no native bird or mammal species occur on most of the site, development of a large portion of the project area will not have a significant impact on native fauna. Landscaped areas will probably increase the value as a habitat for introduced passerine bird species. The greatest potential impact to avifaunal habitats could be that associated with the effects of development on the anchialine ponds.

Noise

The main sources of noise at the subject property are coastal "surf" noise and vehicular traffic noise along the Queen Kaahumanu Highway. Aircraft noise from Keahole Airport, located approximately 4 miles to the south, should not have any major impact on the project.

Air Quality

Existing air quality is good in the vicinity of the subject property. Construction activities may cause short-term impacts on air quality. Increased automotive emissions will have long-term impacts on air quality; however, the low density of the project, combined with the land-sea breeze wind regime in the mornings and late afternoons, will limit the seriousness of the impacts.

Visual Resources

The landscape of the property will be irretrievably altered from its present natural state to one characterized by man-made structures and exotic landscaping. The major visual feature, the Pu'u Kuili cinder cone, will be preserved. The development is not expected to interfere substantially with the line of sight from Queen Kaahumanu Highway because of the moderate slope of the property. The development will be visible, however, from the highway, from higher elevations, from the air, and from offshore. Views from adjacent properties should not be significantly impacted.

Land Use

The proposed action will convert approximately 350 acres from its present undeveloped state to urban uses. Soil limitations render the land agriculturally unsuitable.

Historic and Archaeological Sites

A total of 84 archaeological sites with 239 component features were identified at Awake'e. Most of the identified archaeological sites are located in the coastal area within 1000 feet of the shoreline. Since development will be concentrated in this area, many of the sites could be affected; however, adjustments have been made to the Preliminary Land Use Plan to minimize disturbance to important sites. All sites which are designated by the archaeologist for retention will be preserved and insignificant sites which must be disturbed will be recorded.

Traffic

The additional traffic generated by the Awake'e development is not expected to have a significant adverse effect on highway capacities along the Queen Kaahumanu Highway. This assessment would have to be reevaluated with implementation of other major developments between the Mauna Kea Resort and Kailua-Kona and their cumulative traffic requirements. However, it should be pointed out that the purpose of constructing the Queen Kaahumanu Highway was to open the region to development. A high level of service can be maintained with improvements at the intersection of the Queen Kaahumanu Highway and the Awake'e access road.

Socioeconomic Considerations

The project will generate additional revenues for both the State and the County. Much of the increases in wages and salaries from direct induced employment growth will stay within the Kona region. The resort will generate direct, indirect and induced visitor expenditures in the state.

The project will generate increased direct and indirect employment, both over the short-term (construction) and the long-term (operation) and a related need for additional employee housing. It is estimated that between 66 and 82 affordable housing units will need to be provided by project completion in 2010. These are cumulatively significant within the context of proposed developments for the North Kona region.

Public Facilities, Infrastructure and Services

The estimated water demand for the project is 1.37 million gallons per day (mgd) including both domestic water (.71 mgd) and water for irrigation (.66 mgd). Based on currently available information, development of a new private water source is the most probable alternative for the Awake'e project. Domestic wastewater flow from the project is estimated at .62 mgd. The most feasible alternative for wastewater treatment and disposal appears to be secondary level treatment at a single on-site facility with the treated effluent used for golf course and landscape irrigation.

The development will increase demand for police and fire protection services that are already operating at capacity. The recurring costs of increased manpower levels would be offset by increased County tax revenues generated by the project.

1.5 Summary of Mitigating Measures

- o All structures within the property will be designed and constructed to conform with County building standards and regulations for potential seismic activity. No habitable structures will be constructed in the flood hazard area.

- o To the extent possible, land uses have been sited to take advantage of natural physiographic features and to maximize views, and to minimize the need for large-scale reshaping of the underlying land form.
- o Soil erosion is not considered to be a significant adverse effect; however, dust control techniques, such as construction phasing, sprinkling, and early planting, will be implemented where possible.
- o A marine baseline assessment survey was conducted to establish a quantitative baseline from which changes due to construction can be ascertained. As part of the study, permanent baseline stations or "benchmarks" were established to allow future monitoring of these stations.
- o The preliminary land use plan shows that no development areas will encroach into or require modification of the ponds. In addition, a management plan will be developed for the ponds which will detail steps to be taken to preserve the ponds and associated avifaunal habitat, provide for buffer zones around pond areas, and establish a program for continued management of the ponds.
- o Although detailed site plans have not been developed, planned land use densities are amenable to low-rise, low-density construction, extensive landscaped buffers to retain the open, spacious character of the Kona Coast, and maximum retention of makai-mauka view corridors. The existing Pu'u Kuili will be maintained in its natural state, and will be buffered from development by the golf course.
- o The twenty-eight archaeological sites recommended for preservation will be incorporated into the development, either in their natural state or following restoration. Where appropriate, the interpretive value of these sites will be highlighted as features along pedestrian paths.
- o Paved accesses to the shoreline will be available for public use. Parking will be provided adjacent to the planned commercial area. Existing access to the beach and shoreline area on the adjacent Makalawena property will be retained.
- o The public cost of funding additional public services and utilities will be compensated by increased revenues generated by the project.

1.6 Unresolved Issues

- o The archaeological reconnaissance by Paul H. Rosendahl, Inc. concluded that 28 sites will require further work to determine the appropriateness of future disposition. Additional archaeological work will be coordinated with development of more detailed site plans that pinpoint building sites more precisely. The findings of subsequent investigations and recommendations will be discussed with the County Planning Department and the State Historic Sites Office.

- o Traffic improvements at the intersection of the Queen Kaahumanu Highway and the Awake'e access road will require coordination with the State Highways Division.
- o Plans for the development do not include any single-family housing. The developer will continue to work with the County to meet employee housing needs that are generated by the development. Actual housing needs will be determined before the project becomes operational, and a program to meet those needs will be established with the County.
- o Although preliminary studies indicate that the most likely alternative for providing a domestic water supply system for the development is to develop a new source and distribution system to serve Awake'e exclusively, discussions have taken place and will continue regarding the possibility of development of a joint water system between the developers of Awake'e and the adjoining Makalawena project.

1.7 Relationship to Land Use Plans and Policies

Chapter 3 contains a detailed discussion of the relationship between government plans and policies and the proposed action. The conceptual plan for the Awake'e multi-use development is consistent with all relevant public objectives, except for portions of the Hawaii County General Plan and State Land Use District boundary. An amendment petition is currently pending before the Hawaii County Planning Department, and the developer will eventually be submitting a petition to the State Land Use Commission for the required boundary amendment.

West Hawaii, particularly the North Kona-South Kohala area, has been the focus of efforts to expand the Big Island visitor industry. The Awake'e development represents an opportunity to promote economic growth by establishing a viable, high-quality resort area.

1.8 Alternatives Considered

Three alternative actions that could reduce or eliminate environmental risks or costs were considered: (1) "no action" (no amendment to the existing land use classifications at either the State or County level); (2) "major resort" development (including a hotel of up to 3,000 rooms); and (3) "retreat resort" development (with a maximum of 100 hotel rooms). None of the three alternatives considered compared more favorably than the proposed action in establishing an economically feasible resort that meets the developer's standards of quality and also fulfills public policies and objectives.

1.9 Necessary Permits and Approvals

<u>Authority</u>	<u>Approval Required</u>
State Government	
State Land Use Commission	Land use district amendment
Dept. of Land and Natural Resources	Conservation district use (CDUA) permit for improvements within the shoreline setback (if the shoreline portion of the site remains in the Conservation District) Queen Kaahumanu Highway access point Well drilling permit
Historic Sites Section	Chapter 6E review
Dept. of Health	Private wastewater treatment plant certification/permit New water source development approval
Dept. of Transportation	Queen Kaahumanu Highway access point
County of Hawaii	
Planning Dept.	General Plan/LUPAG amendment Rezoning Special Management Area (SMA) permit Subdivision approval Grading permit
Dept. of Water Supply	Source and water distribution system approval

CHAPTER II



CHAPTER II

PROJECT DESCRIPTION

2.1 Location

The subject property lies within the Awake'e Ahupua'a on the leeward coast of the island of Hawaii, four miles north of the Keahole Airport and eleven miles north of the town of Kailua-Kona (Figure 1). Approximate distances and estimated travel times to major activity centers are shown in Table 1.

Table 1: Distances to Major Activity Centers

<u>Activity Center</u>	<u>Distance (miles)</u>	<u>Trip Time</u>
Keahole Airport	4	10 min
Honokohau Harbor	5	15 min
Kailua-Kona	11	25 min
Kawaihae	20	30 min
Waimea	30	45 min
Hilo	80	2 hrs
Honolulu	169	45 min
Los Angeles	2,500	5 hrs

2.2 Existing Uses

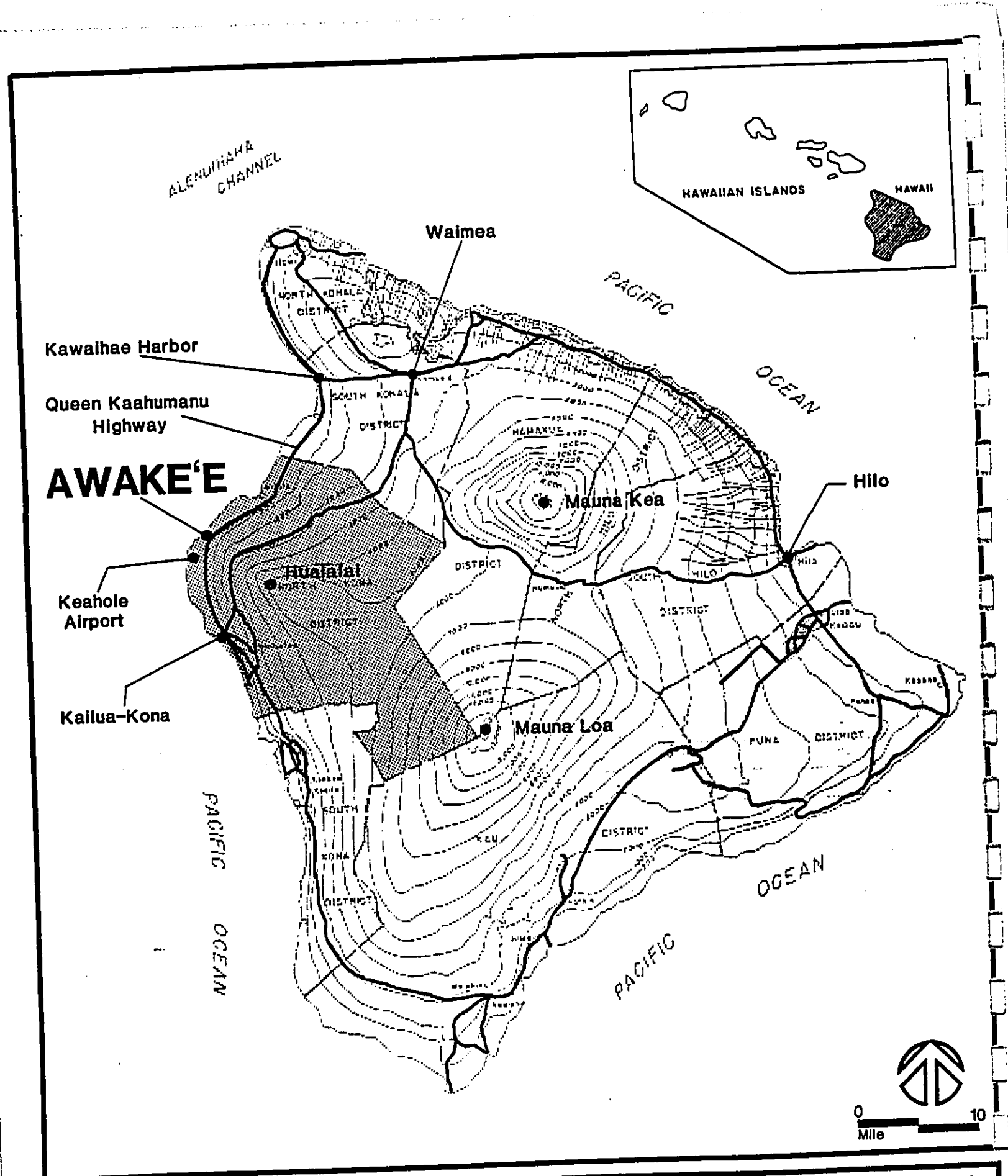
The project area is currently unimproved except for several poorly maintained jeep roads and historic and archaeological remains from a previous era (see Figure 2). The coastal area is used for recreational purposes, such as fishing and diving. Currently, access to the beach and shoreline areas of the adjacent Makalawena property are provided through the site.

2.3 The Master Plan

2.3.1 Development Concept

The development concept for the subject property incorporates a variety of land uses and is based, in part, on prior marketing studies. These uses have been integrated into a planned resort community. The central element of the development concept is the creation of a self-contained, intermediate resort development with an 18-hole golf course. Each category of the land use is discussed below and summarized in Table 2.

Figure 3 is a graphic representation of preliminary land use concepts. It should be noted that this layout provides a basis for discussion and has been revised from the original General Plan Amendment submittal to reflect additional information which has been gathered regarding the site. It is still subject to change as additional information becomes available. No site plan showing building locations and site improvements has been prepared as yet.



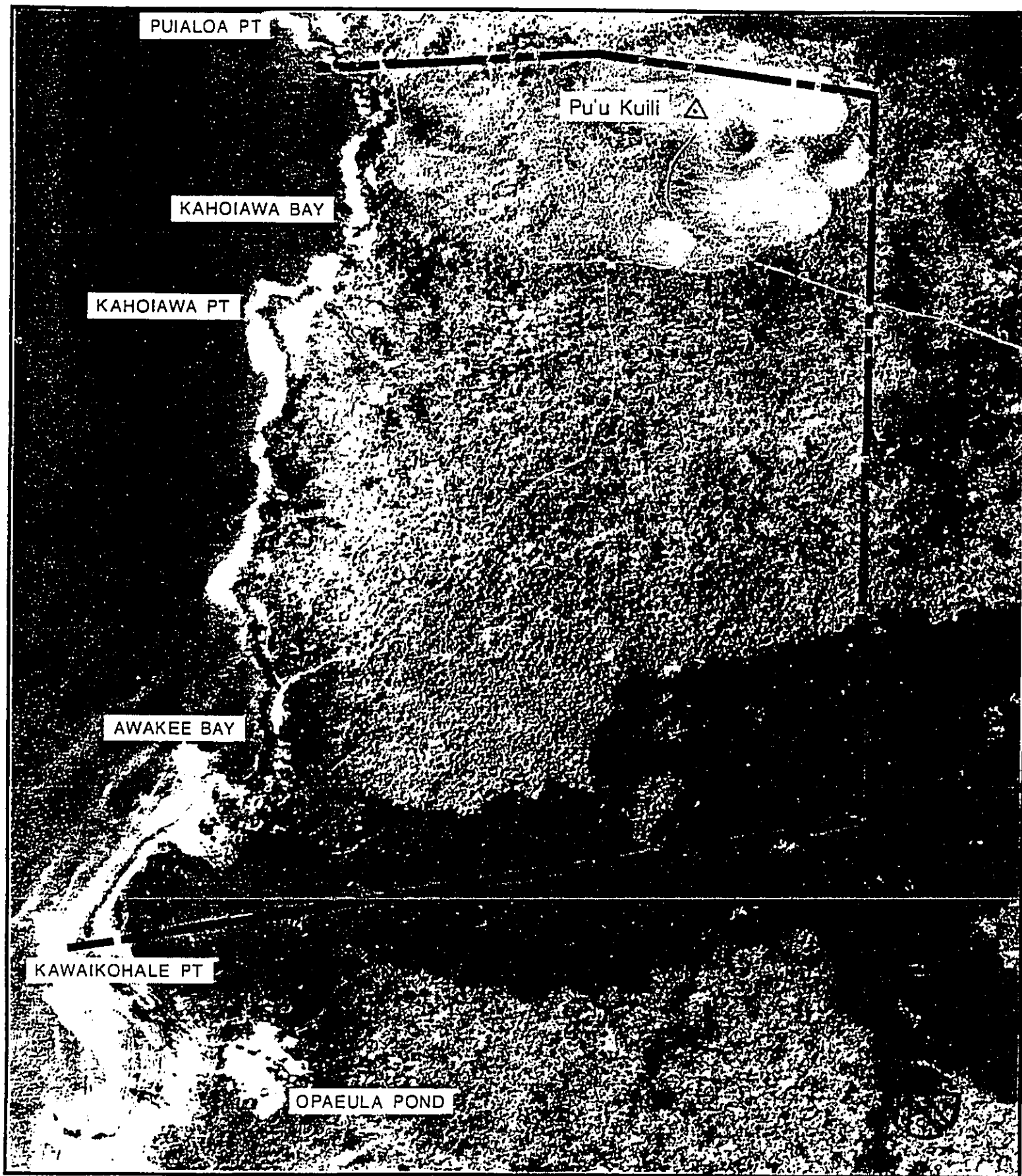
Project Location Map

Figure: 1

AWAKE'E RESORT

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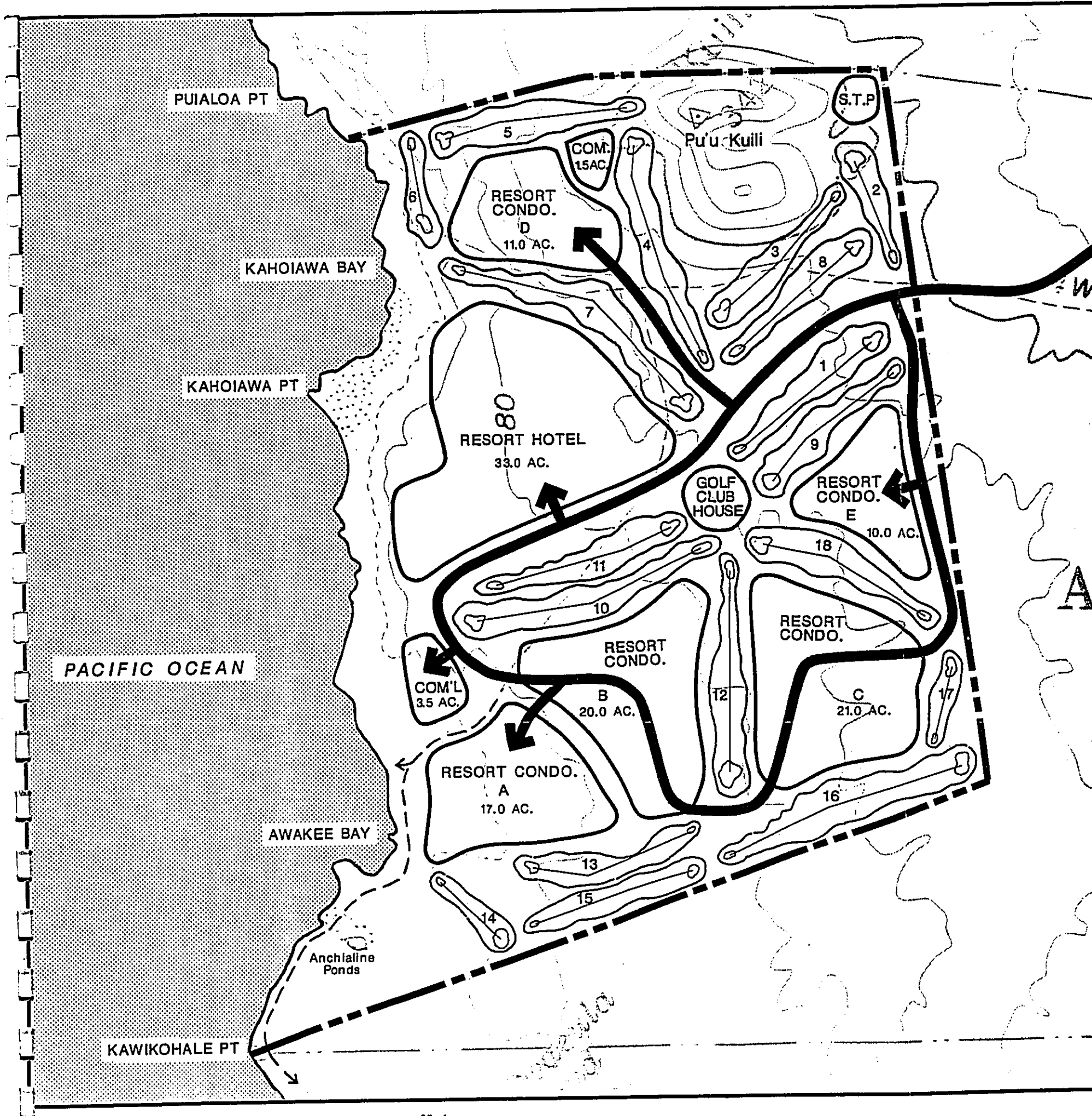


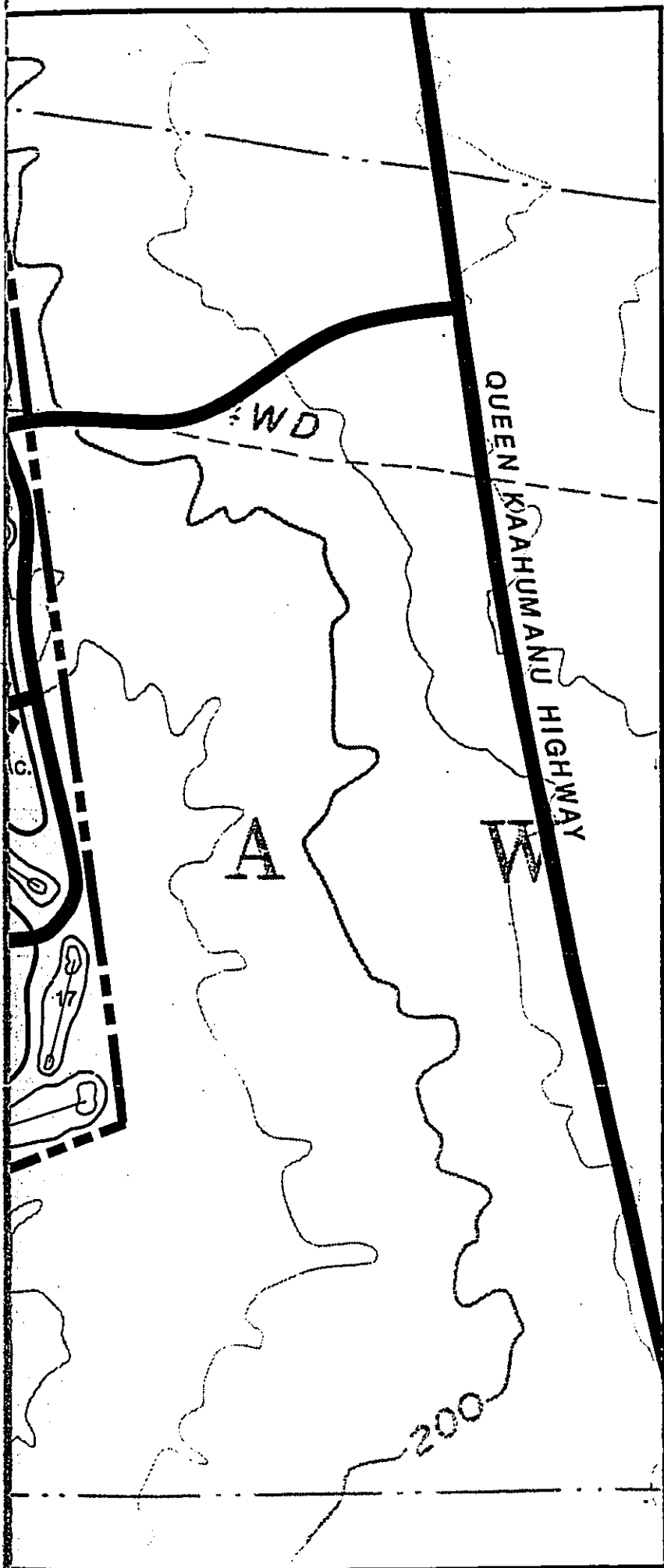
Site Photograph

Figure: 2

AWAKE'E RESORT

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Preliminary Land Use Plan

AWAKE'E RESORT

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0 600'

Figure: 3

Resort Hotel

One resort hotel is provided containing 600 rooms. The hotel is located overlooking Kahoiawa Bay. The hotel is envisioned as a "first class" standard hotel.

Resort Condominium Units

Complementing the hotel, approximately 900 resort condominium residential units are planned amid the fairways of the 18-hole golf course. Further market and feasibility analyses will determine whether these units are best oriented to the visitor trade or to the local rental market.

Resort Commercial

Two sites are identified on the land use plan as commercial development. One is located adjacent to Awake'e Bay on a 3.5 acre site. It will be developed in resort oriented commercial and shopping uses. The second is a 1.5 acre site on the slopes of Pu'u Kuili and will contain an ocean-view restaurant.

Golf Course

The 18-hole golf course is an important attribute of the proposed master plan for several reasons:

- o It generates a cooling effect on the surrounding environment.
- o It provides a soothing contrast to the harsh lava landscape;
- o It acts as an open space buffer between different land uses;
- o It provides a recreational amenity to the residents of the North Kona region; and,
- o Most importantly, it provides the catalyst necessary for a viable intermediate resort community.

The golf clubhouse is sited in an elevated area near the center of the property on a site which offers commanding views of the Kona Coast. It is anticipated that the clubhouse would contain a standard mix of golf-related commercial enterprises, including a pro shop and a restaurant or coffee shop.

Shoreline Access

The coastal areas of the site have provided a recreational amenity to residents of North Kona. Beachcombers and fishermen frequent the area. The master plan recognizes this recreational resource and has provided for public access and parking within the commercial area adjacent to Awake'e Bay. Although the beach and setback areas will remain open to the public for the entire length of the property, vehicular movements will be restricted beyond the beach parking areas, with the exception of continued access to the Makalawena shoreline.

Archaeological Resources

An archaeological reconnaissance survey conducted for the master plan identified numerous sites, most of which lie near the coast, and along the A'a lava flow. The land use plan recognizes the value of preserving significant remains that link the present with the past. Every attempt will be made to preserve major sites for possible incorporation into the landscaping within the resort.

Internal Circulation

The principal entrance to the site will be located toward the northern-mauka corner where a former easement connects the property with Queen Kaahumanu Highway. The main parkway is tentatively aligned to run from mauka to makai across the property, providing direct access to the resort hotel, resort commercial and shoreline areas. Secondary roads will serve the various condominium areas.

Table 2: Preliminary Land Use Summary

<u>Land Use</u>	<u>Gross Acreage</u>	<u>Net Density</u>	<u>Units</u>
Resort Hotel	33 ac.	18/ac.	600
Resort Condominium	79 ac.	11/ac.	790
Resort Commercial	5 ac.		
Golf Course/Clubhouse	166 ac.		
Beach Parking/ Open/Roads/STP	66 ac.		
Total	349 ac.		1500

2.4 Project Rationale

A market assessment conducted for the proposed development provides the primary economic rationale for the project. It estimates that the Awake's Resort will be able to achieve 6% to 8% of the total visitor room requirements for the region. Based upon that assumption, the study identified potential markets which would support an intermediate resort containing the following elements:

- o Hotel development - One hotel with about 600 rooms would be sited next to Kahoiawa Bay.
- o Condominium development - About 900 condominium apartments would be positioned throughout the property. One grouping would be located on the slope of Kuili Pu'u, fronting the coast, another along the entrance

road to the Kahioawa Bay Hotel and the balance positioned around the golf course fairways.

- o Commercial development - Two retail/commercial areas would offer shopping, dining, and services for resort and regional guests and residents. The main commercial area would be located on a 3.5 acre site near Awake'e Bay and would include parking spaces for local residents utilizing the bay and shoreline for recreational purposes. The second, which would be limited to a restaurant, would be located on the slopes of Pu'u Kuili and provide panoramic views of the coastline.
- o Golf course and clubhouse - A par-72, 18-hole championship golf course would be the major recreational amenity of the development. It would provide park-like frontages and view corridors for the condominium units and outstanding vistas for the golfers.

With respect to the hotel development, the potential market is influenced by the following factors:

- o The extensive ocean frontage offered by the hotel sites and the planned 18-hole championship golf course is expected to attract visitors who seek at least a first-class level of service.
- o The proximity of the resort to affordably priced shopping, dining and other recreational amenities of Kailua Town as well as the higher priced amenities of the South Kohala resorts would provide additional attractions to the first class market.
- o The reputation and widespread market recognition of the South Kohala luxury resorts would also attract travelers with lower budgets to the area.
- o The resort and hotel sites lack a quality sandy swimming beach. Good swimming beaches are offered by other existing luxury resorts as well as some planned resorts.
- o Competition in the luxury hotel market on the island as well as the state is expected to be intense over the next decade due to the expected completion of the Hyatt Regency Waikoloa as well as the large number of planned and proposed developments throughout the state which are oriented to this traveler market.

Based on these factors, hotel development is recommended to offer a first-class level of facilities and services targeted to the moderate- to upper-income clientele rather than the luxury, upscale traveler. In this way the resort could position itself to:

- o Benefit from the visitor reputation and quality image of the South Kohala area.

- o Not compete with the luxury developments in the Kohala area.
- o Serve the mid- to upper-income traveler markets by offering a higher quality alternative to the nonintegrated and random development of Kailua-Kona.

With respect to the resort's proposed condominium development, the potential market for such units is affected by the following factors:

- o The first-class quality of the proposed hotel development at the resort.
- o The long ocean frontage but lack of sandy beaches at the site.
- o The favorable location of the proposed condominium sites with respect to ocean and golf course views and frontage.
- o Proposed competitive developments elsewhere on the island.

Based on the above factors, the study recommends that condominium units at Awake'e have a first-class orientation with units targeted primarily at buyers who seek vacation or future retirement homes.

The market study identified support for the commercial development from three population segments:

- o Awake'e Resort guests
- o Awake'e Resort residents
- o Off-resort visitors and residents

The supportable amount of net leasable commercial space at the resort is estimated to be about 15,690 square feet in 1995, 22,740 square feet in 2000, and 37,250 square feet in 2010.

Based upon the market support for the various land uses described for the project, the market study recommended a phasing program for development which is discussed in the following section.

2.5 Preliminary Costs and Project Phasing

Given the internal road alignment, most areas of the project site will be accessible after the main parkway is constructed. Because utility trunk lines and piping are laid within the road right-of-way, a major portion of the infrastructure will be constructed at the outset and sized for full development. Shoreline parking is planned for the early phases of development.

Table 3 summarizes the projected order of magnitude costs for installation and construction of Awake'e infrastructure.

**Table 3: Order of Magnitude Costs for
Awake'e Infrastructure**

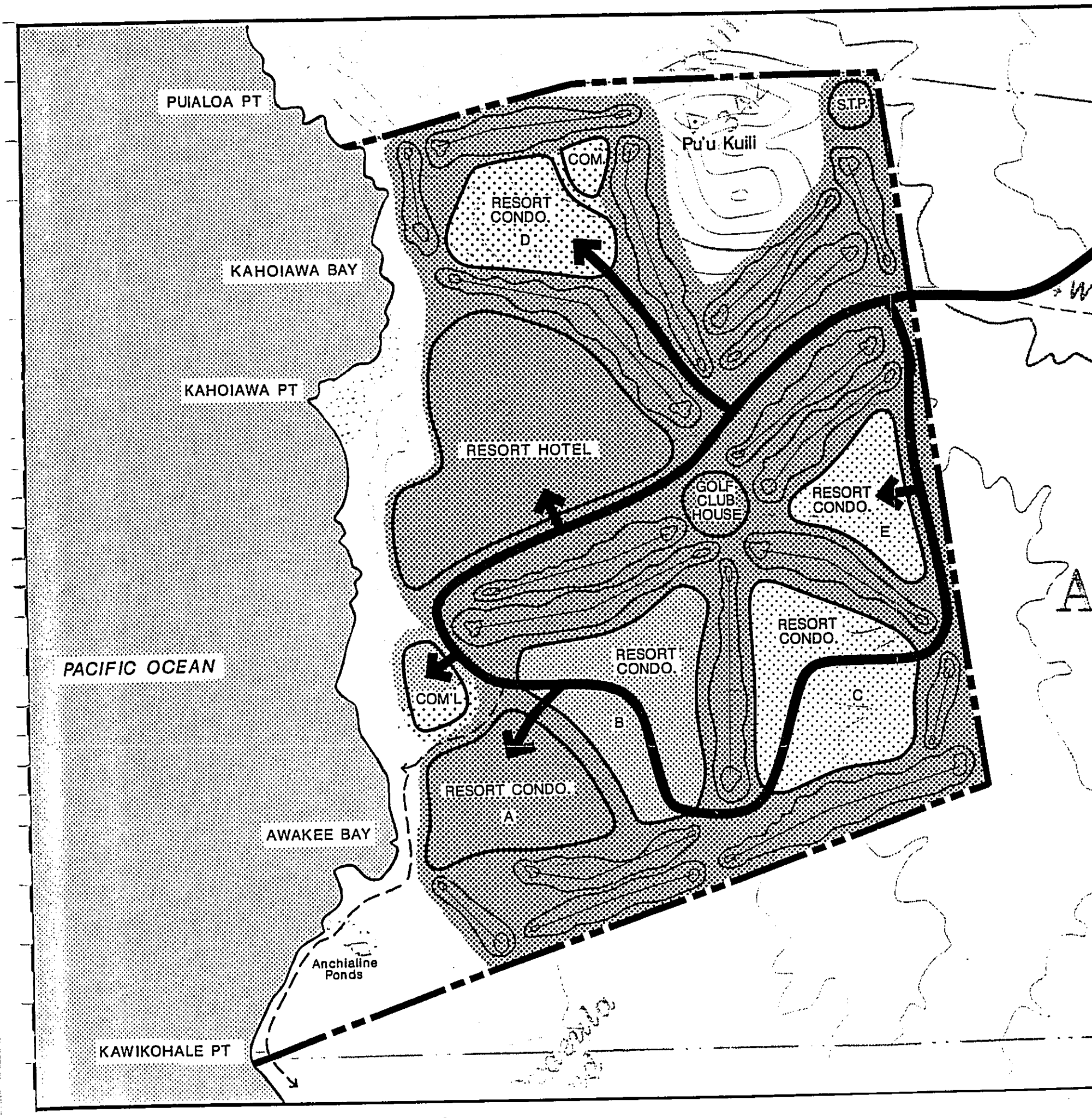
<u>Description</u>	<u>Cost Estimate (\$ millions)</u>
<u>On-Site Costs</u>	3.1
Site Preparation	2.7
Roads	.9
Drainage	2.4
Water Supply	7.3
Wastewater	3.0
Power and Telecommunications	10.3
Golf Course	<u>2</u>
Erosion Control	29.9
Subtotal - On-Site Costs	
<u>Off-Site Costs</u>	1.2
Road Right-of-way	<u>7.0</u>
Water Supply	8.2
Subtotal - Off-Site Costs	38.1
Total	

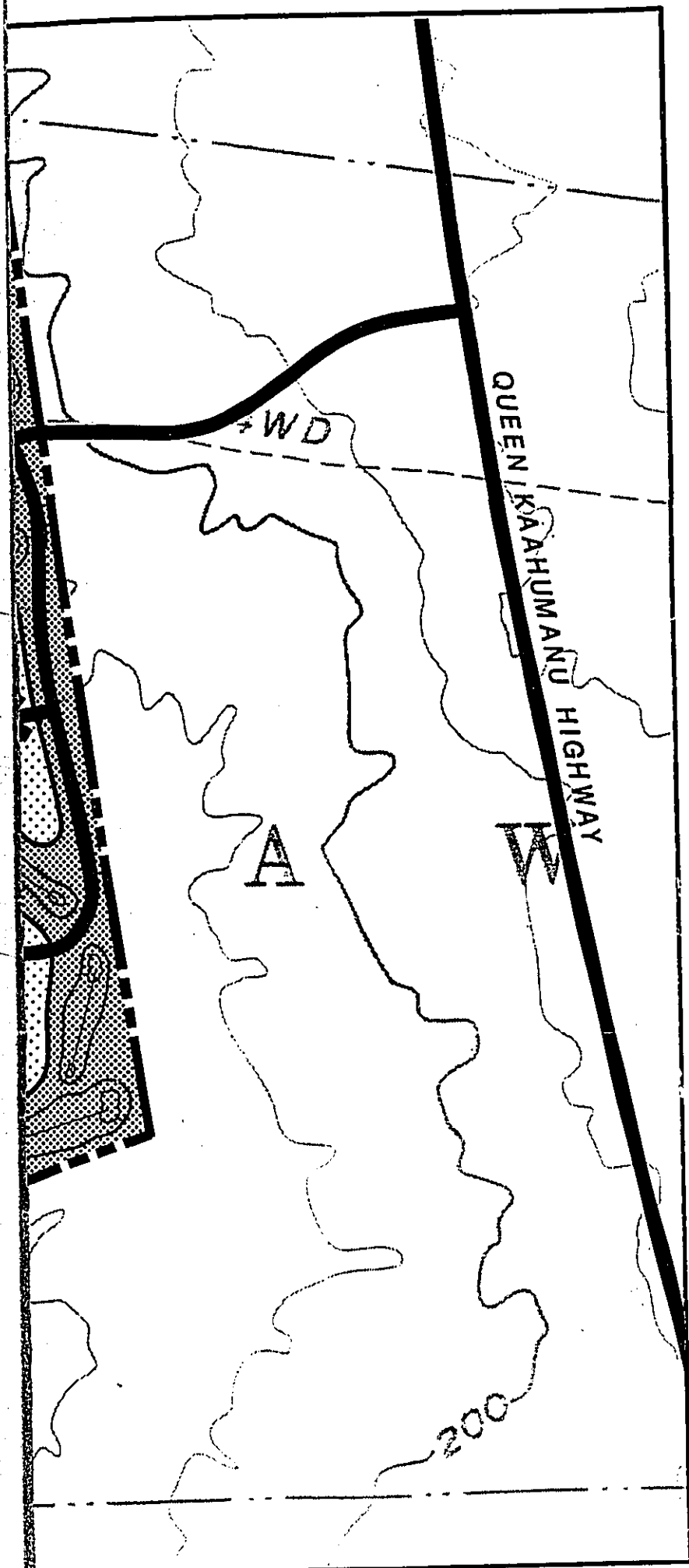
The resort development will be phased to meet market demands and will coincide with the required infrastructure improvements including site access and roadways, installation of the water and electrical power systems, and the incremental phasing of waste water treatment and disposal system. Figure 4 shows the approximate phasing of the resort.

The market assessment for the proposed development recommends that Phase I of the development include the entire 600 room resort hotel and between 140 and 175 condominium units. Phase I would also likely include the golf course and a scaled-down golf club house. Phase II would include an additional 145-260 condominium units and the first increment of the resort commercial development (about 22,000 S.F.). Phase III would consist of an additional 275 to 355 condominium units, and the final phase would contain between 135 and 475 condominium units, as well as the final 15,000 S.F. of resort commercial development. Incremental phasing of the development would be dependent upon receiving the necessary government approvals and sales experience.

2.6 Necessary Permits and Approvals




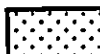
Table 4 lists the Federal, State, and County permits that are required prior to implementation of the project. Other permits may be required for specific construction activity.





Preliminary Phasing Plan

LEGEND

-  Phase 1
-  Phase 2
-  Phase 3
-  Phase 4

AWAKE'E RESORT

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0 600'

Figure: 4

Table 4: Development Permits and Approvals

<u>Authority</u>	<u>Approval Required</u>
State Government	
State Land Use Commission	Land use district amendment
Dept. of Land and Natural Resources	Conservation district use (CDUA) permit for improvements within the shoreline setback (if shoreline portion of the site remains within the Conservation District) Queen Kaahumanu Highway access point Well drilling permit
Historic Sites Section	Chapter 6E review
Dept. of Health	Private wastewater treatment plant certification/permit New water source development approval
Dept. of Transportation	Queen Kaahumanu Highway access point
County of Hawaii	
Planning Dept.	General Plan/LUPAG amendment Rezoning Special Management Area (SMA) permit Subdivision approval
Dept. of Public Works	Building Permit Grading Permit
Dept. of Water Supply	Source and water distribution system approval

CHAPTER III



CHAPTER III

RELATIONSHIP OF THE PROPOSED PROJECT TO EXISTING PUBLIC PLANS, POLICIES, AND CONTROLS

3.1 Hawaii State Plan

The Hawaii State Plan, established through the State's legislative process, represents public consensus regarding expectations for Hawaii's future. Chapter 226, Hawaii Revised Statutes (as amended) describes the purpose of the State Plan as follows:

"...[it] shall serve as a guide for the future long-range development of the State; identify the goals, objectives, policies, and priorities for the State; provide the basis for determining priorities and allocating limited resources, such as public funds, services, human resources, land, energy, water, and other resources; improve coordination of state and county plans, policies, programs, projects, and regulatory activities; and to establish a system for plan formulation and program coordination to provide for an integration of all major state and county activities." (Chapter 226-1: Findings and Purpose, HRS)

The proposed project is generally consistent with the goals, objectives, policies, and guidelines of the Hawaii State Plan. The following section analyzes project impacts with respect to three substantive areas of the Hawaii State Plan: the economy, the population, and the physical environment.

Economy Relevant objectives and policies focus on four areas of the State's economy: (1) its general vitality, (2) the agricultural sector, (3) the visitor industry, and (4) potential growth activities. The plan also contains three major thrusts: (1) to increase and diversify employment opportunities to achieve full employment, increase income and job choice, and improve living standards for Hawaii's people; (2) to support the continued growth of the State's major industry, tourism; and, (3) to establish a steadily growing and diversified economic base that is not overly dependent on a few industries.

The Awake'e Resort will provide significant employment opportunities to residents of North Kona which will contribute towards increased income and job choice and improved living standards for Big Island residents. The construction of the 349 acre resort is expected to take place over a number of years and will be a significant contributor towards the maintenance of a healthy construction industry in Hawaii County and the State of Hawaii. With a growing population and historically high levels of unemployment, Hawaii County and the West Hawaii region will benefit from the projected increase in employment opportunities. The multiplier effects of both the construction and visitor industry are widely recognized as having favorable financial multipliers.

Awake'e will be a first-class resort which will promote Hawaii's stature as an international visitor destination area. Its development in West Hawaii will add to the area's growing preeminence as a destination resort area. The diverse array of employment opportunities offered by the proposed resort will provide a

major source of long-term primary jobs for West Hawaii residents. In doing so, the resort will further the policy of obtaining job training and allowing for upward mobility within the visitor industry.

Population A policy of the State Plan's population element is to encourage economic growth and greater employment opportunities on the neighbor islands in a manner consistent with community needs and desires, and to ensure that adequate support services and facilities are provided to accommodate the expansion.

Direct and indirect jobs and economic opportunities created by the proposed development will contribute to the population growth of the West Hawaii region to the extent that families move to, or decide to remain in, the area in order to sustain a desired standard of living. The applicant, together with the appropriate public agencies, will seek to expand existing infrastructure systems to accommodate increases in the local population that are attributable to the project.

Physical Environment Objectives and policies for the physical environment relate to the enhancement of terrestrial, shoreline, and marine resources, as well as scenic, aesthetic, and historic resources. These objectives seek to encourage the prudent use of Hawaii's natural resources and to protect environmental resources that are considered unique or fragile.

The project site is rich in natural and cultural resources that have been identified in this report. The shoreline resources, consisting of cobble beaches and lava promontories, are actively used by local fisherman and the maintenance of this shoreline resource is a prerequisite for the success of the proposed mixed use development. Public shoreline access will be enhanced and appropriate public parking facilities will be constructed to better accommodate recreational use by the local community.

The near-shore marine waters are considered pristine. Protecting the existing high quality is of extreme importance from an environmental perspective, and ultimately to the success of the development's resort component as well.

Archaeological surveys conducted at the site have identified numerous historic and prehistoric sites. All sites will be documented in accordance with accepted archaeological practices. Those deemed culturally significant will be incorporated into the overall land use design to prevent deterioration induced by human activity.

Priority Guidelines Part III of the 1986 revision of the Hawaii State Plan contains priority guidelines (formerly called priority directions) which address areas of statewide concern. These delineate "...five major areas of statewide concern which merit priority attention: economic development, population growth and land resource management, affordable housing, crime and criminal justice, and quality education." Priority guidelines concerned with population growth and land resources are the most relevant, however selected guidelines relating to the economic health and quality of the visitor industry and water use are also relevant. These appropriate guidelines are discussed below.

o Economic health and quality of the visitor industry

- 1. Encourage the development and maintenance of well-designed, adequately serviced hotels and resort destination areas which are sensitive to neighboring communities and activities and which provide for adequate shoreline setbacks and beach access.**

Awake'e will provide additional first class resort facilities in a well-designed environment, which respects the shoreline and its environment. Beach and shoreline access will be improved. Development will be buffered from neighboring developments, and environmentally sensitive attributes including the anchialine ponds and archaeological features will be buffered from development, protected, and enhanced where appropriate to take advantage of interpretive value.

o Water use and development

- 1. Encourage the improvement of irrigation technology and promote the use of non-potable water for agricultural and landscaping purposes.**

Awake'e will seek to use secondary treated water for golf course and landscape irrigation, to reduce the demand for potable water.

o Population growth and land resources

- 1. Encourage major state and federal investments and services to promote economic development and private investment to the neighbor islands as appropriate.**
- 2. Encourage urban growth primarily to existing urban areas where adequate public facilities are already available or can be provided with reasonable public expenditures and away from areas where other important benefits are present, such as protection of important agricultural land or preservation of lifestyles.**
- 3. Make available marginal or non-essential agricultural lands for appropriate urban uses while maintaining agricultural lands of importance in the agricultural district.**
- 4. Seek participation from the private sector for the cost of building infrastructure and utilities, and maintaining open spaces.**
- 5. Direct future urban development away from critical environmental areas or impose mitigating measures so that negative impacts on the environment would be minimized.**
- 6. Identify critical environmental areas in Hawaii to include but not limited to the following: watershed and recharge areas; wildlife habitats (on land and in the ocean); areas with endangered species**

of plants and wildlife; natural streams and water bodies; scenic and recreational shoreline resources; open space and natural areas; historic and cultural sites; areas of particular sensitive to reduction in water and air quality; and scenic resources.

7. Protect and enhance Hawaii's shoreline, open spaces, and scenic resources.

The proposed development is consistent with most of the above guidelines which seek to encourage development in non-sensitive or non-productive areas. While there do exist environmentally sensitive areas within Awake'e, they will be protected and enhanced by the development. Archaeological features and anchialine ponds will be protected, managed and enhanced where appropriate to take advantage of their interpretive value. The developers will participate in the cost of constructing all new infrastructure, including roads, water systems, sewer systems and storm drainage. In addition, this should offset the fact that the development is proposed to take place in a previously undeveloped area, which has little or no public infrastructure or facilities.

3.2 State Functional Plans

The Hawaii State Plan directs the appropriate State agencies to prepare functional plans for their respective program areas. The plans set forth "...the policies, programs, and projects designed to implement the objectives of a specified field of activity when such activity is proposed, administered, or funded by an agency of the State" (Section 226-2(10), HRS). Each functional plan contains objectives to be achieved and policies to be pursued within the specified areas. "[S]uch policies shall address major programs and the location of major facilities" (Section 226-57(b), HRS).

Twelve State Functional Plans have been adopted to date by the Hawaii State Legislature in the areas of agriculture, transportation, conservation lands, housing, tourism, water resources, historic preservation, energy, recreation, education, higher education, and health. The State Plan mandates that these plans "...shall be taken into consideration in amending the county general plans (Section 226-52(a)(por 3.), HRS). Policies contained in the functional plans were examined and are discussed below as they relate to the proposed development.

3.2.1 State Agriculture Functional Plan

The State Agriculture Functional Plan (prepared by the State Department of Agriculture) applies to lands "suitable and used (or potentially usable) for agricultural production." The subject property contains only soils with "limited agriculture potential due to stoniness or other textural problems," and thus has marginal agricultural potential.

3.2.2 State Conservation Lands Functional Plan

The State Conservation Lands Functional Plan (prepared by the State Department of Land and Natural Resources) defines and addresses state-wide concerns for environmentally sensitive areas such as watersheds, terrestrial

habitat, ocean habitat, areas with endangered species, natural streams, shoreline, open space, natural areas, air and water quality sensitive areas, and scenic, historic, and cultural sites.

There are no definable streams or drainage channels within the subject property. With proper planning and mitigative actions, preservation and enhancement of valuable on- and off-site natural resources, such as the pu'u, shoreline, pristine air and water quality, and historic and cultural sites, can be compatible with urban use.

The subject property currently is classified in the State Conservation District. A petition for reclassification to the Urban District will eventually be filed with the State Land Use Commission.

3.2.3 State Health Functional Plan

The State Health Functional Plan (prepared and maintained by the State Department of Health) seeks to: (1) prevent disease and promote healthful lifestyles and environmental conditions; (2) ensure and promote appropriate provision and access to health care for the total community; (3) protect society from potential dangers (e.g., epidemics, hazardous environmental conditions or violent persons); and (4) prevent environmental degradation and enhance the quality of the air, land and water.

Proposed development of the property is not expected to pose a significant risk to public safety or health. The acquisition and distribution of potable water, possible use of brackish water, and treatment and recycling/disposal of wastewater will comply with all applicable Federal, State and County regulations. Furthermore, the project will draw upon the experience of other resort areas that have successfully allocated different types of water according to their intended uses. As discussed below (Chapter 4), the project is not expected to have a significant adverse effect on air or water quality.

3.2.4 State Historic Preservation Functional Plan

The State Department of Land and Natural Resources (DLNR) is responsible for the State Historic Preservation Functional Plan. This plan identifies major priorities for such diverse activities as the collection and conservation of oral histories, historic records and artifacts, the perpetuation of traditional arts and skills, the preservation of historic properties, and the education of the public with regard to Hawaii's past.

An archaeological survey of the Awake'e site has been conducted (appendix B) to locate, describe and determine the significance of the historic and archaeological sites within the project area. Throughout the survey process, close coordination has been maintained with the State Historic Sites Office and the County of Hawaii Planning Department. Mitigation measures have also been reviewed with the same offices.

3.2.5 State Housing Functional Plan

The State Housing Functional Plan is prepared and maintained by the Hawaii Housing Authority, an agency administratively attached to the State Department of Social Services and Housing. Among other actions, the plan provides for: (1) assistance in the provision and maintenance of housing through government and private sector efforts; and (2) research needed to make well informed housing decisions.

According to a preliminary housing impact analysis based on currently accepted assumptions of labor force composition and household size, a need for a maximum of 80 employee housing units has been projected. The availability of affordable employee housing continues to be a major concern of Kona residents. Given the relationship between construction costs and household incomes, it will be difficult to expand the housing supply without direct or indirect public or private subsidies. Solutions to the problem will require cooperation between State and local agencies, as well as the developers of major projects.

3.2.6 State Recreation Functional Plan

The State Recreation Functional Plan (prepared and maintained by the Department of Land and Natural Resources) seeks: (1) to assess the present and potential demand and supply of outdoor recreation resources and to guide State and County agencies in acquiring or preserving lands of recreational value; (2) to provide adequate recreation facilities and programs; and (3) to ensure public access to recreation areas.

Development of the proposed project will have a significant effect on the recreational resources of the area. Shoreline access, currently limited to unpaved and seasonally unstable beach trails, will be enhanced. The proposed land use plan provides paved parking areas adjacent to the beaches. The 18-hole golf course will be designed for West Hawaii residents, as well as visitors.

3.2.7 State Tourism Functional Plan

The State Tourism Functional Plan is prepared and maintained by the Tourism Office of the State Department of Planning and Economic Development. The overall theme of the State Tourism Functional Plan, taken from the Hawaii State Plan, is "[t]he achievement of a visitor industry that constitutes a major component of steady growth for Hawaii's economy." Toward this primary objective, the Tourism Functional Plan identifies major issues and problem areas and sets forth policies and actions to insure against unplanned growth which could be damaging to the visitor industry and to the quality of life and well-being of the people of Hawaii. Policies related to this objective include the following:

Objectives, policies, and implementing actions directed to the private sector concerning physical development are the most relevant and are discussed below.

OBJECTIVES:

- A. Maintenance and enhancement of Hawaii's share of existing and potential visitor markets.
- B. Development and maintenance of a well-designed and adequately serviced visitor industry and related developments in keeping with the needs and aspirations of Hawaii's people.
- C. Enhancement of career and employment opportunities in the visitor industry.

POLICIES:

- B(4) Ensure that visitor facilities and destination areas are carefully planned and sensitive to existing neighboring communities and activities.
- C(1) Develop the industry in a manner that will provide the greatest number of primary jobs and steady employment for Hawaii's people.
- D(3) Foster an understanding by visitors of the aloha spirit and the unique and sensitive character of Hawaii's cultures and values.

IMPLEMENTING ACTIONS:

- (1)(a) Encourage the development of an orderly mix of visitor accommodations including full service hotels, condominium apartments, and some single family homes, in order to meet the lodging desires of the broad spectrum of our visitor guests.
- B(3)(b) Institute more expeditious resort development approval systems at the State, County and Federal levels while assuring opportunities for public input.
- B(3)(d) Encourage the clustering of hotels and resort condominium developments to provide open space and promote energy conservation.
- B(4)(a) Discourage the redistricting of land to "urban" classification where resort uses are proposed outside of designated visitor areas.
- B(4)(b) Ensure that new hotel and condominium projects be set back from the shoreline for access which facilitates and encourages public uses of those areas.
- B(4)(c) Ensure the construction, as necessary in connection with both new hotel and large resort condominium projects, of affordable dwelling units adequate to accommodate employee households.

- D(3)(a) Provide relevant interpretation of, and public access to, sites of archaeological significance whenever feasible, and establish a program to explain Hawaii's history and values to visitors and residents.

The objectives, policies and implementing actions of the Tourism Functional Plan provide guidelines for successful resort development in Hawaii. Awake'e Resort will be a self-contained destination resort, similar in some respects to the existing resort areas along the South Kohala and North Kona coast.

The resort is projected to become a major employer in the Kona area, providing a number of primary jobs and steady employment. The resort will contain an "orderly mix" of hotel and condominium dwellings. Shoreline setbacks will be sufficient to "facilitate and encourage" public use of the shoreline area. The applicant will continue to coordinate closely with the Hawaii County Office of Housing and Community Development to meet the projected housing needs of the resort workers.

Awake'e is graced with a number of natural and historically significant site features. Interpretive programs for similar site features established by other destination resort areas in West Hawaii have become very popular exhibits for both visiting guests and the general public. Wherever feasible, these interpretive exhibits will be incorporated into the resort master plan.

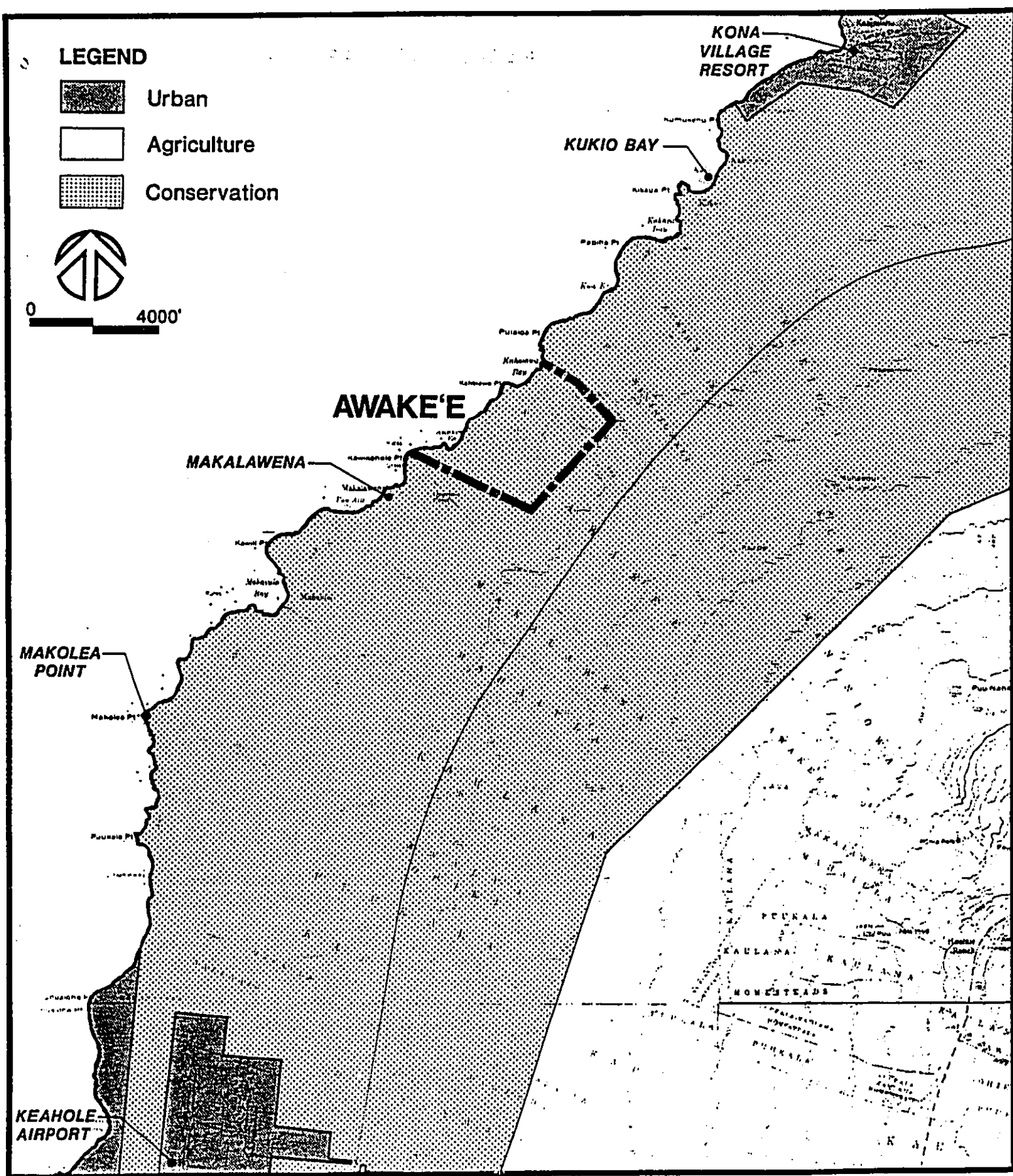
3.3 State Land Use Law

All lands in the State have been classified in one of four land use districts, Urban, Rural, Agricultural, and Conservation, by the State Land Use Commission, pursuant to Chapter 205 HRS. The entire 349.05 acres of the property lie within the State Conservation District (Figure 5). The nearest urban districts are located to the south in the area encompassing the HOST Park, NELH, and Keahole Airport, and beyond that, encompassing the Honokohau Small Boat Harbor-Kaloko Fishpond area and the Kaloko Light Industrial Subdivision. Much of the lands mauka of the Queen Kaahumanu Highway, above the 400-foot elevation, are designated as Agricultural.

Reclassification to the Urban District is a prerequisite for development of the subject property. The applicant will eventually have to initiate a boundary amendment petition with the State Land Use Commission.

In deciding whether to approve an amendment of a district boundary the State Land Use Commission is required to observe and comply with the following policy guidelines:

- (1) Land use amendments shall be approved only as reasonably necessary to accommodate growth and development, provided there are no significant adverse effects upon agricultural, natural, environmental, recreational, scenic, historic, or other resources of the area.



State Land Use Districts

Figure: 5

AWAKE'E RESORT

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- (2) Lands to be reclassified as an urban district shall have adequate public services and facilities or as can be so provided at reasonable costs to the petitioner.
- (3) Maximum use shall be made of existing services and facilities, and scattered urban development shall be avoided.
- (4) Urban districts shall be contiguous to an existing urban district or shall constitute all or a part of a self-contained urban center.
- (5) Preference shall be given to amendment petitions which will provide permanent employment, or needed housing accessible to existing or proposed employment centers, or assist in providing a balanced housing supply for all economic and social groups.
- (6) In establishing the boundaries of the districts in each county, the Commission shall give consideration to the general plan of the county.
- (7) Insofar as practicable conservation lands shall not be reclassified as urban lands.
- (8) The Commission is encouraged to reclassify urban lands which are incompatible with the interim state-wide land use guidance policy or are not developed in a timely manner.

3.4 Hawaii County General Plan

The Hawaii County General Plan "is the policy document for the long-range comprehensive development of the island of Hawaii.... [It] provides the direction for balanced growth of the County" (General Plan 1971, as amended). The plan contains goals, policies, and standards concerning thirteen elements, as well as a series of land use maps referred to as General Plan Land Use Pattern Allocation Guide (LUPAG) Maps. The LUPAG maps delineate thirteen different land use categories throughout the county. It is important to note that the LUPAG Map boundaries are not intended to be site specific, therefore, they are not to be interpreted in the same manner as, say, zoning map boundaries.

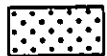
The current LUPAG map designates the project area as Open and Conservation (See Figure 6). The Open designation is generally reserved for parks and historic sites, and conservation areas such as forest and water reserves and natural and scientific preserves. The Conservation designation is a subcategory of the Open category, generally mapping State Land Use Conservation Districts.

In August 1986, the developer petitioned the Hawaii County Planning Department to amend the LUPAG land use designations from Open and Conservation to Intermediate Resort, Medium Density Urban, and Open (See Figure 7). A general description of each of these General Plan land uses is presented in Table 5 below.

LEGEND



Industrial



Agriculture



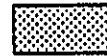
Orchards



Resort



Open Area



Conservation



Alternate Urban Expansion



0 4000'

MAKALAWENA

MAKOLEA POINT

KEAHOLE AIRPORT

KONA VILLAGE RESORT

KUKIO BAY

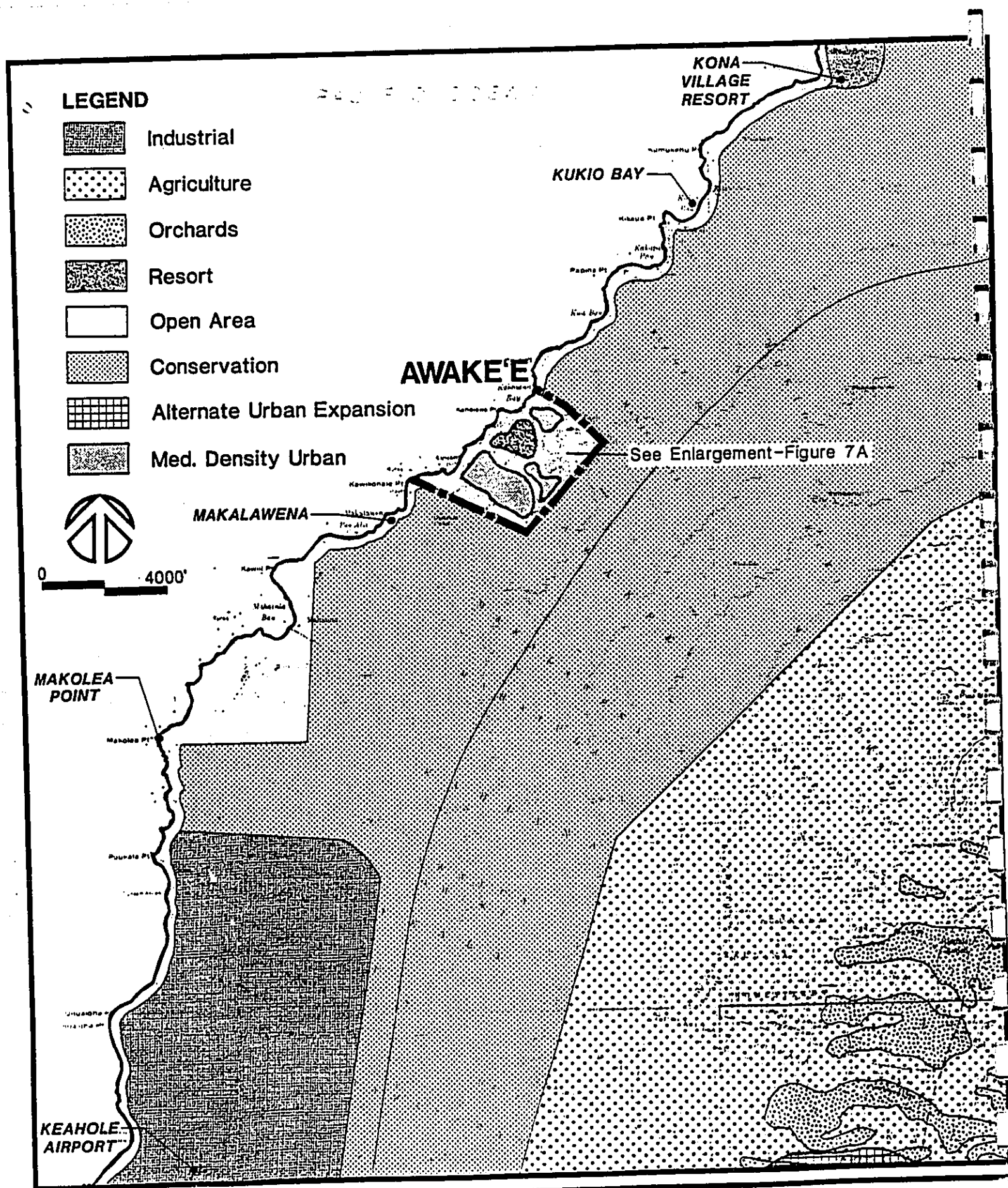
AWAKE'E

Existing Land Use Pattern Allocation Guide Map

Figure: 6

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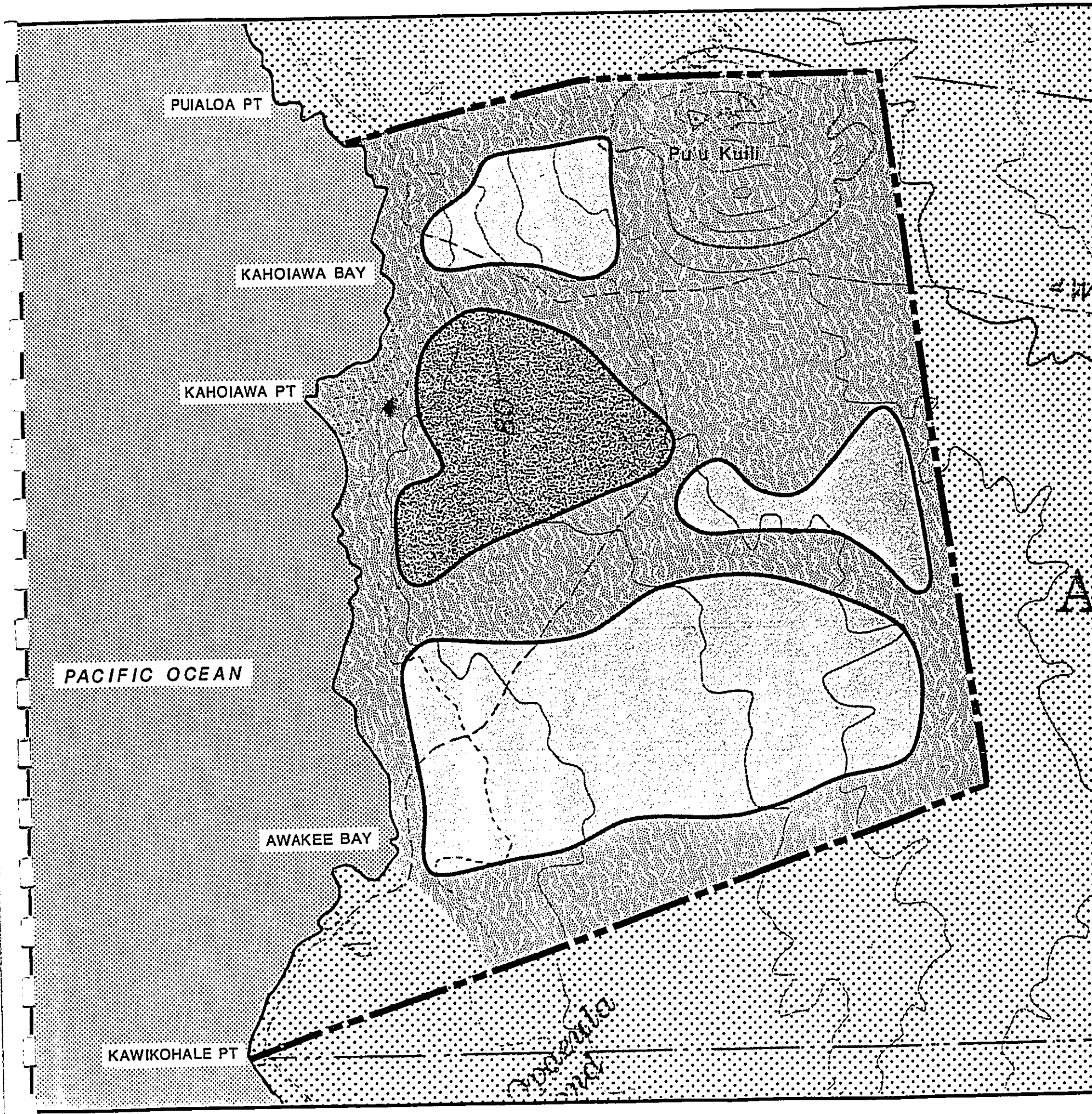


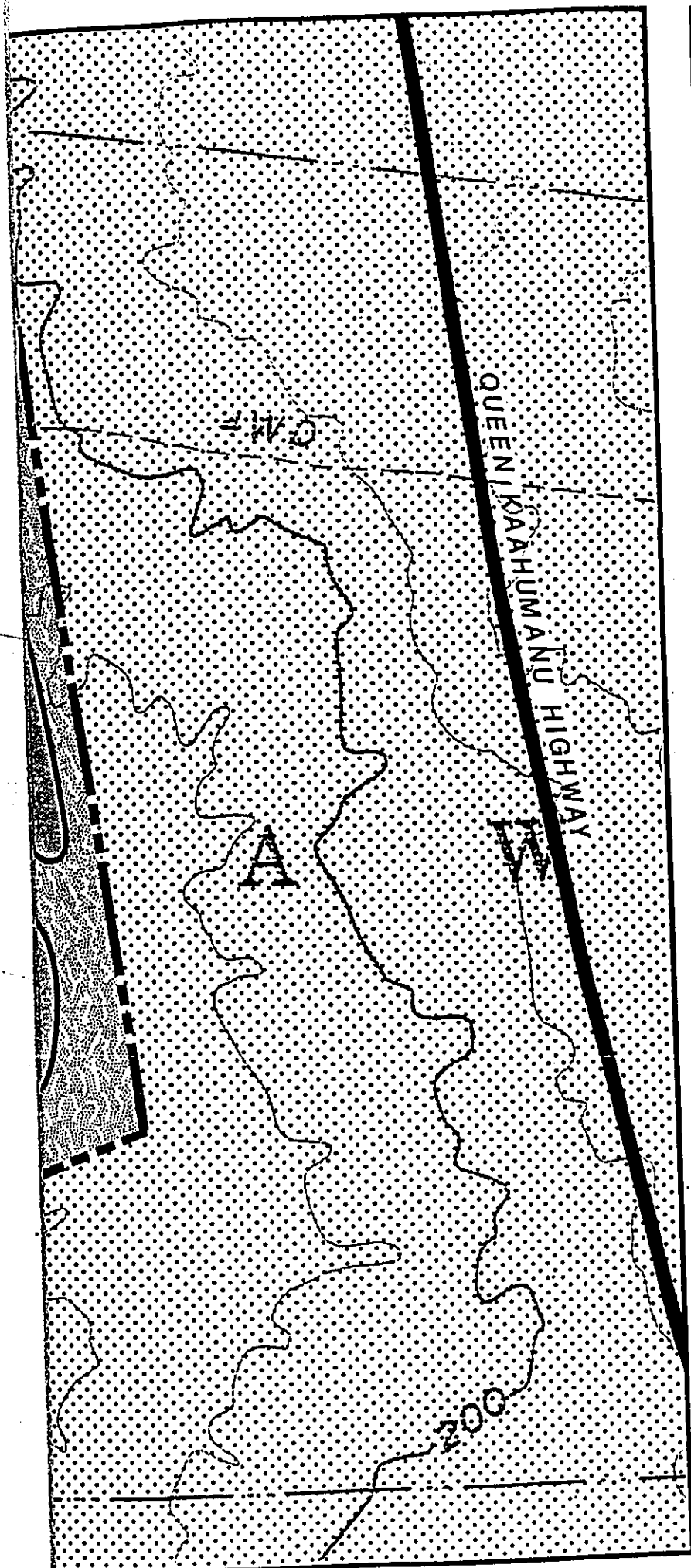
Proposed Land Use Pattern Allocation Guide Map

Figure: 7

AWAKE'E RESORT





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Proposed Land Use Pattern Allocation Guide Map (Enlargement)

LEGEND

-  Resort
-  Medium Density Urban
-  Open Area
-  Conservation

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0 600'

Figure: 7A

Table 5: Selected LUPAG Map Designations

<u>LUPAG Designation</u>	<u>Land Use Description</u>
Open Area:	Areas subject to natural hazards; parks and historic sites.
Conservation:	Forest and water reserves; natural and scientific preserves.
Intermediate Resort:	Hotels and supporting services; self-contained resort destination area. Max. visitor units = 1,500 rooms.
Medium Density Urban:	Village and neighborhood commercial and residential and related functions (3-story commercial; multi-family residential: 35 to 11.6 units/acre; single-family residential: 5.8 units per/acre).

Source: *Hawaii County General Plan.*

Appropriate elements contained in the County of Hawaii General Plan are discussed below as they relate to the Awake'e project.

Economic Element This section of the General Plan points out the potential economic benefits that could accrue to the County from tourism. It further notes that the job category experiencing the largest increase in opportunities is hotel employment. Another issue addressed is the need to diversify the economic base, thus employing a variety of skilled personnel and providing stability against the cyclical performance of any one industry.

In May 1986, the Planning Department released a draft of revisions to the 1971 General Plan. Absent from the draft were LUPAG map amendments and any new recommendations regarding designated resort sites, both of which provide a spatial dimension to the General Plan's policy statements. However, the Draft Plan states: "The principal visitor destination area of the Big Island is the South Kohala-North Kona region in West Hawaii... By and large the west side of the island has dominated the visitor market and this trend is expected to continue into the future" (Hawaii County Planning Department, 1986: I-4). At the same time, the Draft Plan reduced slightly the number of acres to be allocated to resort use county-wide, from 2,359 acres in the 1971 General Plan to 2,172 acres.

Environmental Quality As noted in the General Plan, much of the county's popularity as a visitor destination area is dependent on "the natural beauty of the island, which is accentuated by the quality of the air and water." Development of the Awake'e property would be required to comply with all Federal, State, and County standards for pollutant control. A significant portion of the development will be oriented to the visitor industry, thus maintenance of an attractive, high-quality environment will be tied directly to the success of the project.

Flood Control and Drainage Flooding problems in the county are attributed to three sources: surface storm water runoff, high seas, and tsunami inundation. Surface runoff due to impervious surfaces on the site is not expected to increase significantly due to low rainfall levels. Areas affected by flooding due to tsunami high-wave run up and storm surge are identified in the Flood Insurance Rate Map prepared by the Federal Emergency Management Agency (May 3, 1982). The 100-year boundary along the Awake'e property closely follows the coastline makai of the beach trail, except near Kawikohale Point, where the boundary extends inland for a short distance. No habitable development is planned for areas within the 100-year boundary.

Historic Sites The goals and policies of the general plan seek to ensure the identification, protection and enhancement of historically significant sites located on private lands. The developer has carried out an archaeological reconnaissance of the subject property which had identified several sites of historic significance. As a result, the developer will prepare a historic preservation plan in coordination with State and County officials. It is noted that successful resorts in the region have played active roles in protecting and refurbishing archaeological and historic sites. It is felt that significant sites on the Awake'e property could be incorporated into project development plans to preserve and enhance public access to them.

Housing The General Plan notes that although the visitor industry is expected to expand rapidly in North Kona, the industry faces a major problem in attracting labor and providing housing for employees. The Awake'e master plan does not include any single-family housing. The developer has expressed a willingness to work with the County to meet employee housing needs that are generated by the development. Based upon preliminary studies, it is estimated that a maximum of 115 rental units will be required to meet the needs of construction workers during that phase of the development. It is expected that this demand will be absorbed by units available in the short-term rental market of the Kona region.

The cumulative demand for additional housing directly attributable to operational employees resulting from the resort's expansion is projected to amount to about 115 homes by 1995, increasing to about 200 at project completion in 2010. Of those, it is estimated that 36 to 45 affordable housing units would be needed by the County by 1995, increasing to 66 to 82 affordable units needed in 2010.

Natural Beauty The General Plan states that "Hawaii's natural beauty is the manifestation of the interplay of various physical elements and forces," including attributes such as elevation, relative location, and geologic origin and age. The plan also recognizes human modification as another factor, one that involves a desire to experience natural beauty (in part, to enhance that beauty by making it more accessible) and also to obtain economic benefits from it. The project will seek a balance between natural and man-made elements through architectural and landscape designs that are harmonious with the existing environment.

Natural Resources and Shoreline The Kuili Pu'u, cobble beaches, the rocky shoreline, and pristine near-shore waters are important site resources. Shoreline areas will be protected by adhering to State and County setback regulations. Public access will be improved by roadway development on the site and provision of public parking areas. Shoreline access to the neighboring Makalawena property will be maintained.

Public Facilities Public facilities include those service systems which are provided, staffed, and maintained by governments to serve the public health, safety, and welfare. Public facilities include schools, libraries, fire stations, police stations, detention facilities, and refuse disposal areas. In the North Kona region, these services are provided from the larger urban communities of Kailua-Kona, Captain Cook, Kealekekua, Kawaihae, and Waimea. Direct and indirect State and County taxes that will be generated by the Awake'e project are anticipated to more than cover the costs of these services.

Public Utilities Public utilities, namely, water, electricity, telephone, gas, and sewerage and sewage treatment, are directly influenced by the location and intensity of land development. The Awake'e property will require on-site and off-site improvements for adequate utility service. More detailed evaluation of estimated consumption rates and infrastructure requirements for the various utilities are contained in Chapter 6.

Recreation Demand for recreational resources within the county is expected to increase with growing numbers of visitors and greater amounts of leisure time available to residents. County policies are intended to increase the number and diversity of recreational opportunities, to provide public access to the shoreline, and to preserve the quality of recreational resources. The project includes several proposals that promote these goals and policies: an improved beach access road, public beach parking areas, and recreational amenities, e.g., 18-hole golf course, that are available for use by residents, as well as visitors.

Transportation The interrelationship between transportation and land use planning is reflected in the General Plan statement that "coordinated planning of transportation facilities requires an understanding of the characteristics of the modes of conveyance and the patterns and densities of the area which they are intended to serve." Keahole Airport lies approximately four miles to the south of the property, the Honokohau Small Boat Harbor is approximately six miles to the south, and the Queen Kaahumanu Highway is just mauka of the property's eastern boundary. Land uses proposed for the property are compatible with the area's transportation network.

Land Use Land-use policies contained in the General Plan which are relevant to this petition are those referring to: (1) zoning of urban uses in areas that are accessible to community services, employment centers, and adequate public utilities and facilities and (2) granting of rezoning requests in accordance with existing and projected needs of the neighborhood, community, region, and county.

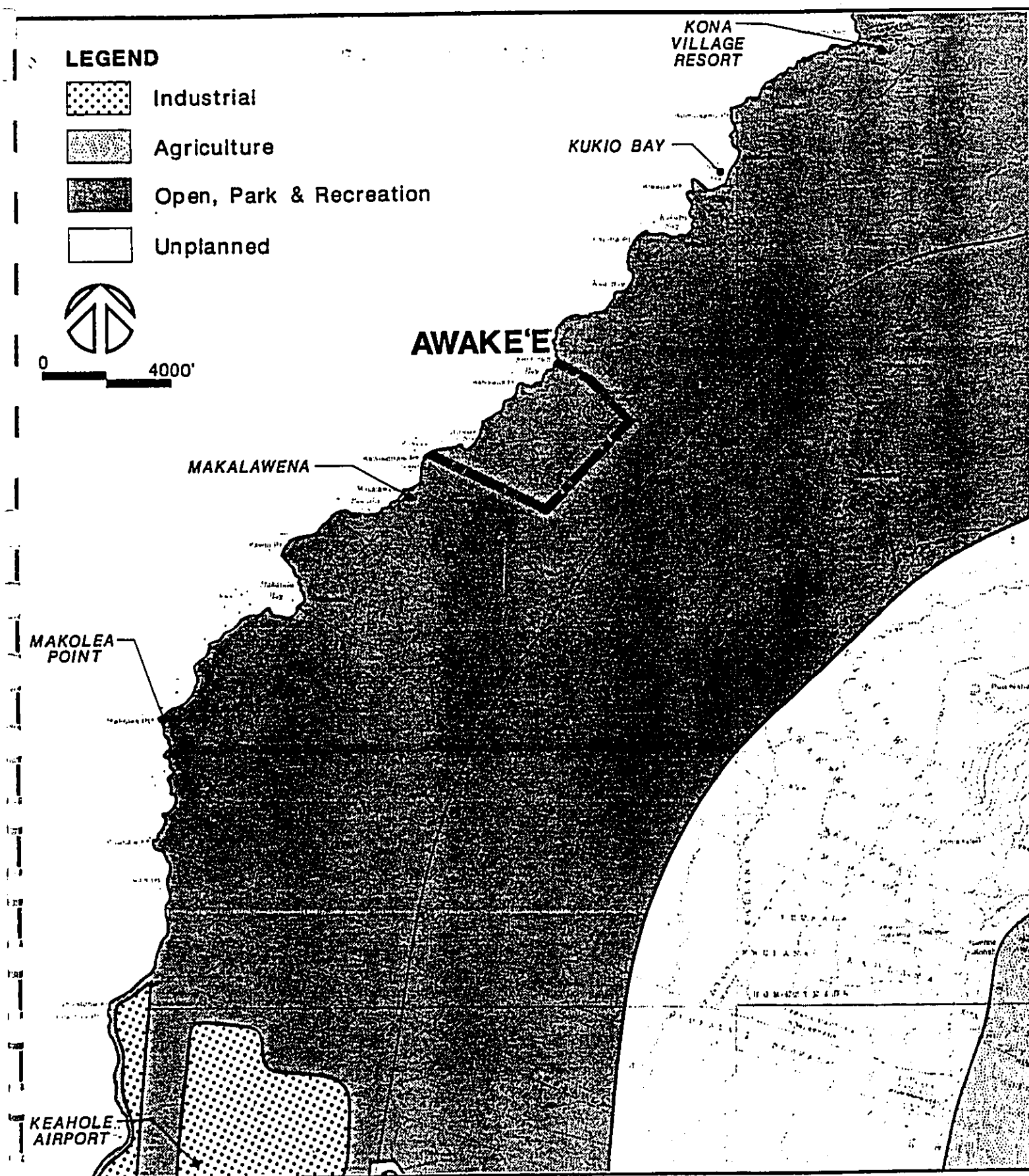
The site involved is in close proximity to a growing urban and resort area along the North Kona coast. The proposed development would provide employment within the Kona Coast region, an area that is planned for and developing a critical mass necessary for successful destination resort development.

3.5 Kona Regional Plan (Draft)

The original draft of the Kona Regional Plan (KRP) was distributed by the Hawaii County Planning Department in July 1982, and subsequently revised in October 1983. The Draft KRP was adopted by the Hawaii County Planning Commission in April 1984 and is pending before the County Council. Upon Council adoption, the document will serve as a medium-range plan which implements the longer range General Plan and as a more precise guide for land use regulation. "The role of the Kona Regional Plan is to serve as an implementing tool for the General Plan of the County of Hawaii... the [KRP] is not intended to supersede the General Plan nor pose additional developmental controls, but rather to guide the implementation of the General Plan...It should be clearly noted that the [KRP] is...not intended to function in a regulatory manner mandating compliance" (ibid.).

The results of the KRP analyses are graphically presented in the Land Use Concept Maps, which show the subject property to be designated Open (See Figure 8). The plan also contains policy recommendations for residential land use, housing needs and infrastructure systems requirements, CIP budgeting, and an implementation strategy to direct growth. The subject property is situated in the planning area identified as Queen Kaahumanu Highway Corridor-Keahole to Palani Road. Proposed land uses for this area include expansion of industrial developments readily accessible from the highway, development of the Kealahou/Honokohau/Kaloko resort area, and development of public facilities within the State-owned Kealahou land division.

The economic element of the KRP includes a set of scenarios depicting potential growth trends in the Kona region to the year 2000. Population was expected to increase from 20,000 residents in 1980 to between 33,200 and 43,000 by the year 2000, depending on the absorption rates of lands currently designated for urban development. (The Draft General Plan has since extended the population projection to the year 2005.)

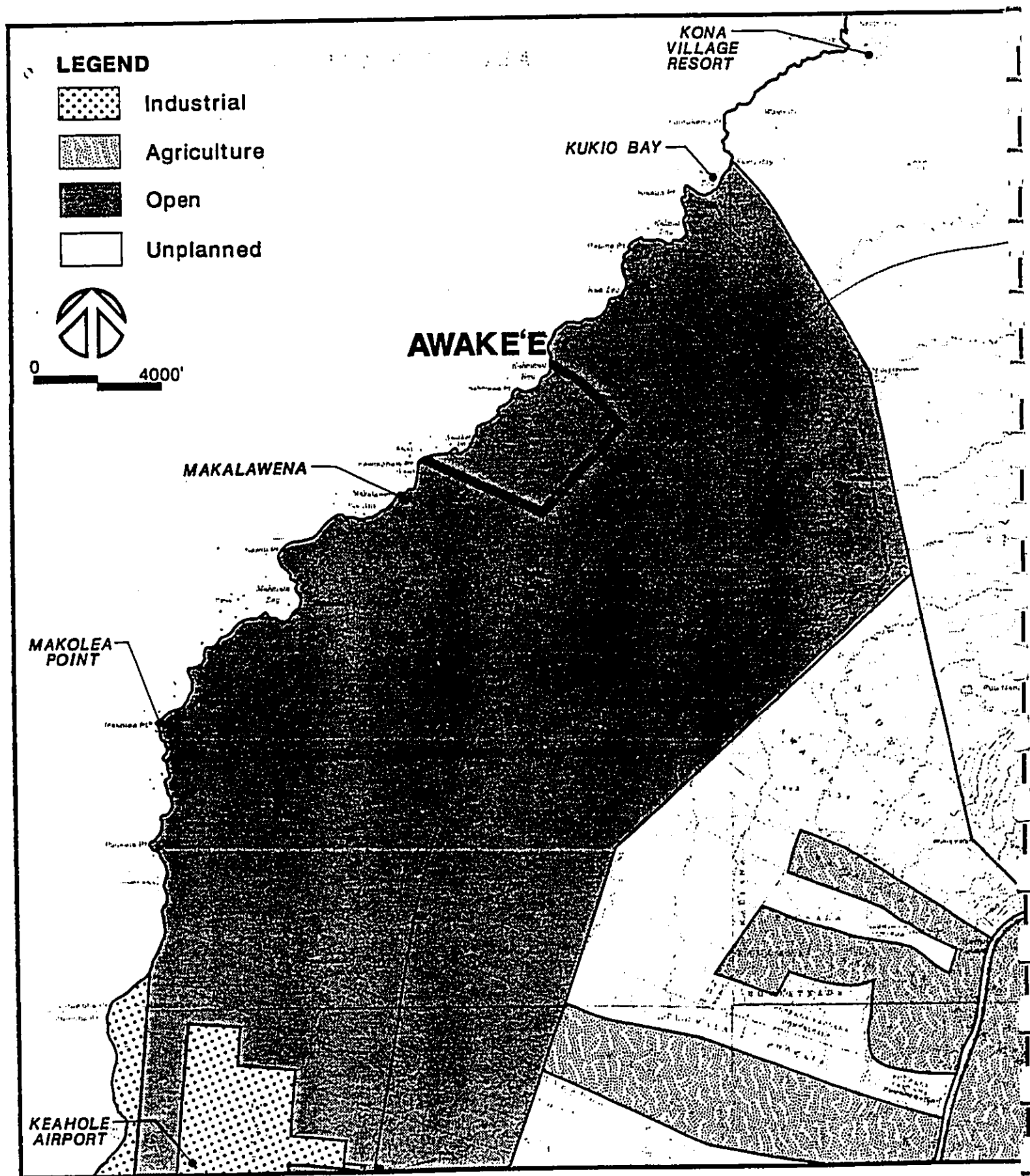


Land Use Concept Map (Kona Regional Plan)

Figure: 8

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County Zoning

Figure: 9

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CHAPTER IV



CHAPTER IV

IMPACTS ON THE PHYSICAL ENVIRONMENT

This chapter describes the physical environment in which the proposed development is situated. For major elements of the physical environment, we also discuss probable impacts in terms of impacts generated by the project and impacts that might constrain the project. In certain cases, impacts are distinguished as: (1) *short-term impacts*, confined primarily to the construction period; (2) *long-term impacts*, that occur while the development is operational or represent irreversible effects; or (3) *cumulative impacts*, resulting from the combined effects of developing Awake'e and other nearby lands. Measures to mitigate potentially adverse impacts are proposed where appropriate.

Some of the findings and conclusions presented in this chapter have been extracted or summarized from technical reports prepared in conjunction with the overall planning effort. In particular, interested readers should refer to the following:

Hydrology

Appendix C Preliminary Engineering Report (Wilson Okamoto & Associates, Inc.)

Marine Water Quality

Appendix D Baseline Assessment of the Marine Environment and Anchialine Ponds (Steven Dollar, Ph.D.)

Flora and Fauna

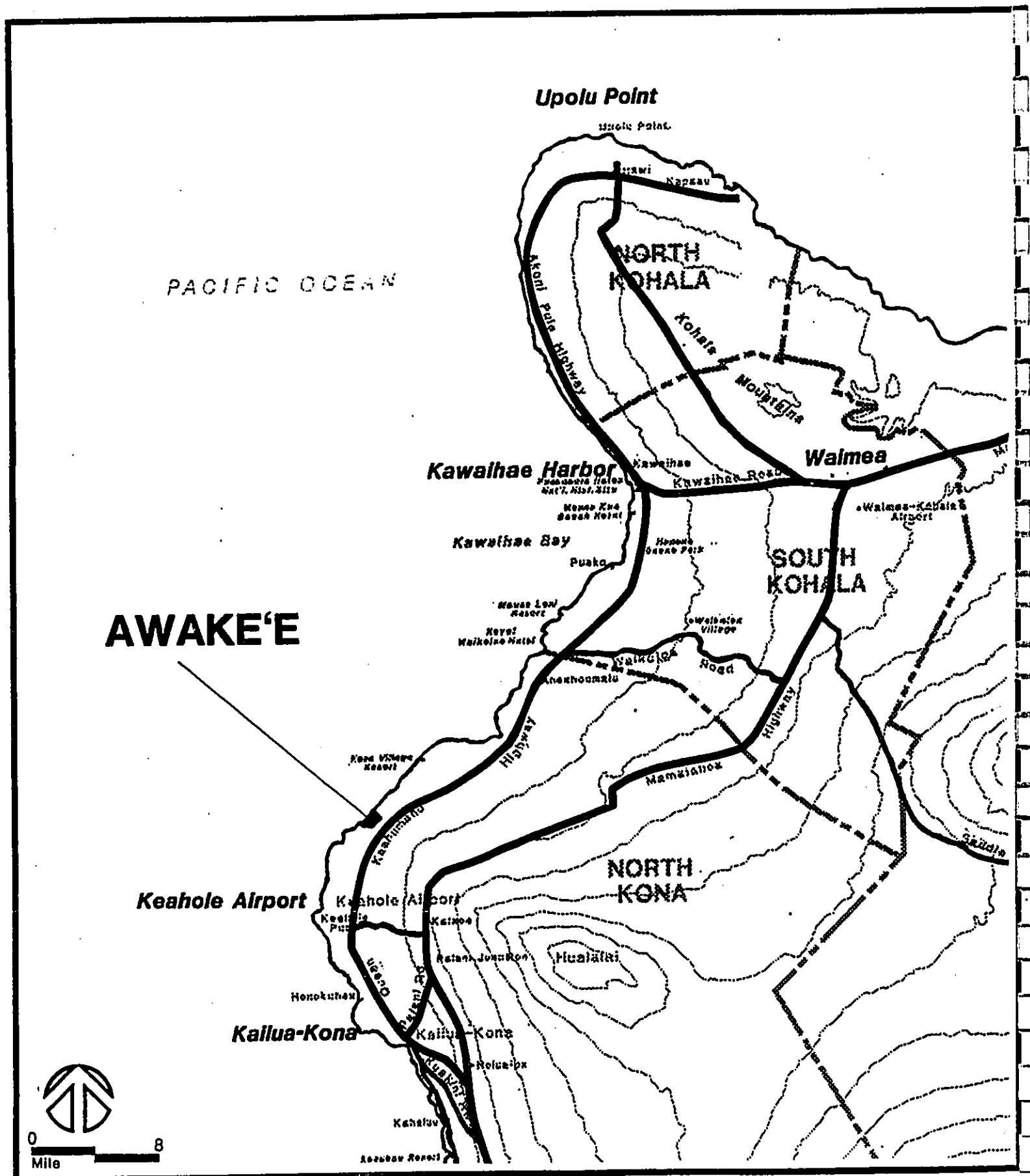
Appendix E Botanical Survey (Char and Associates)
Appendix F Fauna Survey (Char and Associates)

Archaeology

Appendix G Archaeological Reconnaissance Survey-Proposed Awake'e Resort Development Project Area (Paul H. Rosendahl, Ph.D., Inc.)

4.1 The Region

The subject property lies within the North Kona Judicial District, one of nine judicial districts in Hawaii County (see Figure 10). The North Kona district lies on the western coast of the island of Hawaii within a larger region known as West Hawaii. Anaho'omalu Bay marks the district's northern boundary and Kealahakua Bay marks the southern boundary. The inland boundaries are defined by the land masses of Mauna Loa and Hualalai. The North Kona Judicial District includes Census Tracts 215 (Kailua-Kona) and 216 (the remainder).



North Kona Region

Figure: 10

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The primary commercial center of the region is located at Kailua-Kona, the second largest town on the island of Hawaii. Secondary urban centers are found in the communities of Holualoa, Honalo, Kainaliu, Keauhou, and Kalaloe.

4.2 Geography and Climate

Coastal areas of North Kona have a semi-tropical, semi-arid climate. The average annual temperature is 78°F with an average high of 83°F and an average low of 67°F. Average annual precipitation at Awake'e is 10 to 15 inches. The geographic distribution of precipitation closely resembles the topographic contours: a high rainfall belt lies between the 1,200- and 3,000-foot elevations on the leeward slopes of Hualalai and Mauna Loa, with zones of decreasing annual rainfall at lower elevations near the coast and at higher elevations above the rain-bearing trade wind regime.

The North Kona Coast is largely sheltered from the predominant trade wind system by the land masses of Mauna Loa, Mauna Kea, and Hualalai. The prevailing pattern is on-shore winds in the morning and early afternoon, often collecting in a cloud bank at the higher elevations, then becoming off-shore breezes in the late afternoon and evening. Typical wind velocities range between 3 to 14 knots. Relative humidity is also generally stable year-round, the daily average ranging from 71 to 77 percent (Wilson Okamoto, 1981; Sato, et al., 1973).

Impacts No significant change in the site's macro (or regional) climate is anticipated. Modification of the micro (or site-specific) climate will result from the planting of shade trees and the construction of buildings that channel air flows. Equally important would be changes in people's perception of the climate through the addition of landscaping, the golf course, and water features throughout the site.

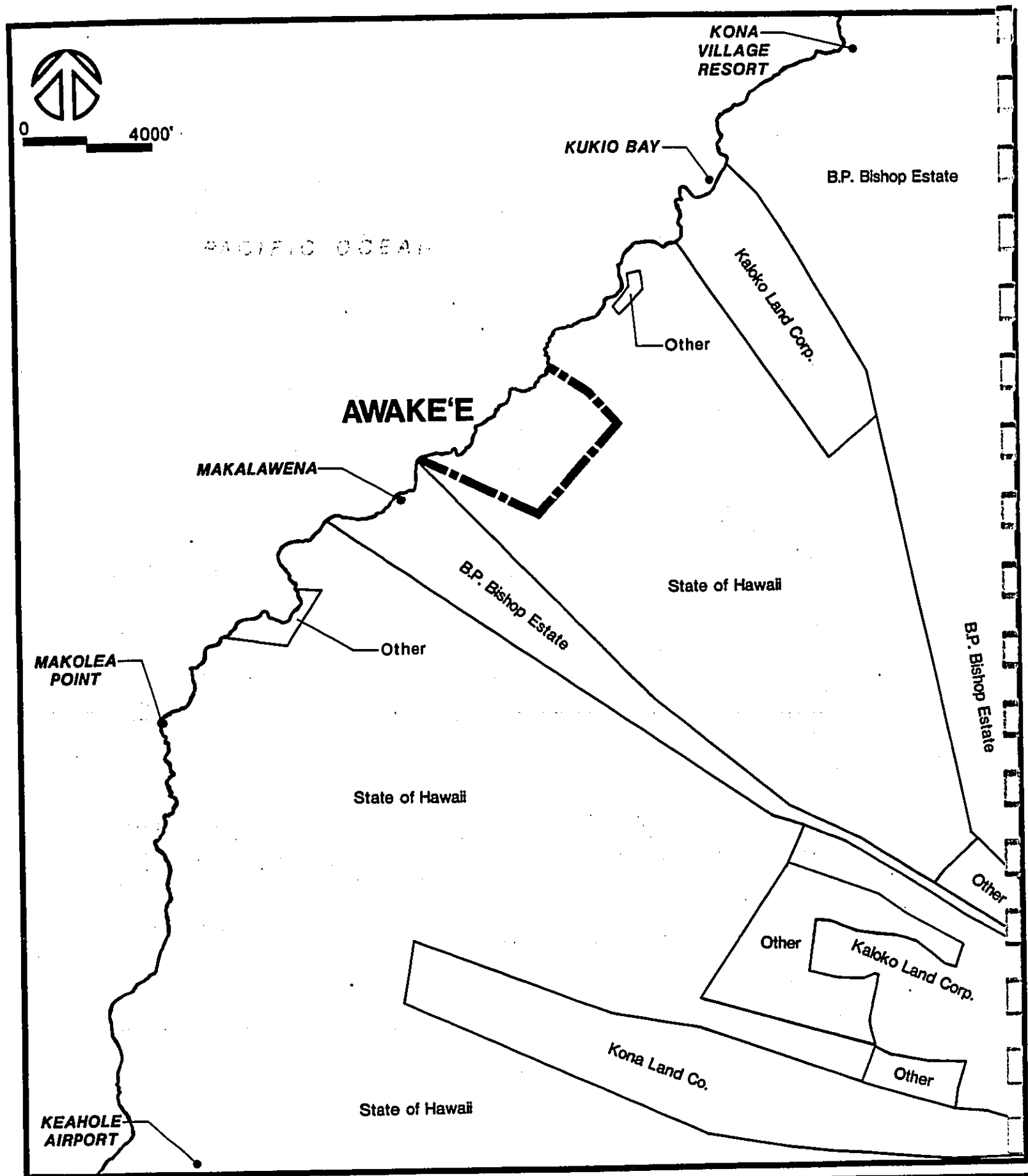
4.3 The Site

The project area consists of approximately 350 acres of open land situated approximately 4 miles north of the Keahole Airport. The site is roughly rectangular in shape with the major axis parallel to the coastline. The mauka portion of the Awake'e parcel is partly covered with lava and slopes gently from sea level to approximately 200 feet at the northern mauka corner, about two-thirds of a mile inland. The subject property is described for taxation purposes as Division 3, Zone 7, Section 2, Plat 04, Parcel 03 (TMK: 7-2-04:03).

4.4 Surrounding Land Uses and Ownership

The site is surrounded by land on three sides with the fourth side fronting the Pacific Ocean (see Figure 11). Listed below are the surrounding land uses starting from the north and rotating clockwise.

Maniniowali, Kukio 2nd and remainder of Awake'e Ahupua'a (TMK 7-2-04:4 & 17). The State of Hawaii owns an approximately 3,400-acre tract of land which entirely surrounds the subject property. This tract includes the Ahupua'a of Maniniowali, Kukio 2nd and the mauka portion of the Awake'e Ahupua'a.



Land Ownership

Figure: 11

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Access to the makai areas of the northerly adjacent Ahupua'a is via a four-wheel drive coastal trail which originates on the subject property. These lands are presently vacant and unimproved. Five small privately owned parcels front Kua Bay to the north of the site.

To the south of the Awake'e property is 631 acres of land owned by the B.P. Bishop Estate known as Makalawena Ahupua'a (TMK 7-2-04:01). Within this parcel lies a small parcel of 10,000 square feet (TMK 7-2-01:02) near Opaecula Pond. This plot is owned by the United Church of Christ, Hawaii Conference. The parcel was the site of the Kalawina Church, which was moved to Kalaoa. Access to the site is by a jeep trail which connects to the coastal jeep trail.

Impact Development of the Awake'e site, as proposed, will not affect the surrounding land uses significantly, as there is no significant development in the area.

Mitigation Measures To maximize compatibility and coordination between the Awake'e development and surrounding land uses, the developer will monitor changes in existing and proposed uses of adjacent properties and keep the community informed of revisions to the subject master plan.

4.5 Access

Access to the site is via a jeep trail which enters the property near the northern, mauka corner of the site, at the base of Kuili Pu'u. The access traverses State-owned land fronting the highway and is considered poor and passable only on foot or in four wheel drive vehicles. Currently, there is no legal access from the Queen Kaahumanu Highway into the project site. The State Department of Land and Natural Resources (DLNR) officially moved the access point from Awake'e (Sta. 475+00) to Maniniowali (Sta. 504+00). In order to obtain approval for a new access point, a Traffic Impact Analysis Report (TIAR) must be conducted and submitted to the State Highways Division for review and approval (State Department of Transportation, 1986). Approval for the access easement must also be obtained from DLNR.

Impact Access to the property will improve substantially with construction of paved roadways and upgrading of the Queen Kaahumanu Highway intersection.

Mitigation Measures Because vehicles travel at high speed on Queen Kaahumanu Highway and the property lacks highway frontage, clear signage will be necessary to mark the entrance to Awake'e. The designated access point occurs on a straight stretch of the highway, therefore adequate sight distance is available for safe design of the intersection.

Although through traffic on the existing coastal jeep road will be discouraged, pedestrian access along the coastline will not be affected. Existing jeep trail access to the adjacent Makalawena property will be maintained from the point where it intersects the planned Awake'e parkway. Adequate public parking for shoreline users will be provided in conjunction with planned commercial activities. A comfort station will be provided adjacent to the parking area for shoreline users. No new boat launching facilities are planned.

4.6 Natural Hazards

Volcanic Activity

The U.S. Geological Survey (USGS) has identified "zones of overall relative risk" associated with volcanic activity on the island of Hawaii. These zones take into account both direct elements of volcanic activity (such as lava flow inundation, rock fragments, and gases) and indirect hazards (such as subsidence, surface rupture, earthquakes, and tsunamis). The classification system includes six zones, "A" through "F," with risk increasing from "A" to "F." The subject property is located in the "DE" zone indicating a relative degree of risk from volcanic action (Mullineaux and Peterson, 1974).

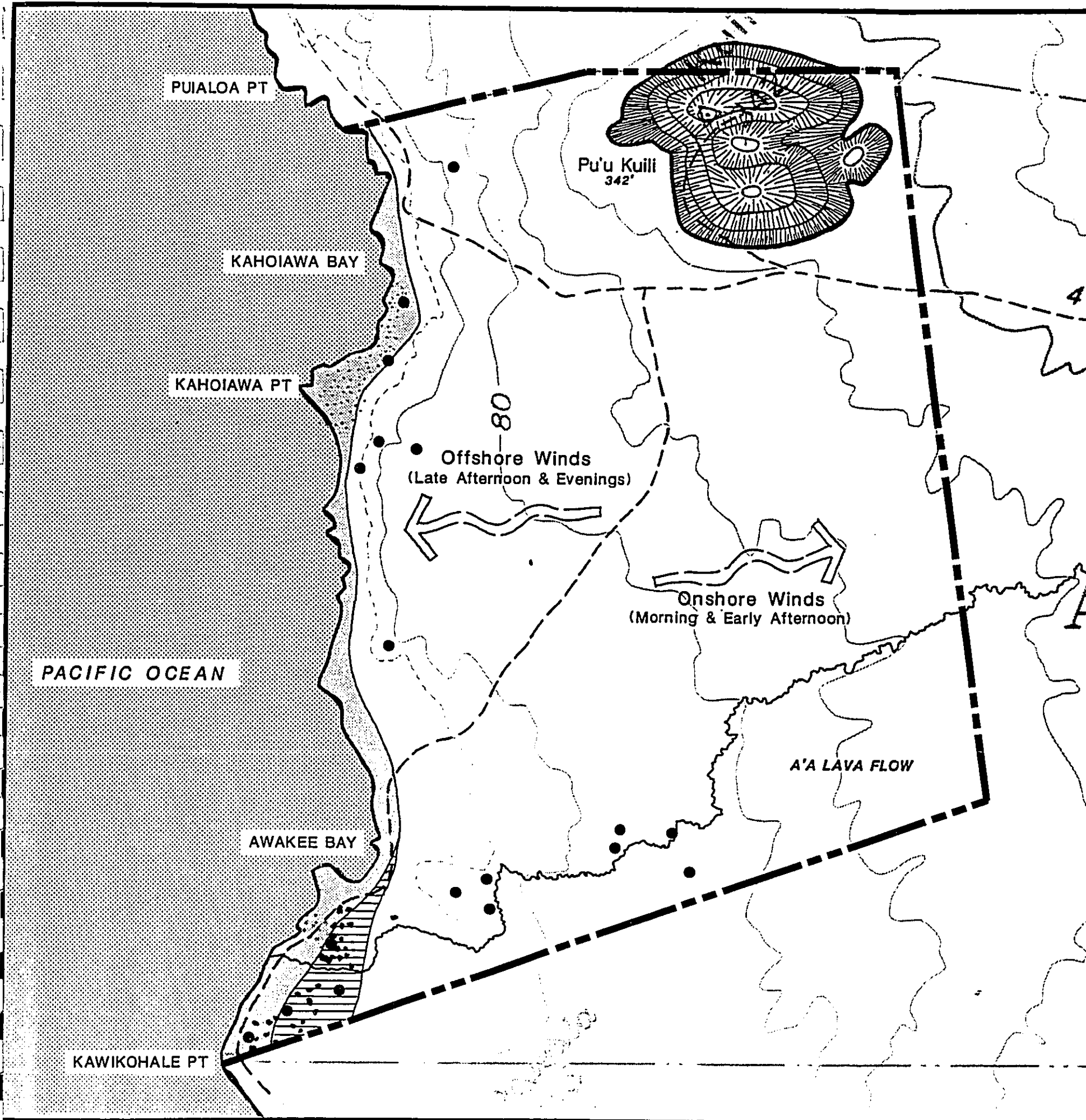
Seismicity The entire island is susceptible to earthquakes originating in fault zones under and adjacent to it. Two fault zones have been identified within the Kona region: the Kealakekua and the Kaloho faults, both located in South Kona and well away from the subject property. The Big Island is classified as a Zone 3 area for the purpose of structural design. The classification system is based on a scale of 0 to 3, with a rating of 3 given to zones of highest seismic occurrence and danger. The Hawaii County Building Code requires that all new structures be designed to resist forces that might be expected in Zone 3 areas.

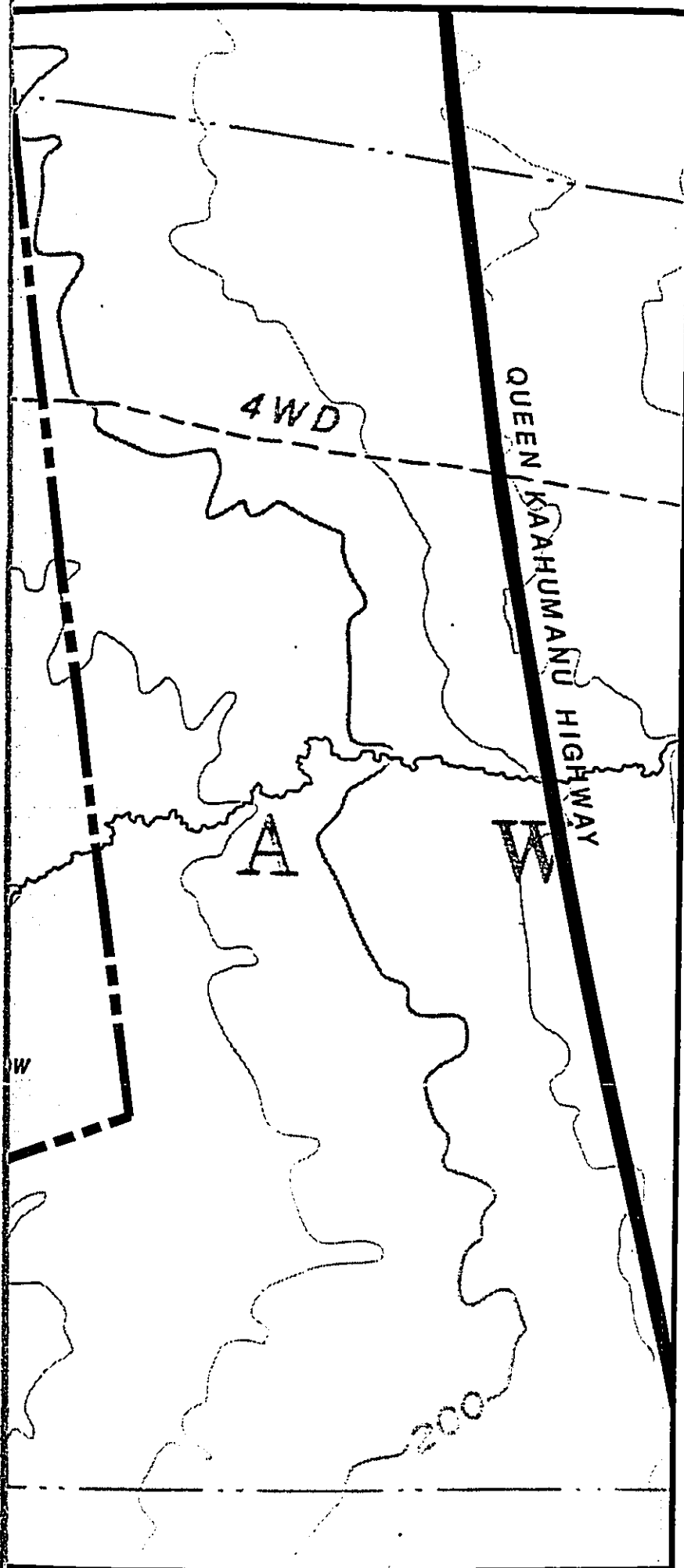
Lava Flow Inundation The project area is susceptible to potential lava flow from Hualalai, one of five volcanoes comprising the island of Hawaii and one of three which have been active in historic times. The last active period of eruption occurred circa 1800. The northwest volcanic rift zone at about the 1,600-foot elevation (makai of the Mamalahoa Highway), produced a lava flow which extended to the shoreline between Keahole Point and Mahaiula to the south of the subject, and the Kaupulehu area to the north; essentially bracketing the subject property.

Tsunami Hazard The Hawaiian Islands have been subjected to at least 50 tsunami occurrences within historic times. The greatest tsunami wave run-up heights ever recorded in the Kona region resulted from the 1960 tsunami which caused extensive damage throughout the state. The Flood Insurance Rate Maps prepared by the Federal Emergency Management Agency (May 3, 1982) have identified coastal high hazard areas at risk from flooding due to tsunami and high wave run-up. As shown in Figure 12, the 100-year flood boundary closely follows the coastline except near Kawikohale Point where the boundary extends inland for approximately 750 feet.

Impacts The occurrence of a natural disaster, such as a volcanic eruption, earthquake, or tsunami would pose a risk to life and property within the development. The 100-year flood boundary has a one percent chance of being exceeded in any given year.

Mitigation Measures All structures within the property will be located, designed, and constructed to conform with local building standards and regulations for potential seismic activity. More extensive geotechnical surveys will be required before detailed site and construction plans can be drawn to ensure adequate stability of structural foundations. No habitable structures will be constructed in the flood hazard area.





Site Analysis

LEGEND

Jeep Track

Anchialine Ponds

100 Year Flood Zone

Coastal High Hazard Area

Archaeological Sites to be Retained

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0 600'

Figure: 12

4.7 Geology and Topography

The subject property is located on the western slope of Hualalai, a dormant shield-type volcano (elevation 8,271 feet). The Keahole Point area was formed by progressive layering of prehistoric lava flows from Hualalai. The lavas are primarily pahoehoe with thicknesses varying from 6 inches to 100 feet. The layers are very porous and contain numerous lava tubes, cracks, and fissures (R.M. Towill, 1976). A number of anchialine ponds of various sizes are found near the southern coastal border.

The elevation of the Awake's property ranges from sea level at the coastline to approximately 200 feet above mean sea level at the northern-mauka boundary. The land slopes gently, with average slopes ranging from 5 to 7 percent. The Kuili cinder cone in the northwest portion of the site reaches a height of 342 feet MSL. From the peak of Kuili to the shoreline, the average slope increases to 17 percent.

Impacts The 18-hole golf course will require a significant amount of site work, including alteration of the existing lava terrain. Roadways and building sites will also require grading, because of the moderate slopes found on the property.

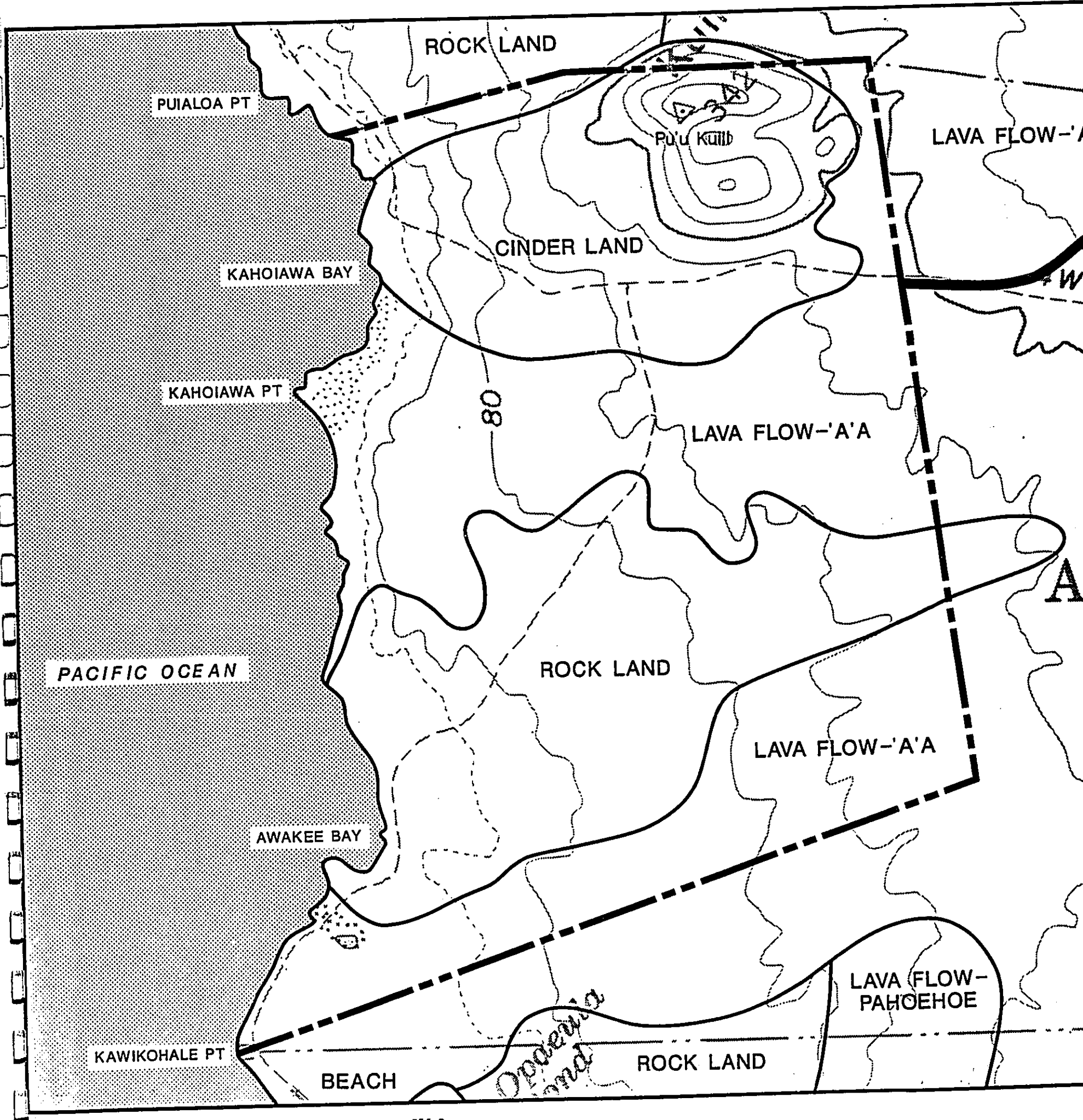
Mitigation Measures To the extent possible, the preliminary land use plan sites future uses in areas with suitable physiographic features to take advantage of views provided by the variation in ground elevation and to minimize the need for large-scale reshaping of the underlying land form. The landform of the Pu'u will be preserved and will be buffered from intense development by golf course fairways.

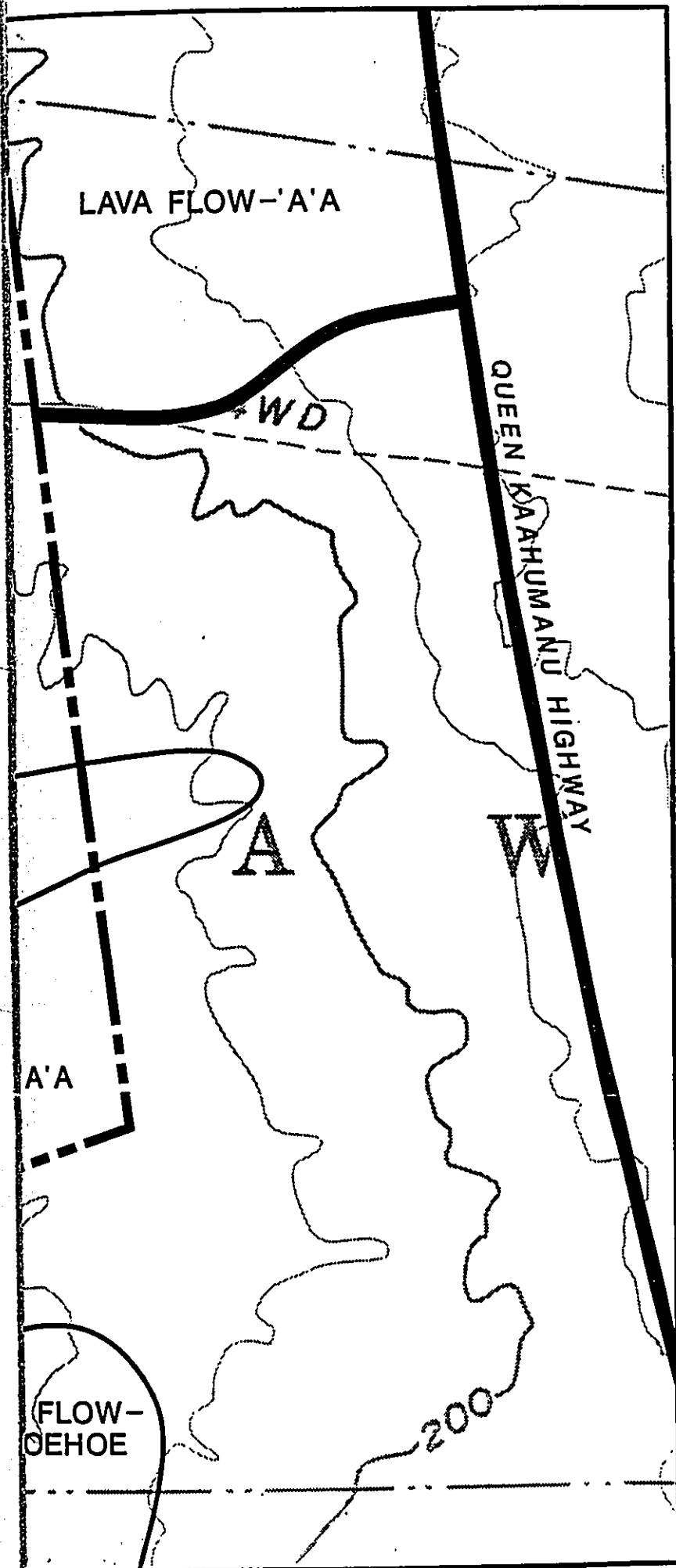
4.8 Soils

The Soil Survey of the Island of Hawaii, State of Hawaii, prepared by the United States Department of Agriculture Soil Conservation Service, has identified three land types on the site. The predominant types consist of a'a lava and rock outcrops. A newer a'a lava flow runs along the southern boundary (Figure 13) and is characterized by clinkery, hard, glassy, sharp pieces piled in tumbling heaps. The third land type identified is cinder land, specifically Pu'u Kuili, located along the northern border.

The Soil Survey indicates that the property is not suited for agricultural use. The entire site has been given a Capability Class Rating of VIII, defined as soils and land forms whose limitations preclude the cultivation of commercial plants. Subclass VIIIs soils have very severe limitations that restrict their use for wildlife habitat and recreation and include areas of cinderland and rock outcrops.

The University of Hawaii Land Study Bureau's Detailed Land Classification--Island of Hawaii classifies the land forms into groupings similar to those mentioned above, and also indicates that the particular soil types were not suited for agricultural uses.





Soil Series Map

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0 600'

Figure: 13

The State Department of Agriculture has mapped Agricultural Lands of Importance to the State of Hawaii (ALISH). The site does not contain "prime" or "unique" agricultural lands. More recently, the Hawaii State Legislature established the Land Evaluation and Site Assessment (LESA) Commission to rate agricultural potential. The commission synthesized previous soil and agricultural studies to assess overall site suitability. The total value of a site must rate 60 or above to be considered important agricultural land. The highest land evaluation rating for this parcel was 22 for soils below the 200 foot elevation.

Short-term Impacts Construction activity will take place on gently sloping sites, requiring some amount of earthwork. Much of the site is covered with pahoe-hoe lava which could present difficulties as a foundation material in comparison to a'a lava, which is more easily crushed and shaped by conventional bulldozers. Periodically during the grading and construction phases, loose lava particles and fill material will be exposed to wind and water erosion.

Long-term Impacts Most of the property is covered with lava or sand, rather than soils per se. Development of the property will not reduce the inventory of agriculturally significant lands. On the other hand, lack of sufficient soil cover will require soil to be imported for the golf course and other landscaped areas. The amount of material needed has not been determined.

Cumulative Impacts Development of Awake'e and other projects will increase the need for housing. A secondary impact of the project, therefore, is the possible reduction of the agricultural lands inventory through their conversion to residential use. If barren lava lands are used, a substantial amount of fill and top soil would be required.

Mitigation Measures The most important mitigative technique is the choice of grading scheme and the layout for the golf fairways and water features. Planned conformity between site design and the natural topography will minimize the amount of reshaping and filling needed.

To provide adequate on-site drainage, the complete elimination of mass-grading would not be possible. Erosion control techniques called for by State and County agencies would be used where appropriate to minimize soil loss.

Although soil erosion is not considered to be a significant adverse effect, the following control measures, individually and combined, could further reduce construction impacts:

- o Minimize time of construction.
- o Retain existing ground cover until just prior to construction.
- o Construct drainage control features early in the development program.
- o Use temporary area sprinklers in nonactive construction areas when ground cover is removed.
- o Station water trucks on site during construction to provide immediate sprinkling, as needed.
- o Use temporary berms and cut-off ditches where needed.
- o Sprinkle graded areas thoroughly after construction activity has ceased for the day and on weekends.
- o Sod or plant all cut and fill slopes immediately after grading has been completed.

4.9 Shoreline and Nearshore Marine Environment

A baseline assessment of the marine environment and anchialine ponds was prepared by Steven Dollar, PhD and is appended to this report as Appendix C. References cited are included in Appendix D. A summary of substantive findings and conclusions of the report relating to the shoreline and nearshore marine environment is presented below. Findings related to the anchialine ponds are discussed in Section 4.10 of this EIS.

4.9.1 Existing Conditions

Shoreline Area

The main structural feature of the approximate one mile of shoreline of the Awake'e property is a scalloped basaltic ledge interspersed with pocket beaches composed of rounded basaltic rocks and white coral rocks. The coral rocks have apparently been thrown up on the shoreline after being broken loose by storm action. The most prominent beach of this type occurs along the margin of Awake'e Bay. At the southern end of the property (south of Awake'e Bay), an intertidal platform of calcium carbonate beach rock lies between the reef bench and the shoreline. Shoreward of the beachrock platform, a berm of white coral rocks separates the ocean from a low-lying area where the anchialine pond complex occurs. North of Awake'e Bay the shoreline is somewhat elevated, preventing the formation of tidepools and anchialine ponds.

Off-shore Marine Environments

Water Quality

A comprehensive data set of surface water chemical parameters has been collected at Keahole Point located approximately 4 miles south of Awake'e. The data set consists of weekly measurements spanning the last 4 years. Because of the homogeneity of the coastline and the lack of shoreline development between Keahole Point and Awake'e, it is reasonable to assume that the present water quality at the two sites is similar.

Descriptively, the nearshore waters off Awake'e are classed by the State Department of Health as AA, and can be considered pristine. Lack of suspended material results in extreme water clarity. There are no streams entering the sea along the development frontage, but there is evidence of high volumes of ground water extrusion. Awake'e Bay showed definite effects of groundwater discharge in the form of a visible surface lens of low salinity water and increased nutrient concentrations.

Benthic Community Structure-Corals and Invertebrates

In general, the geologically young age of the Island of Hawaii limits the development of true "coral reefs". Rather, the majority of the off-shore benthic (i.e. bottom) environment is a "coral community". The distinction is that, for the most part, corals are growing on substrata composed of basement rock, rather

than on calcareous rock of organic (reef) origin. The major group of benthic organisms occurring on the Awake'e reefs, other than corals, are sea urchins and sea cucumbers.

Reef Fish Community

The reef fish community off Awake'e is typical of that found along most of the Kona Coast and can be grouped into six general categories: juveniles, planktivorous damselfishes, herbivores, rubble-dwelling fishes, swarming tetrodons and surge-zone fishes.

Overall, fish community structure at Awake'e is fairly typical of the assemblages found in undisturbed Hawaiian reef environments. The presence of large schools of some food fishes indicates that the area has been subjected to only light to moderate amounts of fishing pressure, both by aquarium fish collectors and fishermen. The apparent low levels of fishing are undoubtedly a function of the remote location of the site with respect to shore access and the distance from the nearest harbor or boat launching facility.

Threatened or Endangered Species

Three species of marine animals that occur in Hawaiian waters have been declared threatened or endangered by Federal jurisdiction. The threatened green sea turtle occurs commonly along the Kona Coast, and is known to feed on selected species of macroalgae. The endangered hawksbill turtle is known infrequently from waters off the Kona Coast. No turtles were observed at Awake'e during the course of the present survey. George Balasz, Zoologist with the National Marine Fisheries Service, who specializes in the study of Hawaiian sea turtles, has indicated that while he has not personally visited Awake'e, the area is not identified as a turtle nesting, breeding, or aggregating site.

Populations of endangered humpback whale are known to winter in the Hawaiian Islands from December to April. In general, however, it is not common for whales to occupy the shallow reef areas that are the primary areas of potential project-related impacts.

4.9.2 Impacts

With regard to the aquatic resources, the major potential indirect parameters appear to be increased sedimentation from wind or runoff as a consequence of grading, and changes in groundwater discharge and surface runoff, especially with respect to nutrients from sewage effluent used for irrigation and golf course fertilization, as well as possible impacts from herbicides and pesticides used on the golf course.

Sedimentation and Runoff

Increased sedimentation is not likely to produce a significant change in the coastal environment. The main reason is that the ground cover of land areas to be graded is raw lava that has not been weathered to any appreciable extent, or scrub brushland with a thin soil layer. When these materials are moved and crushed by bulldozers a smooth surface of cobbles 1 to 4 inches in size generally results. In addition, only a fraction of any wind-blown material would probably

be carried in a westerly direction toward the ocean and existing anchialine ponds. As the size distribution of the wind-blown fraction would probably be in the silt-clay range, it would be expected that this material would remain in suspension for some time if it entered the water column, and therefore it is unlikely that any measurable settlement would occur anywhere in the nearshore marine environment.

Likewise, for several reasons it is not expected that runoff during construction would increase oceanic sediment loads. Most rainwater that enters the ocean as runoff appears to do so following percolation through the surface rock layers to the water table and subsequent groundwater extrusion at the shoreline. Such groundwater flow would not have the effect of transporting sediment to the ocean since the basal rock acts as a filter.

Increased Nutrient Loading From Irrigation and Fertilization

Operations of the Awake'e development call for irrigation and fertilization of the golf course with treated sewage effluent, which has the potential to impact existing aquatic ecosystems with high rates of nutrient loading. A frequent consequence is "eutrophication" or increased growth of a portion of the community, generally at the expense of normal community integrity. At Awake'e, it is not anticipated that such impacts will occur for several reasons. Most importantly, the unrestricted circulation of the off-shore zone by tides, current, wind, and wave action promotes rapid dilution and water exchange. Residence time of a parcel of water at any one location over the reef is probably on the order of hours, so build-up of any nutrient material is unlikely.

Other factors include the following: (1) nutrient loads taken up by vegetation on the golf course and other chemical reactions within the soil environment that would lessen the nutrient load; and (2) substantial reduction in nutrient loading as a result of the proposed secondary level of sewage treatment. No raw sewage would be allowed to enter the marine environment for any length of time.

It has not been found necessary to utilize substantial quantities of pesticides on Hawaii golf courses and only very small applications of herbicides are periodically applied to the greens. Such small quantities do not appear to be of magnitude great enough to leach through the soil and lava, to accumulate, and then produce a noticeable effect.

Potential Effects to Protected Species

As previously mentioned, there are several protected marine species that may inhabit the offshore environment. Because there are no plans for modification of the shoreline, potential impacts to marine mammals and turtles are negligible. Heavy equipment used in construction might produce noise that could be heard by whales. However, according to a literature review conducted by Darby-Ebisu & Associates (1984) for the Waikoloa Beach Resort EIS this kind of low-level noise would have no apparent adverse effects on major marine animals, and would not cause avoidance of the area. Short term changes in water quality resulting from construction would also not be of a magnitude to affect the behavior of sea turtles that might inhabit the reefs off Awake'e. Increased access to the shoreline, once the development is constructed, might affect

resident turtles because these animals often do not remain in areas frequented by humans. This potential impact must be considered very slight, however, owing to the lack of observed turtles in the area.

Marine Ecosystems

In general, the potential for direct impact as a result of development of the Awake'e project to the aquatic communities appears to be very small. None of the developmental activities appear to have the potential to induce changes in physio-chemical water quality parameters of a magnitude sufficient to cause a change in community structure. Marine environments are routinely subjected to stresses of massive proportions by storms that are much more influential than the incremental changes that could result from any development activity.

If some unexpected event related to development activities does occur, the resulting alterations to marine community structure would probably be reversible, and recovery rapid once the stress factor is mitigated. Tolerance to such changes appears to already be part of the physiological range of the community.

4.9.3 Mitigation Measures

The baseline marine biological study has been implemented in such a way that replicate surveys can be conducted in subsequent years. If development practices cause actual changes in marine community structure or physical-chemical parameters they would be quantified through the time-series surveys. If a regional water quality monitoring plan is deemed by the County to be necessary and is required for Awake'e, it would likely be developed at the Shoreline Management Permit stage of the project approval process. In general, it can be concluded that as long as normal reasonable steps are taken in construction practices and operational procedures for the golf course, and the sewage treatment system is carefully maintained, there should be no adverse impacts to the marine environments.

4.10 Anchialine Ponds

A baseline assessment of the marine environment and anchialine ponds was prepared by Steven Dollar, PhD and is appended to this report as Appendix D. References cited are included in Appendix D. A summary of substantive findings and conclusions of the report relating to the anchialine ponds is presented below. Findings related to the shoreline and nearshore marine environments are discussed in Section 4.9 of this EIS.

Existing Conditions

Brackish water pools separated from direct contact with the ocean, termed "anchialine ponds", constitute unique coastal features in Hawaii that are inhabited by rare organisms.

At Awake'e, a series of ponds is located at the southwestern corner of the property, between Awake'e Bay and Kawikohale Pt. (see Figure 12). The pond system continues farther south on the adjacent property (Makalawena). Lack of

ponds on the northern portion of Awake'e appears to be due to relatively steep coastal topography.

Eighteen ponds were numbered and surveyed within the Awake'e property. The ponds are concentrated in a small geographical area, and are surprisingly diverse in size and type. Four of the Awake'e ponds are large (>1000 sq. ft.), 11 ponds are medium (100-1000 sq. ft.), and four are small (<100 sq. ft.). Four of the Awake'e ponds have "apparent" bottoms (depth to rock bottom) classified as shallow (<20 in.), 14 are moderate in depth (20-60 in.), and none can be classified as deep (>60 in.).

Awake'e ponds are classified by type according primarily to composition of the bottom. "A'a" ponds are depressions in lava rock with no growth of benthic macro-algae, and no sediment accumulation. A'a ponds are the most abundant type at Awake'e (12 of 18). Three ponds are "orange crust" ponds which are similar to a'a ponds except that the bottom rock is covered, at least in part, by orange-brown mineralized crusts of the blue-green algae Schizothrix sp. Three ponds are "sediment" ponds which contain bottom layers of unconsolidated mushy sediment up to 2 feet deep.

One pond (no. 10) contained a surface mat of slimy green algae that appears to be an alternate growth form of Schizothrix. A berm of dried algal mat ringed the pond, apparently from periodic cleaning of the water surface. The reason for this cleaning activity is not known, but may have been to keep the pond functional as a fish enclosure.

One common characteristic of all pond types is evidence of cultural modification. Many of the a'a ponds contained walls that divided the ponds into sub-sectors, or modified pond boundaries. As mentioned above, the large pond with a surface mat appeared to be systematically cleaned. Dating such cultural modification of ponds is not possible, although it is probable that much of the activity was conducted by populations of Hawaiians that inhabited the area in the early 1900's.

The most ubiquitous plant group occurring in the Awake'e ponds is the orange algal crusts (Schizothrix) that occurs in shallow, low salinity ponds. The undersides of rocks from a'a ponds contain small algal cells that constitute the only plant material in some ponds. Ponds with deep soft sediment layers often have surface films of gray-green material, possibly diatom mats. Ponds with substantial sediments contained the vascular plant Ruppia maritima, commonly known as widgeon grass.

Typically, the most abundant fauna of anchialine ponds are snails and shrimp. Shrimp were extremely scarce at Awake'e and only one species, Halocaridina rubra, (opae'ula) was observed. The three representative snails, Assiminea sp., Melania sp., and Theodoxus cariosa, typically found in tide pools and anchialine ponds, especially on the undersides of rocks, were ubiquitous in the Awake'e system. Representative pond fish, Eleotris sandwicensis and Kuhlia sandwicensis, were not observed in any of the Awake'e ponds.

The absence of many of the representative species indicates that the faunal makeup of the Awake'e ponds was found to be somewhat atypical of pond ecosystems. The most obvious characteristic of the Awake'e pond biota is the lack of shrimp and native fish species, and the overwhelming domination by introduced fish. The observed exotic fish, topminnows and guppies, occurred in all ponds.

Impacts

Potential impacts to the pond resource include the potential for development related surface runoff to inundate the pond area, the effect of increased dissolved nutrient levels in the groundwater (resulting from the use of treated effluent to irrigate golf course fairways and the application of fertilizers and herbicides to landscaped areas), and the impact of direct physical intrusion into the pond area.

Mitigation Measures

The anchialine ponds at Awake'e, while diverse in physical character, appear to be greatly impacted by the activities of man. Ponds show signs of extensive physical alteration, and changes in community structure resulting from the introduction of exotic species.

The potential for direct impact as a result of development of the Awake'e project to the ponds appears to be very small. Actual developmental activities will not encroach into or require modification to the ponds. Pond communities are not nutrient limited, so increased nutrient level resulting from resort activities would probably have no adverse affect.

It can be concluded that as long as the normal reasonable steps are taken in construction practices, and operational procedures for the golf course and sewage treatment systems are carefully maintained, there should be no adverse impacts to the ponds.

Also, a Management Plan for the anchialine ponds will be developed in consultation with the Army Corps of Engineers and the Fish and Wildlife Service (FWS). Discussions with the FWS indicate the possibility of including the ponds at Awake'e within the boundaries of a proposed National Wildlife Refuge which FWS is proposing for the ponds at Makalawena. If such a plan can be worked out, management of the ponds would be handled by the FWS in conjunction with their management of the Makalawena ponds. The objectives of such a plan are to:

- 1) Maintain the environmental integrity of the existing ponds;
- 2) Protect and manage this resource to provide educational and interpretive opportunities to the public;
- 3) Control and monitor construction activities so that secondary impacts may be identified and mitigated to avoid any detrimental impacts to the ponds; and,

- 4) Provide for a pond manager to implement the management plan and conduct scientific monitoring programs.

The management plan will detail the areas of ponds to be preserved, the dimensions of buffer zones surrounding the pond areas, allowable activities within the pond areas, if any, and establish a pond management program.

The baseline report included in this EIS as Appendix D, provides a basic understanding of the major physical, chemical and biological parameters that influence community structure in the subject environments. The purpose of gaining this understanding is to be able to assess the changes that might come about as a result of modification of environmental parameters by development construction. In the case of the Awake'e anchialine ponds, pond community structure has been greatly modified by the introduction of predatory fish at the expense of the shrimp population. The presence or absence of certain nocturnal species does not change this scenario, and will not change the intent of any measures to return the ponds to their natural state. If, and when a pond monitoring program is designed, night monitoring to assess the populations of endangered shrimp and other nocturnal species will undoubtedly be included.

4.11 Flora

4.11.1 Flora

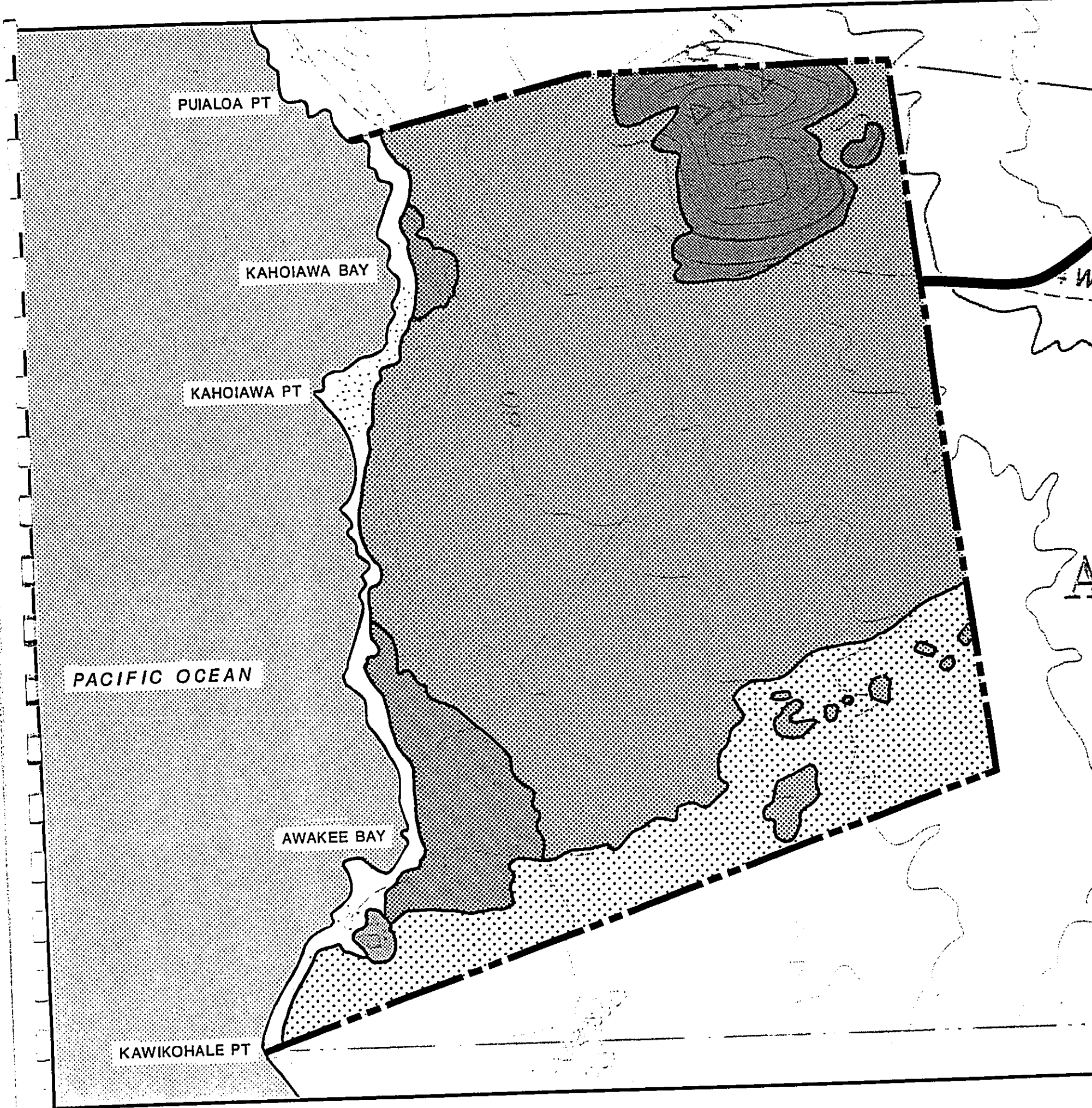
A botanical survey conducted in September 1986 (See Appendix E) inventoried a total of 45 plant species (Char and Associates, 1986). Of those 45 species, 26 (58%) are introduced, 17 (38%) are native - 14 are found in the Hawaiian Islands and elsewhere, 3 are restricted to the Hawaiian Islands and 2 (4%) are of Polynesian origin. None of the native species on the project area are listed as rare, threatened, or endangered by the U.S. Fish and Wildlife Service.

The distribution of vegetation types on the project area is strongly influenced by the substrate type. The older, weathered pahoehoe and 'a'a lava flows support a more or less dense cover of fountaingrass and kiawe trees. The younger 'a'a flow which lies on the southern boundary is almost devoid of vegetation. The loose cinder-pumice-ash substrate of Pu'u Kuili supports a grassland with scattered trees. Five major vegetation types are found on the project area (See Figure 14) and are discussed below.

Strand Vegetation







The coastal portion of the project area is predominantly rocky with large basalt boulders. Vegetation is sparse on the rocky shoreline with only a few scattered plants such as fountaingrass (Pennisetum setaceum), Sagina sp., nettle-leaved goosefoot (Chenopodium murale), pa'u-o-Hi'i-'aka (Jacquemontia sandwicensis), and low, windswept pluchea shrubs (Pluchea odorata) and kiawe trees (Prosopis pallida).

Scattered along the rocky shoreline are areas where high storm-waves have thrown up coral rubble. The rubble is composed of rounded to irregularly shaped pieces of coral 8 to 10 inches in diameter. Small patches of the silver-leaved hinahina-ka-kahakai (Heliotropium anomalum var. argenteum) are occasionally found.



Vegetation Zones

LEGEND

-  Grass Land
-  Closed Prosopis (Kiaue) Forest
-  Open Prosopis (Kiaue) Forest
-  Lava Flow-'A'a
-  Anchialine Ponds
-  Strand

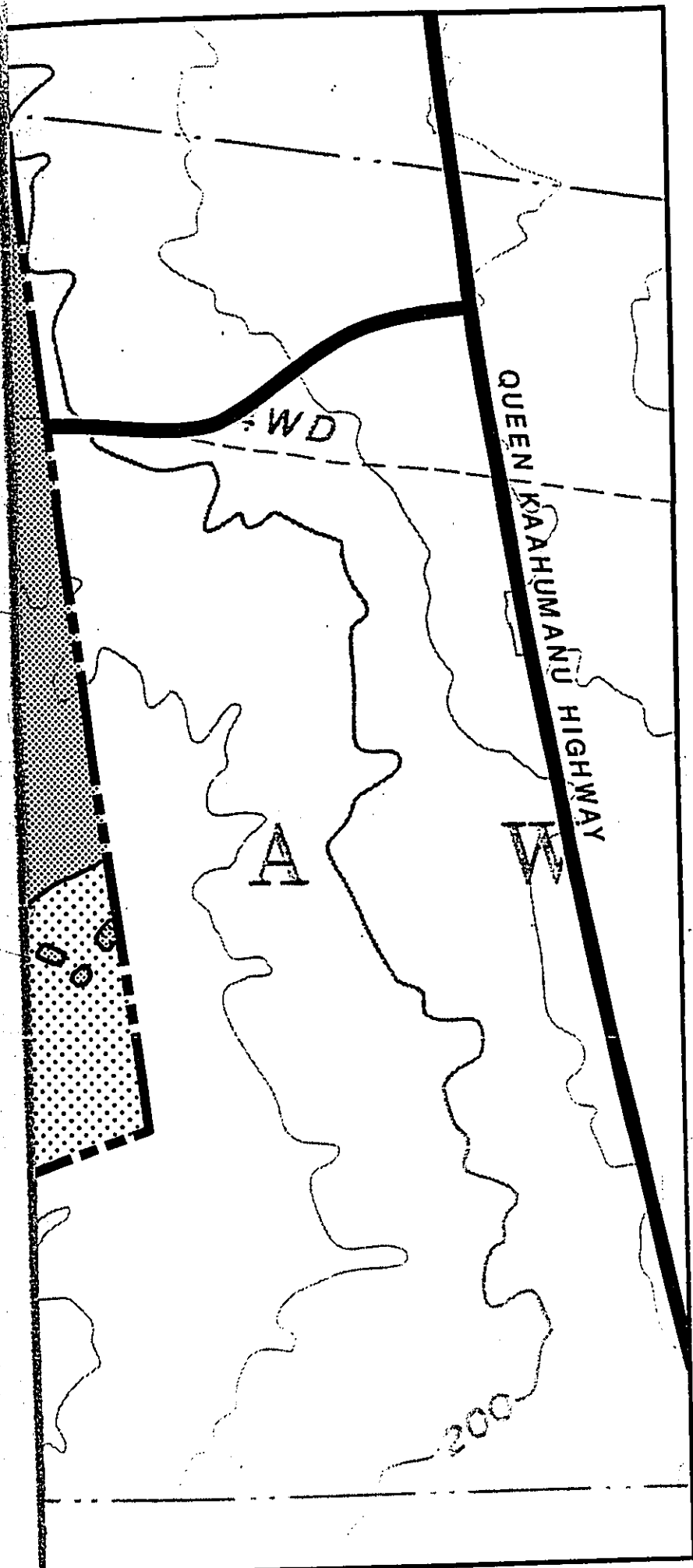
AWAKE'E RESORT

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0 600'

Figure: 14



Along Kahoiawa Bay is a small beach with very coarse sand. A small grove of tree heliotrope (Messerschmidia argentea), up to 18 feet tall, is found here. Mats of pohuehue or beach morning-glory (Ipomoea brasiliensis) and 'aki'aki or beach dropseed grass (Sporobolus virginicus) are scattered here and there on the coarse sand.

By Awake'e Bay, near the largest anchialine pond, beach morning glory forms scattered patches. A grove of milo (Thespis populnea) and coconut (Cocos nucifera) is found between the strand and pond areas.

Pond Vegetation

A number of anchialine ponds are found behind the beach by Awake'e Bay (See Section 4.16). The ponds found on the 'a'a lava flow generally have sparse or no vegetation around their edges. Larger ponds, located by a grove of milo and coconut trees, support a growth of makaloa or 'ehu'awa (Cyperus laevigatus), water hyssop (Bacopa monniera), 'ohelo-kai (Lycium sandwicense), pohuehue or beach morning-glory, and a few kiawe trees. However, the vegetation occurs as scattered patches and bare 'a'a predominates. Milo seedlings are abundant on the edge of the pond abutting the grove of milo and coconut trees.

The larger sediment-laden ponds support orange-colored algal crusts (Schizothrix sp.) and floating mats of filamentous algae. Widgeon grass (Ruppia maritima var. pacifica), an aquatic flowering plant, was observed in only one of these ponds.

Closed Prosopis forest

This vegetation type is found on the lower portion of the project area, behind the coast. The closed Prosopis forest occurs on pahoe-hoe bedrock covered by a thin layer of reddish-brown soil material, 6 to 8 inches deep.

Kiawe trees form a closed canopy forest with the crowns of the trees touching and interlocking. The trees are from 18 to 25 feet tall. There are only a few, smaller kiawe saplings present and no subcanopy layer or dense ground cover because of the heavy shade from the tree canopy.

A few scattered plants found in this forest include false mallow (Malvastrum coromandelianum), hoary abutilon (Abutilon incanum), lantana (Lantana camara), fountaingrass, and 'uhaloa (Waltheria indica var. americana). In areas where the canopy is thinner, hoary abutilon and 'ilima (Sida aff. fallax) may form small, localized clumps.

Open Prosopis forest

This vegetation type occurs on the pahoe-hoe and smaller areas of very weathered 'a'a lava flows found on the project area. There is very little soil in these areas. The surface of the pahoe-hoe flows is often rough and broken with numerous hummocks and domes.

Kiawe trees form an open canopy forest with the trees scattered and the crowns not touching. The canopy cover varies from 30 to 40 to as much as 50% in some places. Ground cover is very dense and dominated by the introduced fountaingrass.

Other grasses found in this vegetation type include buffelgrass (Cenchrus ciliaris), lovegrass (Eragrostis tenella), and piligrass (Heteropogon contortus), which is locally common in the upper portions of the project area. Other species found occasionally in the open kiawe forest include 'ihi (Portulaca cyanosperma), 'uhaloa (Waltheria indica var. americana), garden spurge (Euphorbia hirta), indigo (Indigofera suffruticosa), and hairy abutilon (Abutilon grandifolium). 'Ilima is quite common throughout this vegetation type.

Goat (Capra hircus) droppings and signs of browsing were observed in this vegetation type.

Grassland

The grassland vegetation type is restricted to the loose, reddish-brown colored, bedded cinder-ash-pumice material of Pu'u Kuili. Fountaingrass is the dominant species, forming a 90 to 95% cover in most places. Locally common are patches of 'ilima shrubs. Near the top of the cinder cone, the grass cover is reduced and more surface rock and cinder are present. In these areas 'ihi (Portulaca cyanosperma), 'ihaloa, and pa'u-o-Hi'i-aka become more numerous.

The 3- to 12-foot tall kiawe trees (Prosopis pallida) found in the grassland occur as very scattered individuals. However, very large depressions or pits on the cinder cone may support a small kiawe forest (up to 25 feet tall) on their bottoms.

A few koa-haole shrubs (Leucaena leucocephala) are found alongside the jeep trail which goes to the top of the pu'u and to a U.S.G.S. marker. The koa-haole plants are heavily browsed, and fresh goat droppings are occasionally found on the cinder cone.

Impacts

The proposed development will cover a majority of the site's approximately 350 acres with urban activities. As a result, much of the existing vegetation will be removed. However, certain areas, such as the grasslands located on Pu'u Kuili and areas within the shoreline setback, consisting primarily of coastal strand vegetation will be preserved. Of primary importance is the unique ecosystem supported by the anchialine ponds. Prior to any public approval for development, it is likely that the developer will be required to develop a comprehensive management plan for the ponds.

No endangered plant species are known to inhabit the site. While the proposed development will result in the loss of vegetation, it is expected to have only a minimal impact on the totals island populations of the species involved.

Mitigation Measures

Some of the native species found within the project site should be included in the landscaping of the final project. This would include species such as milo (Thespiea populnea), tree heliotrope (Messerschmidia argentea), and beach morning-glory (Ipomoea brasiliensis).

4.12 Fauna

A faunal survey of the Awake'e site was conducted in September 1986 by Char & Associates, botanical and environmental consultants (Appendix F). Major objectives of the study were to describe major vertebrate communities present in the study area, provide an annotated checklist of the vertebrate species, identify sighting locations that are listed under the Endangered Species Act and to identify and discuss areas of potential environmental problems or concerns.

Existing Conditions

Six major faunal habitats were present in the study area. These approximately correspond to the major vegetation types in the study area, but are less clearly defined.

Thirteen bird species were identified during the bird survey of the site. The most common species present were the Gray Francolin (Francolinus francolinus) which was found primarily in the closed Kiawe forest and the grassland habitats; the Pacific Golden Plover (Pluvialis fulva) found near the largest of the anchialine ponds; the Common Myna (Acridotheres tristis) which utilize the area around Awake'e Bay as a roosting site and forage in the closed Kiawe forest; and the Yellow-billed Cardinal (Paroaria capitata) found primarily in the closed Kiawe forest. Other species identified included: Black-crowned Night Heron (Nycticorax nycticorax hoactli), Black Francolin (Francolinus pondicerianus), Wandering Tattler (Heteroscelus incanus), Spotted Dove (Streptopelia chinensis), Zebra Dove (Geopelia striata), Japanese White-eye (Zosterops japonicus), Warbling Silverbill (Lonchura malabarica), Northern Cardinal (Cardinalis cardinalis) and Yellow-fronted Canary (Serinus mozambicus).

Impacts

Because no native bird or mammal species occur on most of the study site, development of a large portion of the project area will not have a significant impact on the native fauna. In fact, landscaped areas will probably increase the value of the site as a habitat for introduced passerine bird species. The greatest potential impact to avifaunal habitats could be that associated with the effects of development on the anchialine ponds.

Mitigation Measures

The preliminary land use plan (Figure 3) shows that actual development activities will not encroach into or require modification of the ponds. In addition, a management plan will be developed for the ponds (See Section 4.11.3) which will detail steps to be taken to preserve the ponds and associated

avifaunal habitat, provide for buffer zones around pond areas, and establish a program for continued management of the ponds.

4.13 Noise

The main sources of noise present at Awake'e are coastal "surf" noise and vehicular traffic noise along the Queen Kaahumanu Highway. Aircraft noise from Keahole Airport, located approximately 4 miles to the south of the project site should not have any impact on the site.

As with all developments which are located in close proximity to the shoreline, a primary source of noise is that naturally caused by wave action crashing against the beaches and lava boulders. A minor source of noise will be vehicular traffic moving along the Queen Kaahumanu Highway mauka of the project site.

In October 1986 Peat, Marwick, Mitchell & Co. prepared a plan showing the projected 1990 Ldn contours for the Keahole Airport. It does not assume any expansion of the airport runways in a northern direction. That map is reproduced in Figure 15. In general, the State Department of Transportation, Airports Division, and the State Land Use Commission have set standards for development within proximity to airports, which require a noise easement (requiring notification of prospective buyers of residential and resort condominium units) for areas where Ldn levels exceed 55. For areas where Ldn levels exceed 60, sound attenuation measures are required in residential and condominium developments, and in areas exceeding 65 Ldn, residential and resort condominium units are prohibited. Figure 15 shows that the Awake'e property is not located within the areas projected to exceed noise levels of 55 Ldn by 1990. As a result it is unlikely that the Awake'e development will suffer any adverse impacts in terms of aircraft noise arising from flight operations at Keahole Airport.

4.14 Air Quality

There are no air quality monitoring stations in the West Hawaii region. The Department of Health maintains monitoring stations in Hilo and Honoka'a, about 60 miles east-southeast of the site, but the data collected are specific to these localities and cannot be correlated to the subject property. Because there are no large stationary sources or heavy vehicular traffic in the area, it can be inferred that North Kona generally has air quality as good as Hilo, a more urbanized area. The County does not monitor key automobile pollutants, such as carbon monoxide (CO) and nitrogen oxide (NOx). At present, the largest, though sporadic, contributor to air pollution is volcanic activity.

Air circulation patterns on the western side of the island are self-contained because the area is sheltered from the full impact of the northeast tradewinds. Land-sea breezes dominate air movement patterns: east-southeast winds prevail during the early morning and evening hours while west-northwest sea breezes occur during the remaining daylight hours. Air quality conditions may be more vulnerable here than elsewhere on the island. According to the Environmental Impact Assessment prepared for the Kona Industrial Subdivision Expansion and Commercial Development (1979), the development of a 100-acre site for light

industry and a regional shopping center could exceed state air quality standards for carbon monoxide in several locations under worst-case conditions.

Short-term Impacts

Construction is a short-term activity, but given the dry climatic conditions of the site, could produce significant adverse impacts on air quality. The major sources of pollutants are increased emissions from construction machinery with diesel-driven combustion engines and fugitive dust from exposed ground, earth moving, and vehicular movement on unpaved roads.

Long-term Impacts

An air quality impact analysis prepared recently as part of an EIS for the Kaupulehu Resort (Belt, Collins and Associates, 1986) reported that vehicular emissions at full build-out (600-900 hotel units, 350-600 condominium units, and 2 golf courses) would result in a net increase in the pollutants CO, NOx, and Ox. However, the study concluded that even with these increases, the air quality would still be in compliance with federal and State 1-hour standards and that compliance with federal 8-hour standards could be inferred. Proposed resort-oriented uses at the Awake'e development are smaller in scale than Kaupulehu and one can assume a corresponding degree of impacts.

Cumulative Impacts

Air quality is especially susceptible to the impact of cumulative developments. Besides Awake'e, the Kona Village Resort, proposed Kukio Beach, Makalawena and Kaupulehu Resorts, and traffic generated by the respective activities, are existing and future contributors toward a potentially significant net increase in air pollutants.

Mitigation Measures

The impacts on air quality due to site disturbance would be temporary. Several methods to reduce the amount of airborne particulate pollution would be employed, including regular ground watering and a phased landscaping plan.

The strong land-sea breeze regime in the morning and late afternoon hours will help to dissipate increased automotive emissions at the beginning and end of the work day. In addition, road and intersection improvements should be designed to minimize automobile idling time. With the likely expansion of urbanized areas in the Kona region (even without the subject project), regular sampling of air quality parameters may be warranted to monitor compliance with federal and State standards.

4.15 Visual Resources

The primary visual feature of the Awake'e site is the Pu'u Kuili cinder cone. It is prominently visible from both the north and south as one approaches the subject property along the Queen Kaahumanu Highway.

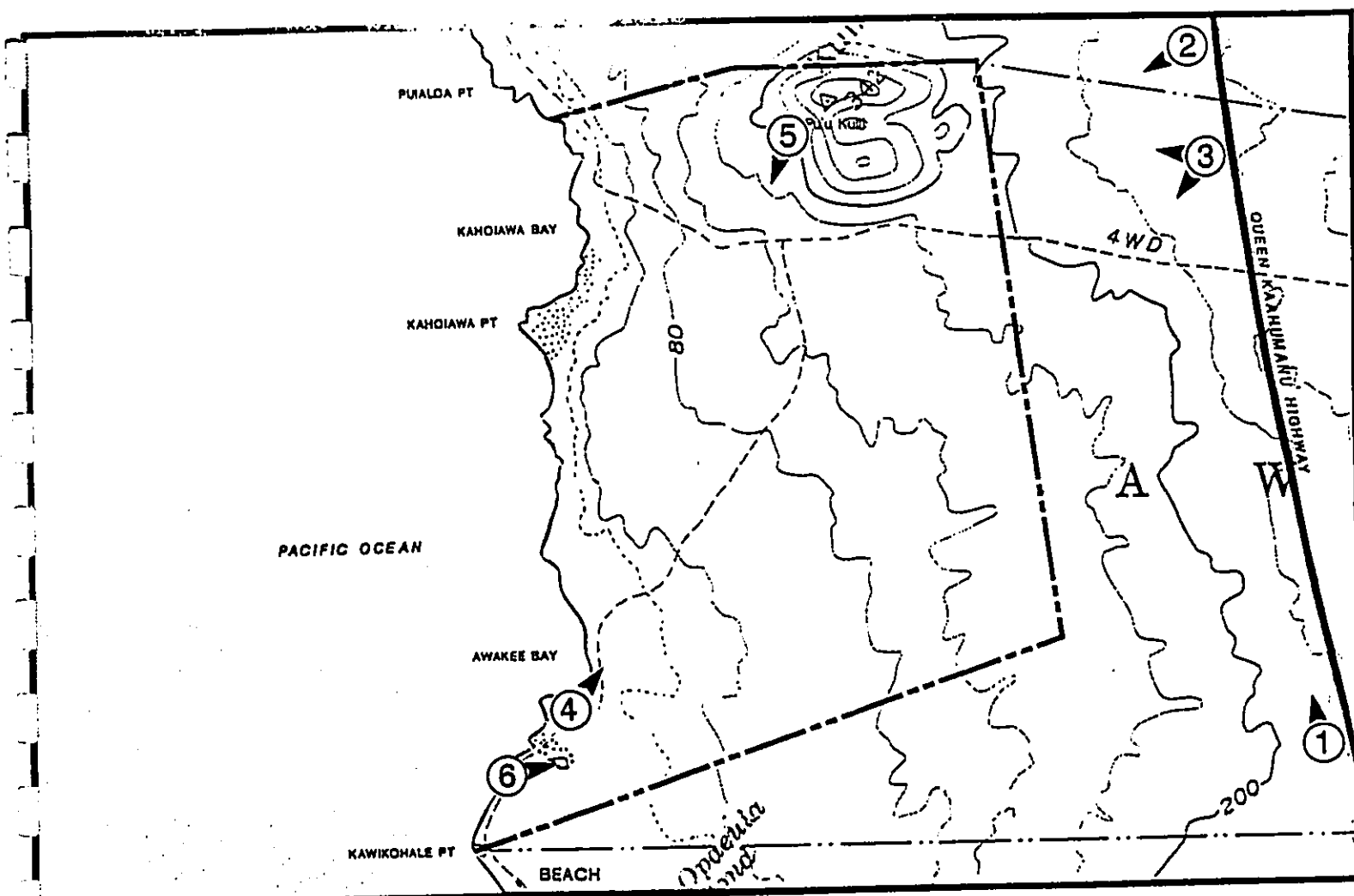
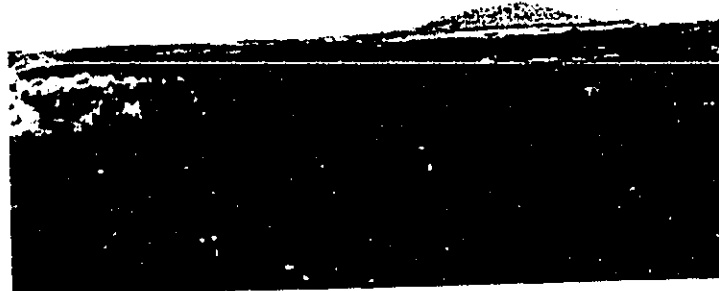


Photo Key



① View from Queen Kaahumanu Hwy. looking south



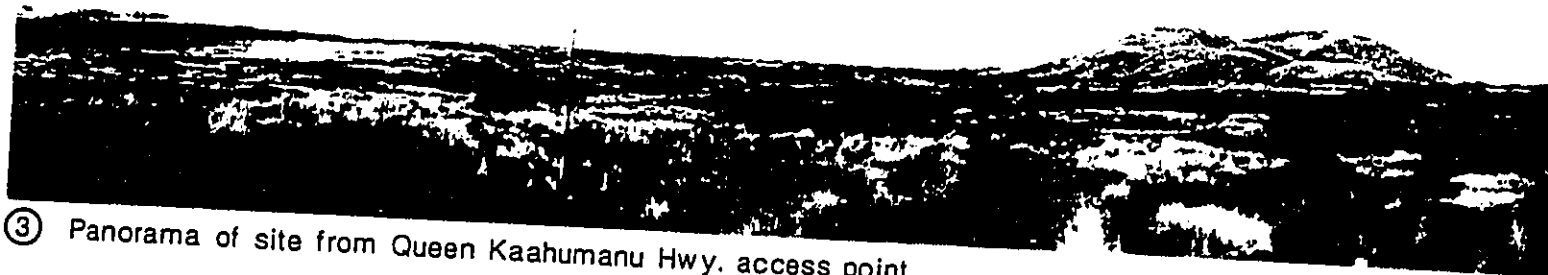
② View from Queen Kaahumanu Hwy. looking north

Visual Analysis--Site Photos

AWAKE'E RESORT

Figure: **16**

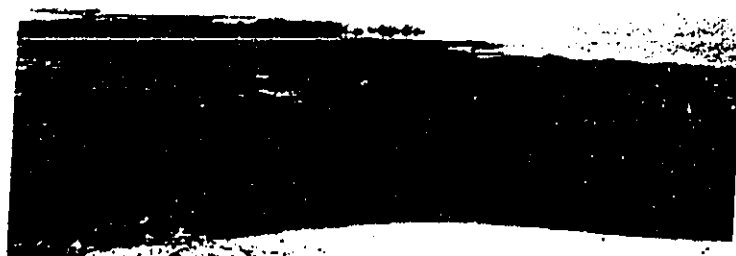
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HONOLULU, HAWAII 96813 TELEPHONE : (808) 545-2055



③ Panorama of site from Queen Kaahumanu Hwy. access point



④ View along shoreline toward Pu'u Kuli



⑤ View from Pu'u Kuli across site



⑥ Largest Anchialine Pond

Visual Analysis—Site Photos

AWAKE'E RESORT

Figure: **16**

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The property is less visible from the portion of Queen Kaahumanu Highway directly mauka of the property, because that section of the highway and adjoining land are relatively level. However, as one turns off of the highway and begins to descend toward the property, panoramic views are afforded of the property, coastline and ocean.

The site slopes moderately down to the ocean from the mauka property line, allowing excellent ocean views from most portions of the site, and especially from the slopes of the cinder cone.

The majority of site is covered by closed kiawe forests and a relatively dense understory of shrubs and fountain grass. The cinder cone, located on the northern/mauka portion of the property is vegetated with a dense cover of fountain grass. The southern portion of the property is characterized by the dark A'a flow which stretches from the mauka property line to the coast.

Shoreline areas are characterized by lava and rock outcrops and white cobble beaches. Views along the coastline are limited to the areas between Kawikohale Point and Puialoa Point.

Impacts

The landscape of the property will be irretrievably altered from its present natural state to one characterized by man-made structures and exotic landscaping. The development should have only a minor impact on views of the coastline and ocean from the Queen Kaahumanu Highway because of the moderate slope of the property. Although it should not obscure much of the view of the coastline from the highway, the development itself will be visible from the highway, and well as from areas mauka of the highway and the air.

The proposed development at Awake'e should have only minor visual impact on views from adjoining properties. Elevations at Makalawena are generally lower than those at Awake'e, thus the primary views of the shoreline and ocean from the upper portions of the Makalawena property are directly makai. In addition, the western corner of the site is planned to remain open due to the location of the anchialine ponds in that area. Structural development adjacent to Makalawena will be buffered by golf course fairways and landscaped open space.

Views to the ocean and shoreline from the adjoining property to the north of Awake'e are generally in a makai direction, because the Kuili Pu'u blocks views across Awake'e. The Pu'u, the site's primary visual feature, will not be altered by development, and will be maintained in its natural state.

Mitigation Measures

The development will conform to all County ordinances and zoning codes regulating building heights, bulk and setbacks. The development will be designed to be aesthetically pleasing in terms of architectural character and landscape treatment. Although detailed architectural plans have not yet been prepared, it is envisioned that a low-rise, low density character will maintain the open, unrestricted feeling prevalent among other Kona coast resorts, and maintain mauka-makai view corridors to the extent possible. Golf course

fairways will provide view corridors through the site. The prominent visual feature, Pu'u Kuili will be maintained as a visual amenity.

4.16 Land Use

Development of the Awake'e property will result in a fundamental change in land use from open, undeveloped land to a mix of urban land uses.

Cumulative Impacts

[The following discussion focuses on Awake'e resort component--since the synergistic benefits of the individual use areas ultimately are to create a more vital resort destination area.]

Several major resort projects have been proposed for the North Kona-South Kohala area of the Big Island. Most of them have existed in conceptual form for many years, as land developers watched the growth of tourism in West Hawaii and waited for the right market conditions. These concepts assumed formal dimensions with the on-set of the County's General Plan revision process in 1985, which opened the way for the County to comprehensively review all "serious" proposals at one time.

Table 6 recaps the land use plans of five proposed resort areas in North Kona, all of which are in the "intermediate resort" range. From north to south, these resorts are: Kaupulehu, Kukio, Awake'e, Ooma II, and Kohanaiki. Omitted from Table 6 is the proposal for Kaloko-Honokohau due to possible acquisition by the National Parks Service. Table 7 shows the proposed North Kona projects in the context of existing resort developments in North Kona, South Kohala, and the remainder of the Big Island.

Table 6: Proposed Resort Developments: North Kona

	Kaupulehu	Kukio	Awake'e	Ooma II	Kohanaiki	Total
Total Acres	623	675	349	314	470	2431
Hotel (ac)	60	45	45	30	62	242
Units	600-900	900-1350	750	600	700	3550-4300
	1 site	1 site	2 sites	1 site	2 sites	7 sites
Condominium (ac)	120	131	85	30	70	436
Units	350-600	783-1958	750	300	800	2983-4408
	5 sites	8 sites	6 sites	2 sites	4 sites	25 sites
Residential (ac)	--	258	--	--	73	331
Lots		516-774			200	716-974
Golf Course (ac)	170	160	148	130	170	778
Holes	18	18	18	18	18	90

Source: Helber, Hastert, Van Horn & Kimura, Planners

Table 7: Cumulative Resort Development (Proposed and Existing)

	Existing N Kona Resorts*	Proposed N Kona Resorts	Existing S Kohala Resorts	Proposed S Kohala Resorts**	Other Big Isle Resorts	Projected Isle Total (Rounded)
Hotel (ac)		242				
Units	2860	3350-4300	2450	7490	1300	17450-18400
Condo (ac)		436				
Units	2130	2980-4400	230	9350	30	14720-16140

* Includes Kona Village, Kailua-Kona, and Keauhou.

** Includes expansion at Mauna Kea, Mauna Lani, and Waikoloa, and new development at Mahukona.

Sources: Hawaii Business, November 1984, p. 70.

Final EIS for Makukona Resort (Table III-2).

Table 6 shows a total of 2,431 acres to be converted from undeveloped to predominantly resort use. These projects would add some 3550-4300 hotel units and 3000-4400 condominium units, as well as 5 golf courses. Besides the proposed developments, Table 7 shows three existing resort areas in North Kona: Kona Village, Kailua-Kona, and Keauhou, that have an estimated 2,862 hotel units and 2,130 resort condo units. The cumulative total for North Kona, therefore, would be approximately 6400-7100 hotel units and 5100-6500 condo units. The South Kohala resorts, Mauna Kea, Mauna Lani, and Waikoloa, add another 1,204 operational hotel units with 1,250 more to be constructed by the Hyatt Waikoloa project. The number of condos in South Kohala is relatively low with only 234 units in the three resort areas.

If all of the hotel units are constructed as planned, the North Kona room inventory would increase by 125-150 percent. Assuming no further hotel construction anywhere other than in North Kona, the Big Island's tourism plant would boast some 10,100-10,900 rooms, almost 90 percent located in West Hawaii. The resort condominium picture is skewed even more toward West Hawaii and North Kona in particular. Almost 90 percent of all resort condominiums are found in North Kona. The projected number of new units would increase the inventory by 136-200 percent, resulting in a total of 5,000-6500 units in North Kona. The island-wide total would not be significantly larger.

Clearly, the cumulative impact of the five resort proposals is a significant increase in the supply of visitor facilities. Projections of the future demand for visitor units are included in the Preliminary Draft of the revised Hawaii County General Plan. Table 8 shows the number of visitor units required given projected numbers of visitors to the Big Island and occupancy rates of 70 percent for hotels and 50 percent for condominiums. Three series of projections were developed based on conservative, medium, and optimistic outlooks for the County's future.

Table 8: Visitor Unit Projections, 1985-2005

	1985	1990	1995	2000	2005
Conservative					
Hotel Rooms (@ 70%)	4100	5300	6400	7100	7600
Condo Units (@ 50%)	2000	2400	3000	3400	3600
Total Visitor Units	6100	7700	9400	10500	11200
Medium					
Hotel Rooms (@ 70%)	4100	5600	8600	11900	13900
Condo Units (@ 50%)	2000	2600	4000	5600	6400
Total Visitor Units	6100	8200	12600	17500	20300
Optimistic					
Hotel Rooms (@ 70%)	4100	8600	12200	15000	17800
Condo Units (@ 50%)	2000	4000	5800	7000	8400
Total Visitor Units	6100	12600	18000	22000	26200

Sources: County of Hawaii Department of Planning, Preliminary Draft
Hawaii County General Plan, May 1986, pp. xii-xiv.

Substantial increases in visitor accommodations are projected in all series. Under the conservative scenario, the existing supply of hotel units would be sufficient until the year 2000. The medium outlook scenario, however, implies a shortfall in hotel units as early as 1995, with sufficient demand for all proposed North Kona units by the year 2000. A similar situation exists with resort condominiums, with demand exceeding supply by 1990 and "absorption" of all proposed condo units at the low end of the range by the year 2000. What appears to be a surfeit of visitor accommodations currently on the drawing boards actually is within the growth parameters put forth by the County Planning Department. Because of the relatively long lead times for major development projects, a steady program of physical development may be warranted if the County seeks to maintain its competitive position in the visitor market by providing a wide range of high-quality accommodations.

Although the County's projections of visitor unit demand is congruent with the proposed increase in supply, a match between the two is not supported as well by County's proposed land use allocation schedule. The Preliminary Draft General Plan reserves a total 2,172 acres for resort use which is to be distributed among the nine districts (County Department of Planning, 1986: XIII-10). (This is a slight decrease from the 2,359 acres allocated to resort use by the existing plan.) In comparison, the five proposed resort developments in North Kona would themselves require approximately 480 acres, or almost one-third of the island-wide allocation. The land use pattern is intended to be effective for ten years, after which it would be reexamined. The previous analysis of new hotel construction required by 1995 would indicate that a greater allowance is needed for resort use. The alternative is higher density development which lacks the open space and recreational amenities contained in North Kona projects, such as Awake'e.

The proposed development of resorts at Makalawena and Awake'e, if both completed, would create an additional concentration of resort activities in that area. Primary advantages or positive impacts of such development would include the possible joint development of water source and supply system, as

well as other infrastructure, improved access to significant coastal resources, primarily located at Makalawena, for both visitors and residents, and a potential National Wildlife Refuge to encompass the environmentally sensitive ponds at both Makalawena and Awake'e. Such a refuge would result in the planned management of pond resources, help to insure their future preservation, and increase their interpretive value.

Potential negative impacts include the likely increase in traffic levels within the corridor between the Kailua-Kona and Kawaihae, and a minor increase in the need for public services and facilities.

4.17 Historic and Archaeological Resources

Three surveys have been undertaken in the project area: (1) a brief reconnaissance by John E. Reinecke (1930), (2) a study by Lloyd J. Soehren at Kaupulehu and Makalawena for B.P. Bishop estate which recorded several sites at Awake'e (1963), (3) an archaeological reconnaissance survey by Rosendahl (1986). Information and findings used in this Draft EIS are based on an archaeological reconnaissance survey carried out by Paul H. Rosendahl, Ph.D., Inc. in October 1986. The entire survey report is appended to this Draft EIS as Appendix F.

Site Identification

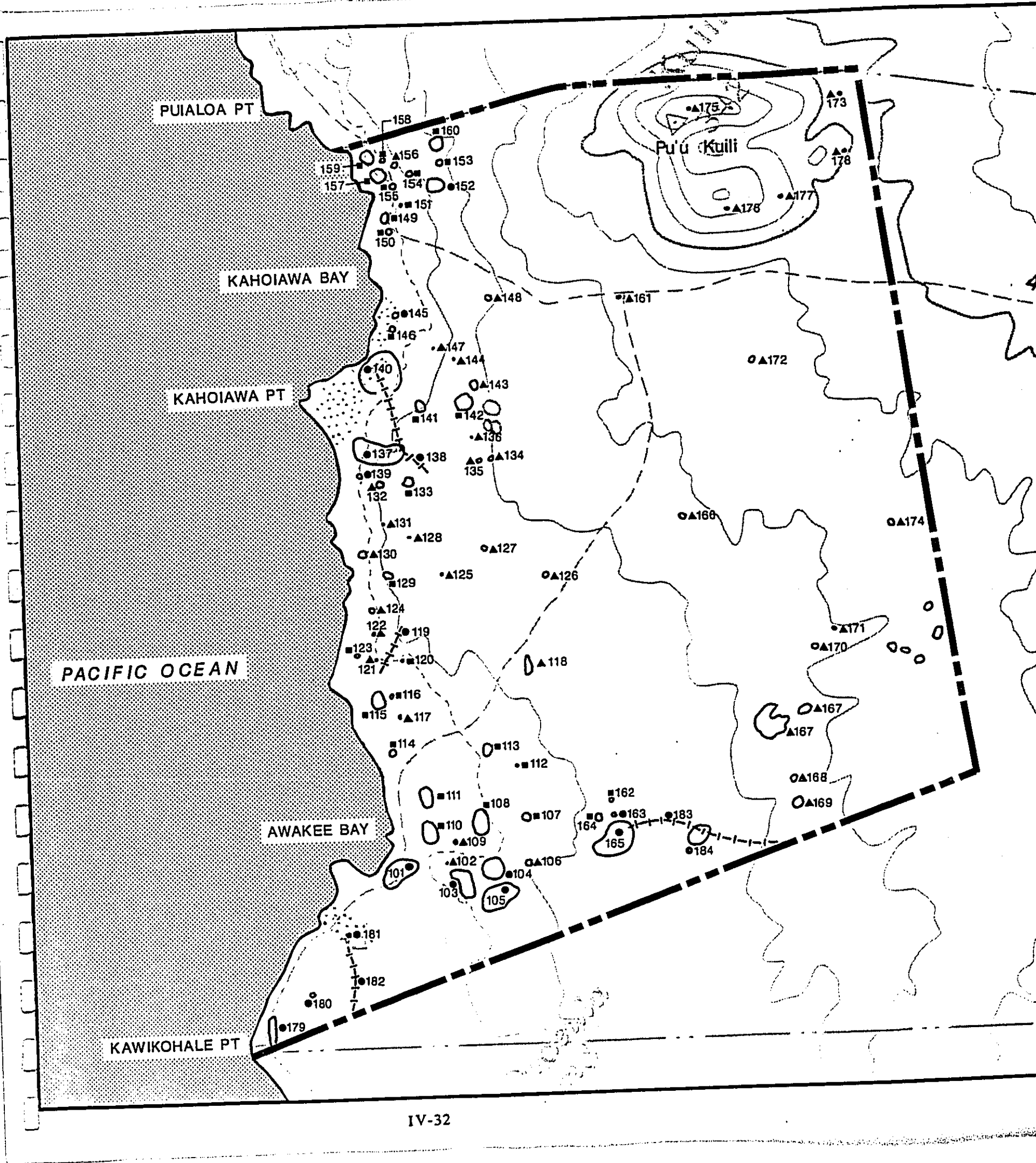
A total of 84 archaeological sites with 239 component features were identified at Awake'e (Rosendahl, 1986). (See Figure 17) Sixty-three sites (153+ component features) were located within the immediate coastal zone extending to approximately 1000 feet inland, an area of about 125 acres. Tentative functional site types included habitation features, possible agricultural features, possible burials, religious, transportation, aquacultural, recreation, and sites of indeterminate function.

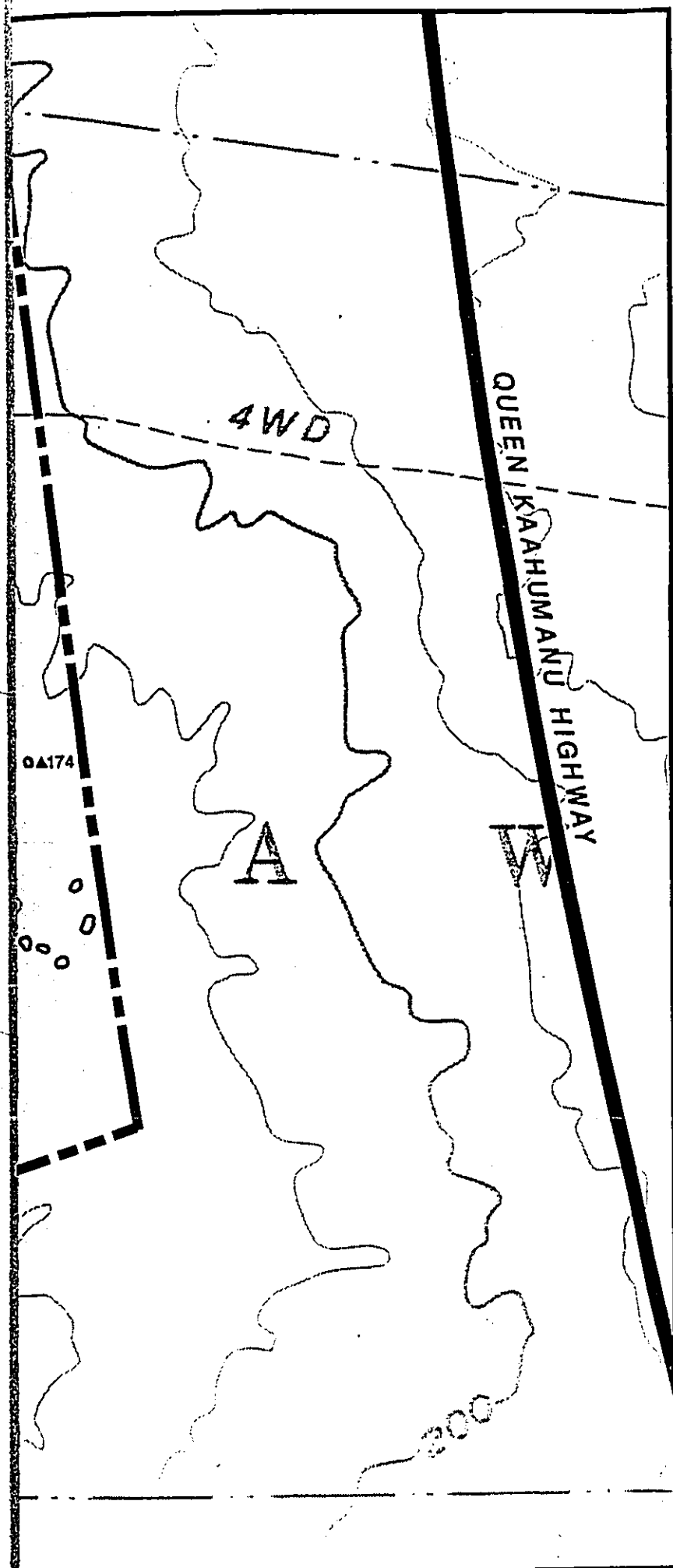
Twenty-one sites (86+ component features) were found to be located within the inland portion of the project area, an area of approximately 225 acres. Tentative functional site types included possible agricultural features, a recent jeep road marker, ceremonial, habitation, transportation, survey markers, and sites of indeterminate function.

A total of 28 formal types are represented among the 239 features recorded. Over half of these features are accounted for in seven formal categories; cairns, C-shaped wall shelters, wall shelters, cave shelters, terraces, platforms, and enclosures.

Site Location

Most of the sites and features are concentrated near the shoreline, in the immediate coastal zone (extending to approximately 1000 feet inland). Within this coastal zone, multiple component habitation site complexes and features appear concentrated in the vicinity of Kahioawa Point, Kahioawa Bay, and Awake'e Bay. The inland portions of the project area have a distinct paucity of sites and features, with the exception of multiple component site complexes and features situated along or near Site T-183, a coastal-inland oriented foot trail.





Archaeological Sites

LEGEND

- To be Retained—Further Data Collection Necessary
- ▲ Further Data Collection Necessary
- No Further Work Necessary

AWAKE'E RESORT

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0 600'

Figure: 17

This distribution of sites conforms to the general pattern of early Hawaiian settlement that has been reconstructed on the basis of archaeological, ethnohistoric, and ethnographic sources for the portion of North Kona to the north of Kailua.

The local environmental setting is characterized by three major zones: a narrow, arid coastal habitation zone associated principally with the exploitation of various marine resources; a sloping, barren middle zone characterized by exposed a'a and pahoe-hoe lava rocklands and largely devoid of soil or vegetation other than grasses; and an upland habitation zone associated with agricultural exploitation. A forest zone, still further inland, was also exploited but not inhabited. The sites and features identified within the proposed Awake's Resort project area evidence the occupation of the narrow coastal zone, and the movement of people and produce along the foot trails through the barren intermediate zone that connected the coastal and further inland areas of habitation and exploitation.

Site Significance

The significance of archaeological remains can be defined in terms of potential research, interpretive, and/or cultural values. Based on the findings of the full reconnaissance survey, the archaeological remains found within the proposed project site appear to be, for the most part, of limited to moderate significance in terms of potential scientific research, interpretive, and cultural values. Specific exceptions to this general evaluation are the following sites:

- T-101 Complex--high research and interpretive values for habitation complexes with cultural deposit, unique architectural features and nearby associated structural features;
- T-103 Complex--high research and interpretive values for habitation complex, due to unique architectural feature (possible small holua slide) and nearby associated structural features;
- T-104 Complex--high research, interpretive and cultural values for habitation complex due to cultural deposit, unique architectural features, and nearby associated structural features;
- T-105 Complex--high research and cultural values, due to possible burial features and numerous associated structural features;
- T-137 Complex--high research, interpretive, and cultural values for habitation complex, due to presence of cultural deposits, possible shrine feature, and nearby associated foot trails;
- T-139 Complex--potentially high research, interpretive, and cultural values, due to possible shrine features.
- T-140 Complex--high research and interpretive values for habitation complex, due to presence of cultural deposits, associated T-138 foot trail, and numerous associated structural features;

T-145 Modified terrace/outcrop--potentially high research, interpretive, and cultural values, due to possible shrine feature;

T-152 Complex--potentially high research and cultural values for cairns, due to possible human remains;

T-163 Collapsed platform--potentially high research and cultural values, due to possible human burial;

T-165 Complex--high research, interpretive, and possibly cultural values for habitation complex, due to numerous associated structural features, association to Site T-183 foot trail, and numerous associated structural features;

T-184 Complex--high research, interpretive, and possibly cultural values for habitation complex, due to numerous associated structural features, association to Site T-183 foot trail and possible human burials;

Various foot trails (T-119, -138, -182, and -183)--potentially high interpretive value, as well as cultural value, (in terms of traditional access rights).

Anchialine pond complex (T-179, -180 and -181)--potentially high research (T-179, -181), interpretive, and cultural values, especially in association with the nearby T-101 complex.

With the exception of the specific sites and features listed above, most of the sites identified during the reconnaissance survey appear to be sites for which continued physical preservation would not be considered essential.

Impacts

Most of the identified archaeological sites are located within 1000 feet of the shoreline. Since development will be concentrated in this area, many of the sites could be affected.

Cumulative Impact

A substantial amount of data on North Kona archaeology has been collected as a result of proposals for land development. This body of information has helped to shed light on the extent to which prehistoric and historic sites could be disturbed. At the same time the data base has created opportunities for the effective management of significant resources. Some of the showpieces of Hawaiian prehistory have been preserved in West Hawaii, among them the City of Refuge, Puukohola Heiau National Historic Site, and Lapakahi State Historic Park. Continued inventory of historic resources will allow better identification of examples that are unique and which contain high cultural significance so that preservation programs can be coordinated on a regional basis.

Mitigation Measures

Table 9 summarizes general significance assessments and recommended general treatments of sites in the Awake'e development area. This assessment has been reviewed by Ms. Virginia Goldstein, staff planner and historic sites specialist in the Hawaii County Planning Department. Ms. Goldstein concurred with the preliminary conclusions and the tentative recommendations regarding further archaeological work to be done within the project area. Based upon the field reconnaissance, sixty-five of the 84 archaeological sites identified within the project area have been determined to be significant solely for their information content. Sufficient data was collected from 37 of these 65 sites to warrant the recommendation that no further data collection is necessary (Sites T-102, -106, -109, -117, -118, -121, -122, -124 thru -128, -130 thru -132, -134 thru -136, -143, -144, -147, -148, -156, -161, -166 thru -178), while further data collection is believed necessary at 28 of the sites. One additional site (Site T-180) for which sufficient data was collected and no further work recommended, was determined significant for both cultural value. Site T-180 is recommended for preservation "as is".

Four sites consisting of foot trails and associated features (Sites T-119, -138, -182, -183) were determined to be significant for both cultural value and as excellent examples of a site type. All four are recommended for preservation with some level of interpretive development.

Three sites (T-105, -152, -163) have been determined significant for their information content and may also have cultural significance as burial sites, pending further investigation. Data collection is recommended at this time. If burials are found to occur at any site, recommended treatment of these will be to preserve and protect specific burial features. If this is not feasible, excavation for the disinterment of skeletal remains will have to be conducted, with additional studies focused on skeletal remains. Reburial of skeletal remains according to appropriate State Health Department regulations and procedures is recommended.

Five habitation site complexes (Sites T-101, -103, -140, -165, -184) were determined to be significant for both informational content and as an excellent example of type. Recommended treatment is data collection at all features and either development as interpretive locales or to minimally preserve the principle features as is and protect them from the adverse effects of development. Furthermore, two of these site complexes (Sites T-165, -184) possibly contain human burials and therefore, may contain significant cultural values and are recommended for preservation "as is" pending further data collection.

Four sites relating to possible religious functions (Sites T-139-145) or aquaculture (Sites T-179, -181), were determined significant for information content, cultural value and as excellent examples of a site type. All four sites are recommended for further data recovery and preservation "as is".

Two habitation site complexes (Sites T-104, -137) have been determined to be significant for informational content, as a site type example, and due to the presence of possible shrine features. Data collection and preservation as interpretive locales or minimal preservation are recommended.

The original land use plan has been modified to reflect the archaeologists findings. Historic preservation planning will be further refined as detailed site plans are developed and building sites are identified more precisely. As a specific archaeological data recovery plan and a specific plan for site interpretive work is developed, we will provide the State Historic Sites Section and the County of Hawaii Planning Department with copies of the plans for their review and approval.

Table 9: Historic Sites Assessment

SUMMARY OF GENERAL SIGNIFICANCE ASSESSMENTS
AND RECOMMENDED GENERAL TREATMENTS
PROPOSED AWAKEE RESORT DEVELOPMENT PROJECT AREA

Site or Feature No.	Significance Category				Recommended Treatment			
	A	X	B	C	FDC	NEW	PID	PAI
T-107	+	-	-	-	+	-	-	-
T-108	+	-	-	-	+	-	-	-
T-110	+	-	-	-	+	-	-	-
T-111	+	-	-	-	+	-	-	-
T-112	+	-	-	-	+	-	-	-
T-113	+	-	-	-	+	-	-	-
T-114	+	-	-	-	+	-	-	-
T-115	+	-	-	-	+	-	-	-
T-116	+	-	-	-	+	-	-	-
T-120	+	-	-	-	+	-	-	-
T-123	+	-	-	-	+	-	-	-
T-129	+	-	-	-	+	-	-	-
T-133	+	-	-	-	+	-	-	-
T-141	+	-	-	-	+	-	-	-
T-142	+	-	-	-	+	-	-	-
T-146	+	-	-	-	+	-	-	-
T-149	+	-	-	-	+	-	-	-

General Significance Categories:

A=Important for information content, further data collection necessary (PHRI=research value);
X=Important for information content, no further data collection necessary (PHRI=research value, SHPO=not significant);
B=Excellent example of site type at local, region, island, State, or National level (PHRI=interpretive value); and
C=Culturally significant (PHRI=cultural value).

Recommended General Treatments:

FDC=Further data collection necessary (intensive survey and testing, and possibly subsequent data recovery/mitigation excavations);
NEW=No further work of any kind necessary, sufficient data collected, archaeological clearance recommended, no preservation potential (possible inclusion into landscaping suggested for consideration);
PID=Preservation, with some level of interpretive development recommended (including appropriate related data recovery work); and
PAI=Preservation "as is," with no further work (and possible inclusion into landscaping), or minimal further data collection necessary.

Table 9: Historic Sites Assessment (cont.)

Site or Feature No.	Significance Category				Recommended Treatment			
	A	X	B	C	FDC	NEW	PID	PAI
T-150	+	-	-	-	+	-	-	-
T-151	+	-	-	-	+	-	-	-
T-153	+	-	-	-	+	-	-	-
T-154	+	-	-	-	+	-	-	-
T-155	+	-	-	-	+	-	-	-
T-157	+	-	-	-	+	-	-	-
T-158	+	-	-	-	+	-	-	-
T-159	+	-	-	-	+	-	-	-
T-160	+	-	-	-	+	-	-	-
T-162	+	-	-	-	+	-	-	-
T-164	+	-	-	-	+	-	-	-
Subtotal: 28	28	0	0	0	28	0	0	0
T-102	-	+	-	-	-	+	-	-
T-106	-	+	-	-	-	+	-	-
T-109	-	+	-	-	-	+	-	-
T-117	-	+	-	-	-	+	-	-
T-118	-	+	-	-	-	+	-	-
T-121	-	+	-	-	-	+	-	-
T-122	-	+	-	-	-	+	-	-
T-124	-	+	-	-	-	+	-	-
T-125	-	+	-	-	-	+	-	-
T-126	-	+	-	-	-	+	-	-
T-127	-	+	-	-	-	+	-	-
T-128	-	+	-	-	-	+	-	-
T-130	-	+	-	-	-	+	-	-
T-131	-	+	-	-	-	+	-	-
T-132	-	+	-	-	-	+	-	-
T-134	-	+	-	-	-	+	-	-
T-135	-	+	-	-	-	+	-	-
T-136	-	+	-	-	-	+	-	-
T-143	-	+	-	-	-	+	-	-
T-144	-	+	-	-	-	+	-	-
T-147	-	+	-	-	-	+	-	-
T-148	-	+	-	-	-	+	-	-
T-156	-	+	-	-	-	+	-	-
T-161	-	+	-	-	-	+	-	-
T-166	-	+	-	-	-	+	-	-
T-167	-	+	-	-	-	+	-	-
T-168	-	+	-	-	-	+	-	-
T-169	-	+	-	-	-	+	-	-
T-170	-	+	-	-	-	+	-	-
T-171	-	+	-	-	-	+	-	-
T-172	-	+	-	-	-	+	-	-
T-173	-	+	-	-	-	+	-	-

Table 9: Historic Sites Assessment (cont.)

Site or Feature No.	Significance Category				Recommended Treatment			
	A	X	B	C	FDC	NEW	PID	PAI
T-174	-	+	-	-	-	+	-	-
T-175	-	+	-	-	-	+	-	-
T-176	-	+	-	-	-	+	-	-
T-177	-	+	-	-	-	+	-	-
T-178	-	+	-	-	-	+	-	-
Subtotal: 37	0	37	0	0	0	37	0	0
T-180	-	-	-	+	-	+	-	+
Subtotal: 1	0	0	0	1	0	1	0	1
T-119	-	+	+	+	-	-	+	-
T-138	-	+	+	+	-	-	+	-
T-182	-	+	+	+	-	-	+	-
T-183	-	+	+	+	-	-	+	-
Subtotal: 4	0	4	4	4	0	0	4	0
T-105	+	-	-	*	+	-	-	*
T-152	+	-	-	*	+	-	-	*
T-163	+	-	-	*	+	-	-	*
Subtotal: 3	3	0	0	3	3	0	0	3
T-101	+	-	+	-	+	-	+	-
T-103	+	-	+	-	+	-	+	-
T-140	+	-	+	-	+	-	+	-
Subtotal: 3	3	0	3	0	3	0	3	0
T-165	+	-	+	*	+	-	+	*
T-184	+	-	+	*	+	-	+	*
Subtotal: 2	2	0	2	2	2	0	2	2

*Provisional assessment, definite assessment pending further data collection (i.e., testing features for presence/absence of skeletal remains)

Table 9: Historic Sites Assessment (cont.)

Site or Feature No.	Significance Category				Recommended Treatment			
	A	X	B	C	FDC	NEW	PID	PAI
T-139	+	-	+	+	+	-	-	+
T-145	+	-	+	+	+	-	-	+
T-179	+	-	+	+	+	-	-	+
T-181	+	-	+	+	+	-	-	+
Subtotal: 4	4	0	4	4	4	0	0	4
T-104	+	-	+	+	+	-	+	-
T-137	+	-	+	+	+	-	+	-
Subtotal: 2	2	0	2	2	2	0	2	0
Totals: 84	42	41	15	16	42	38	11	10

CHAPTER V



CHAPTER V

IMPACT ON THE SOCIO-ECONOMIC ENVIRONMENT

This chapter describes the existing socio-economic environment and probable changes due to implementation of the Awake'e Resort development. Social and economic factors are among the most difficult to quantify. The use of standards and multipliers is necessary to coalesce projections into broad strokes from which a picture of the future can be comprehended more readily, but it can mask variations in outcome. Also, more detailed projections could give the impression that they are sure and accurate, whereas, given the conceptual nature of the development plan, the projections are estimates at best. Because the intent of this chapter is to provide a starting point for assessing social and economic impacts, assumptions have been given as much emphasis as the analyses and their results.

Technical studies related to this chapter include the following:

Appendix B *Economic and Fiscal Impact Assessment for Resort Development at the Awake'e Resort (Peat, Marwick, Mitchell & Co.)*

5.1 Economy

Coffee production and ranching provided Kona's economic base through much of this century, but it was an unsteady economy due to great fluctuations in the international coffee market. In the years following statehood and the introduction of jet service to the islands, the Kona coastline began to host an increasing number of visitors. In the 1960's and 1970's, North Kona fueled a building boom that spread to South Kohala and resulted in hundreds of new hotel and condominium units and residential dwellings.

Today the region is primarily supported by its real estate and visitor industries. Currently the South Kohala and North Kona districts are the heart of the island's visitor industry. As of February 1986 the 5,872 hotel and visitor condominium units in these two districts represented 81% of the islands total.

The availability of large parcels of land under single ownership and the establishment of horizontal property regime laws have permitted high-quality master-planned development in several resort areas along the coast. Three master-planned resorts currently exist in South Kohala:

- o Mauna Lani Resort
- o Mauna Kea Resort
- o Waikoloa Village and Waikoloa Beach Resort

The North Kona district includes the Kailua-Kona resort area and two master-planned resorts:

- o Keauhou Resort
- o Kona Village Resort

Nearly one-third of Hawaii's island population resides in the two Kohala and two Kona districts. The resident population of these four districts was 27,518 in 1980, as shown in Table 10. Since 1970 the resident population for the area has increased at an annually compounded rate of growth of 6.6% per year, or nearly twice the 3.8% rate for the county as a whole. The North Kona district experienced the most rapid population growth at 11% per year, followed by the South Kohala district at 7.1% per year.

Table 10: Resident and De Facto Population of the Kona and Kohala Districts and County of Hawaii, 1970 to 1984

	April 1		July 1, 1984	Average annual percent change	
	1970	1980		1970-80	1980-84
Resident population:					
North Kona	4,832	13,748	18,226	11.0%	6.9%
South Kona	4,004	5,914	6,730	4.0	3.1
North Kohala	3,326	3,249	3,403	(.2)	1.1
South Kohala	<u>2,310</u>	<u>4,607</u>	<u>5,972</u>	<u>7.1</u>	<u>6.3</u>
Total Region	<u>14,472</u>	<u>27,518</u>	<u>34,331</u>	<u>6.6%</u>	<u>5.3%</u>
County of Hawaii	63,468	92,053	106,403	3.8	3.5
De facto population, County of Hawaii	65,700	98,700	112,600	4.2	3.1

Sources: State of Hawaii, Department of Planning and Economic Development, Hawaii State Statistical Areas Committee, Estimated Population of Hawaii by Districts, 1984 (Report CTC-64), 1985; and de facto population, by counties: 1970 to 1984, Data Book, 1985; U.S. Bureau of the Census, 1980 Census of Population, Number of Inhabitants, Hawaii (PC 80-1-A13), 1981; and First Hawaiian Bank, Economic Indicators (May/June 1985), 1985.

Impacts

The proposed development will have impacts on the State and local economies. State tax revenues will increase both as a result of increased visitor expenditures and increased income taxes levied on new resort employees. Increases in real property taxes attributable to development of the property will accrue to the County government (see discussion of Fiscal Impacts, below). Much of the increase in wages and salaries from direct and induced employment growth will stay within the Kona region through the purchase of goods and services.

5.2 Visitor Expenditures

The resort will generate direct, indirect and induced visitor expenditures in the state. Visitors to the resort will make direct expenditures for food, accommodations, gift items and other goods and services. These expenditures will, in turn, generate indirect and induced expenditures throughout the state through multiplier effects. Direct, indirect and induced, and total expenditures by the resort's visitors are projected and shown in Table 11 below:

**Table 11: Projected Total Annual Visitor Expenditures
Attributable to Awake'e Resort**

1995 - 2010

(In 1986 dollars; Millions)

Expenditure type and place of stay	<u>1995</u>	<u>2000</u>	<u>2005</u>	<u>2010</u>
Direct:				
Hotel	\$ 27.5	29.3	29.4	29.3
Condominium	<u>3.0</u>	<u>7.5</u>	<u>13.8</u>	<u>20.8</u>
Subtotal	30.5	36.8	43.2	50.1
Indirect and induced	<u>28.3</u>	<u>34.2</u>	<u>40.1</u>	<u>46.6</u>
Total (1)	\$ <u>58.8</u>	<u>71.0</u>	<u>83.3</u>	<u>96.7</u>

- (1) Projected at \$1.93 per \$1.00 of direct expenditures. Based on unpublished data from the State of Hawaii, Department of Planning and Economic Development.

5.3 Employment

Labor force participation rates increased significantly in the North and South Kona districts between 1970 and 1980, but declined in the North and South Kohala districts.

Information on labor force characteristics since 1980 is not available by district, but the State of Hawaii, Department of Labor and Industrial Relations (DLIR) prepares labor force estimates for the county as a whole. The DLIR estimates that in the first half of the 1980's, the civilian labor force has increased by 3.8% per year to about 50,600 persons in 1985. However, county employment appears to have lagged behind labor force growth, resulting in an estimated 8.5% rate of unemployment in 1985, or about 2.2% more than in 1980.

Job losses since 1980 have occurred in the construction and manufacturing industries, while relatively high job increases were noted in the areas of retail trade, services, and finance, insurance and real estate. County data on agricultural employment is not yet available for 1985. However, in the sugar industry alone, The State of Hawaii, Department of Planning and Economic Development (DPED) estimates that the island lost about 500 jobs between 1980 and 1984.

Impacts

Planned developments at the resort will generate short-term employment during the construction of the new facilities and long-term employment in the operation and support of those facilities. Employment effects may also be classified as being direct, indirect or induced. Direct effects are those directly supported by visitor expenditures, such as the employment of hotels and other establishments that serve visitors. Most of the direct employment effects would occur in the County of Hawaii, both at and outside the resort.

Construction employment would be greatest during the first years of the project when the hotel and golf course, a portion of the condominiums and most of the infrastructure would be under construction. Construction employment is estimated to average about 170 person-years per year from 1991 to 1995. Construction employment could then decrease to an average of about 50 person-years per year from 1996 to 2000 and then increase through the remainder of the project, reaching about 70 person-years per year from 2006 to 2010. Total construction employment for the 20 year period is estimated to be about 1,770 person-years.

The direct employment of construction workers at resort projects will stimulate additional purchases of goods and services on the Island of Hawaii and elsewhere in the state. In its most recent (1982) revisions to a model of the construction industry in Hawaii, the DPED calculated that 2.4 full-time jobs are created in the state for every full-time job in the building construction industry. This multiplier is used to project the indirect and induced employment to be supported by the direct construction employment.

As with direct construction, the greatest employment would occur in the first five year period when indirect and induced construction effects are expected to provide employment opportunities for about 240 person-years per year. Indirect and induced construction employment could then fall to about 70 average annual person-years from 1996 to 2000 and then increase throughout the remainder of the project, reaching about 100 average annual person-years from 2006 to 2010. Total indirect and induced employment for facility construction is estimated to be about 2,470 person-years over the entire 20-year period of which about 350 person-years could be captured on the island of Hawaii.

Operational employment could reach a relatively high level during the first few years when the hotel comes on line and could increase slightly over the remainder of the project as additional condominiums and commercial space are added. The majority of direct operational employment at the resort would occur

in the proposed hotel because of its relatively large size and its expected first-class level of service. First-class resort hotels in Hawaii are found to employ between 0.8 and 1.0 full-time equivalent direct employees per hotel unit. However, direct employment is also generated off-resort such as in airline industry and other travel related jobs. Thus, the overall direct hotel operational employment at the resort is projected at 1.1 full-time equivalent employees per unit. In addition to hotel related employment, condominium development at Awake'e is projected to create about 0.2 jobs per unit and commercial development, about one job for each 200 square feet of leasable area. Thus, the resort could be expected to have generated more than 700 full-time equivalent direct operational positions by 1995, and more than 1,000 full-time equivalent positions at project completion in 2010.

The resort's operations would also indirectly generate employment elsewhere in the state. Recent studies on the economic impacts of tourism by the DPED indicate that each full-time hotel, resort residential and resort administrative employee supports 0.9 indirect and induced full-time equivalent positions elsewhere in the state. Results of the DPED study also suggest that resort retail and restaurant positions could support about 0.6 indirect and induced positions for each direct position. Thus, indirect and induced operational employment could be expected to amount to about 650 full-time equivalent positions by 1995, and about 900 full-time equivalent positions at project completion in 2010. A summary of the resort's construction and operational employment effects is shown in Table 12 below:

**Table 12: Projected Employment Effects Attributable
to Resort Construction and Operations**

1991 - 2010

<u>Type of Employment</u>	<u>1991-1995</u>	<u>1996-2000</u>	<u>2001-2005</u>	<u>2006-2010</u>
Construction employment (1):				
Direct	172	53	59	71
Indirect and induced	<u>240</u>	<u>73</u>	<u>81</u>	<u>92</u>
Subtotal	412	126	140	170
Operational employment(2):				
Direct	715	870	925	1,065
Indirect and induced	<u>644</u>	<u>750</u>	<u>800</u>	<u>903</u>
Subtotal	<u>1,359</u>	<u>1,620</u>	<u>1,725</u>	<u>1,968</u>
Total	<u>1,771</u>	<u>1,746</u>	<u>1,865</u>	<u>2,138</u>

(1) Average annual person-years.

(2) Annual person-years at end of period.

Source: Peat, Marwick, Mitchell & Co., 1986

Mitigation Measures

To maximize the employment competitiveness of long-time West Hawaii residents, the following strategies should be pursued as the project reaches the operational stage: (1) community outreach to stimulate awareness and interest in the visitor industry; (2) in-service upgrade training programs; and (3) possible employer incentives for an organized program of job recruitment and screening, summer internship programs, and/or scholarships.

5.4 Personal and Household Income

The resort could be expected to have a significant impact on personal income for residents of the island and state. Personal income is defined as the wages and salaries paid to the direct construction and operational employees of the resort. Personal income is projected on the basis of average industry wages and salaries for the various types of employment anticipated and on the projected future employment demands.

Total household income generated by visitor expenditures at the resort would include the fringe benefits and proprietor's income paid by establishments that sell goods and services directly to visitors as well as the wages and salaries noted above. In addition, household income includes income generated through the effects of indirect and induced visitor expenditures. Table 13 summarizes the amount of personal and household income expected to be generated by the project:

Table 13: Projected Annual Personal and Household Income

1995 to 2010

(In 1986 dollars; Millions)

<u>Type of Employment</u>	<u>1995</u>	<u>2000</u>	<u>2005</u>	<u>2010</u>
Total personal income (1)	\$ <u>13.7</u>	<u>12.4</u>	<u>13.3</u>	<u>15.2</u>
Total household income(2)	\$ <u>21.6</u>	<u>26.1</u>	<u>30.6</u>	<u>35.6</u>

- (1) Wages paid to direct construction and operational employees of the Resort.
(2) Wages, salaries, fringe benefits and proprietors' income in the state directly and indirectly supported by direct visitor expenditures at the Resort.

Source: Peat, Marwick, Mitchell & Co., 1986

5.5 Population

The development of facilities will lead to increased population at the resort and elsewhere on the island. On any given day there will be visitors staying at the resort's hotel and in residential units that have been put in visitor rental pools. There will also be persons residing during most or parts of each year in the resorts condominiums. In addition, operational and construction employees attracted from off-island will add to the population of the region.

Off-Resort Population Impact

The Awake'e resort will impact the county's population by attracting employees for the resort's construction and operation from off-island. Additional population growth will come from household members who accompany the in-migrant operational employees. Based on projections of employment at other resorts, it was assumed that 15% of operational employment would be filled by in-migrants by 1995, 18% by 2000 and 20% by 2005 and beyond.

Based on past experience, between 20% and 50% of direct construction employees may be expected to come from off-island, with the actual amount related to the amount and scheduling of other major construction projects elsewhere in the state. For purposes of projection, about 30% of construction workers at the resort were assumed to come from off-island labor pools.

In-migrant operational supervisory and managerial employees at the resort were assumed to be accompanied by two additional household members, while other operational employees were assumed to average one additional household member. Construction workers temporarily resident on the island are assumed to be accompanied by an average of 0.5 additional household members per worker. Based on the above assumptions, total off-resort population impact is projected to be about 320 by 1995, increasing to about 500 at project completion in 2010.

On-Resort Population Impact

On-resort population is comprised of visitors staying at the hotels and condominiums and residents in condominiums at the resort. Average daily visitor population is projected to be about 980 by 1995, increasing to about 1,980 at project completion in 2010. On-resort resident population is projected to be about 75 by 1995, increasing to 450 at project completion in 2010. Resident population would represent about 8% of on-resort population by 1995 and about 23% of on-resort population by 2010.

In summary, the facility development at the resort is projected to generate population growth in terms of visitors and residents at the resort's facilities, and in-migrant operational and construction employees and their accompanying household members. Total projected population impact is projected to be about 1,300 by 1995, increasing to nearly 2,500 persons at project completion in 2010 as shown in Table 14.

**Table 14: Summary of On- and Off-Resort
Population Impact**

1995 to 2010

(Average daily population)

<u>Population Category</u>	<u>1995</u>	<u>2000</u>	<u>2005</u>	<u>2010</u>
On-resort:				
Visitor	905	1,103	1,305	1,526
Resident	<u>75</u>	<u>176</u>	<u>302</u>	<u>453</u>
Subtotal	<u>980</u>	<u>1,279</u>	<u>1,607</u>	<u>1,979</u>
Off-resort residents:				
In-migrant operational employees	107	157	185	213
In-migrant construction employees	51	16	18	21
Other household members	<u>159</u>	<u>197</u>	<u>228</u>	<u>263</u>
Subtotal	<u>317</u>	<u>370</u>	<u>431</u>	<u>497</u>
Total population impact	<u>1,297</u>	<u>1,649</u>	<u>2,038</u>	<u>2,476</u>

Source: Peat, Marwick, Mitchell & Co., 1986

5.6 Housing

Construction employment is temporary and therefore does not generate the long-term housing demands that are associated with operational employment. With the generous housing subsidy allowances typically paid to construction workers, the demand for residential housing by construction employees is expected to be absorbed by units available in the short-term rental market of the Kona region.

The maximum number of rental units needed for off-island construction workers during the peak construction period from 1991 to 1995 is estimated to be about 115 housing units.

Operational employment, on the other hand, generates long-term housing needs. All in-migrant operational employees from off-island would require additional housing. In addition, a portion of the operational employees from on-island, such as those forming new households as a result of resort employment, would also require additional housing. It is projected that about 160 direct operational employees would require additional housing by 1995, increasing to about 285 at project completion in 2010, as shown in Table 15.

The number of additional housing units demanded will be less than the number of employees demanding housing because households could include more than one resort employee. Additional housing unit demand by direct operational employees is projected to be about 115 units by 1995, increasing to about 200 units at project completion in 2010.

It is assumed that managerial and specialty employees with their higher salaries would be able to find affordable housing, but that 40% to 50% of the housing unit demand by non-managerial and nonspecialty employees might not be satisfied in the market place due to affordability factors. The affordable housing needs for direct operational employees is projected to be about 35 to 45 units by 1995, increasing to about 70 to 80 units at project completion in 2010, as also shown in Table 15 below.

Table 15: Summary of Employee Housing Requirements and Affordable Housing Unit Need

1995 to 2010

	<u>1995</u>	<u>2000</u>	<u>2005</u>	<u>2010</u>
Direct operational employees requiring housing	<u>159</u>	<u>217</u>	<u>248</u>	<u>285</u>
Housing unit demand	<u>115</u>	<u>155</u>	<u>176</u>	<u>203</u>
Affordable housing unit need	<u>36 - 45</u>	<u>49 - 62</u>	<u>57 - 71</u>	<u>66 - 82</u>

Source: Peat, Marwick, Mitchell & Co., 1986

Mitigation Measures

Close cooperation will be maintained between the developer of the Awake's property and County and State housing officials to ensure that employee housing needs are met. Employee housing requirements will be addressed on a project specific basis as specific phases of the development take place. The cumulative impacts of housing requirements generated by other developments also raises the potential that concerned developers will approach housing alternatives in a coordinated manner.

5.7 Fiscal Impacts

County

The County would receive additional revenues from the resort's development through real property taxes on the hotel facilities, condominiums and commercial and recreational facilities. The County would also incur additional expenses in providing public services to the visitors and residents of the resort and to those who would relocate from elsewhere in the state in order to take employment at the resort. A summary of the projected additional revenues and expenses attributable to resort development and the ratio of additional revenues to expenses that the County could experience are shown in Table 16.

**Table 16: Projected Annual Revenues, Expenses and
Revenue/Expenditure Ratio for the County of Hawaii**

1995 to 2010

(In 1986 Dollars; Millions)

	<u>1995</u>	<u>2000</u>	<u>2005</u>	<u>2010</u>
New revenues	\$ 1.1	1.6	2.2	2.8
New expenses	<u>0.5</u>	<u>0.7</u>	<u>0.8</u>	<u>1.0</u>
Net additional revenues	\$ <u>0.6</u>	<u>0.9</u>	<u>1.4</u>	<u>1.8</u>
Revenue/expenditure ratio	<u>2.2</u>	<u>2.3</u>	<u>2.8</u>	<u>2.8</u>

Source: Peat, Marwick, Mitchell & Co., 1986

State

Additional revenues to the State would be generated by (1) the 4% general excise tax on direct, indirect and induced expenditures by resort visitors and residents, (2) individual income tax and other miscellaneous State taxes paid by the resort's full-time residents who have come from out-of-state and (3) the 5% transient accommodations tax on visitors staying in the resort's hotel and condominium units. On the other hand, the State would also experience additional expenses for state-provided public services for resort visitors and residents who come from out of state. Additional State revenues and expenses attributable to the resort's development and the ratio of additional revenues to expenses is shown in Table 17.

**Table 17: Projected Annual Revenues, Expenses and
Revenue/Expenditure Ratio for the State of Hawaii**

1995 to 2010

(In 1986 Dollars; Millions)

	<u>1995</u>	<u>2000</u>	<u>2005</u>	<u>2010</u>
New revenues	\$ 3.2	4.0	4.8	5.9
New expenses	<u>0.3</u>	<u>0.5</u>	<u>0.8</u>	<u>1.1</u>
Net additional revenues	\$ <u>2.9</u>	<u>3.5</u>	<u>4.0</u>	<u>4.8</u>
Revenue/expenditure ratio	<u>10.7</u>	<u>8.0</u>	<u>6.0</u>	<u>5.4</u>

Source: Peat, Marwick, Mitchell & Co., 1986

5.8 Social Impacts

Social issues associated with resort development include community attitudes, social structure, and employment opportunity-related issues. In terms of social concerns and impacts, there do not appear to be any unique characteristics which would generate impacts different than those associated with other resort developments on the Big Island. More likely, social impacts will be more attributable to the cumulative nature of existing and planned resort developments in the Kona region.

In 1984, the Hawaii State Plan Survey (SMS Research, 1984) conducted in preparation for the State's updating of the Hawaii State Plan identified six major areas of concern to Hawaii residents. These included education, tourism, transportation, housing, jobs, and crime. It also showed that Big Island Residents were more concerned about economic growth than residents of other islands.

A 1983 Study of Big Island Residents on Planning and Housing Concerns (Hawaii Opinion, 1983) showed conflicting attitudes in relation to issues resulting from the tourism industry. Among the attributes which people said they liked most about living on the Big Island, was that it was not over populated and there was lots of open space. On the other hand, the two things more people liked least about living on the Big Island were the high cost of living and the lack of job opportunities. The survey also showed that 86% of the respondents island-wide and 85% in Kona favored spending more money on the promotion of the tourism industry.

These results seem to indicate that resident's attitudes toward the tourism industry are generally favorable in terms of the expanded employment opportunities which the industry provides, and because of the additional revenues it provides for the island's economy. Some negative feelings also exist and are generally related to the continued development of the islands open spaces, perceived over population, increased housing costs, and degradation of unique environments and historically significant sites. It should be pointed out that the Hawaii State Plan Survey also indicated a strong desire for economic diversification, especially in agriculture, as a means of creating more employment opportunities.

Existing residents of the Kona region are impacted by members of three population sectors as a result of new resort development. These include short-term visitors or tourists, long-term visitors or resort residents, and permanent new residents who in-migrate to take advantage of newly created job opportunities.

Short-term visitors have both positive and negative impacts on residents. On the positive side, tourists provide jobs, income, and an economic base for the area. Negative impacts associated with tourists include those caused by cultural differences, competition for the use of "local" places, and increased traffic.

The impact of long term-visitors or resort residents are usually of a lesser magnitude than those of short-term visitors. This is primarily do to the magnitude of volumes of each, and of the limited interaction of resort residents on the surrounding community. Their primary negative impact on the community will be in the form of increased demand for infrastructure and public services.

Permanent new residents may create several impacts in terms of competition for direct or indirect employment and resultant animosity, conflict is political values, increase pressure on housing and increased demand for infrastructure. During the 60's and 70's this segment of in-migrating population created substantial impacts on the West Hawaii community. These problems appear to have been somewhat mitigated over the past few years, as the character and social status of in-migrants has changed in terms of age and affluency.

Employment related impacts the creation of additional employment opportunities, competition between residents and in-migrants for jobs, and the need for resident-oriented job training and motivation programs. Circumstances related to employment can affect the overall population causing secondary impacts such as increased crime, resentment of new residents by existing and local residents, and increased stress levels.

Mitigation Measures

Overall the economic and social impacts of the proposed resort development at Awake'e will be positive, including increased employment levels, increased personal and household income, and increase recreational amenities. These are not likely to need mitigating.

Other impacts and associated mitigation measures such as increased demand for housing, additional demand on public facilities and infrastructure and transportation and traffic impacts are discussed in appropriate sections of this report.

In terms of social impacts which may need to be mitigated to some degree are those related to job-training and competition and possible social stress experienced by residents. Possible programs which might deal with these impacts include:

1. Job training and up-grading programs geared to existing residents. Such programs could target under-employed, or disadvantages portions of the population. These programs might be supported and/or administered by the developer, Hawaii Hotel Association, individual hotel operators, and/or a variety of existing State, County and private agencies and organizations.
2. A variety of potential support services for residents who are employed or are seeking employment, including job placement services, shuttle buses, and day care centers. Most of which could be provided by hotel and resort operators.
3. Increased communication between resort industry members and the public.

CHAPTER VI



CHAPTER VI

IMPACT ON PUBLIC FACILITIES AND SERVICES

This chapter describes the existing conditions of public facilities and utilities in the Awake'e service area. Public facilities are those systems which are provided, staffed, and maintained by governments to serve the public health, safety, and welfare. They include roadways, schools, fire and police protection, and refuse disposal areas. Public utilities are distributed services such as electricity, water, wastewater, and communications, that are provided either by a public agency directly or by a publicly regulated company. Project-related impacts are discussed primarily in terms of anticipated requirements generated by the development. Mitigation measures are preliminary proposals for how that demand may be satisfied. Portions of this chapter have been extracted or summarized from the following reports, which are appended to this document:

Appendix B Economic and Fiscal Impact Assessment for Resort
Development at the Awake'e Resort (Peat,
Marwick, Mitchell & Co.)

Appendix C Preliminary Engineering Utilities Report
(Wilson Okamoto and Assoc., Inc.)

6.1 Transportation Facilities

6.1.1 Roadways

Existing Conditions

Two major roadways serve the North Kona area: Queen Kaahumanu Highway and Mamalahoa Highway (also referred to as the Hawaii Belt Road). Queen Kaahumanu Highway is a two-lane, Class I State Highway, designed for a 70-mile per hour vehicle speed. It is a limited access highway within a 300-foot right-of-way. Dedicated in 1975, the highway extends 38 miles to connect the towns of Kawaihae and Kailua-Kona and provides a vital transportation link between the growing coastal resort areas of South Kohala, Keahole Airport, and Kailua-Kona.

Mamalahoa Highway was the main road between Kailua-Kona and Kamuela prior to the opening of Queen Kaahumanu Highway in 1975. It still provides a major transportation link between Hilo and Kailua-Kona (via Kamuela or directly when traveled in conjunction with the Saddle Road). The highway extends around most of the Big Island.

Impacts

The proposed development will generate vehicular traffic both internally and externally. An estimate was made of trips generated by the proposed development to determine potential impacts on the adjacent highway. Traffic generation figures shown below represent traffic projections from

a fully-developed project, as proposed in the preliminary land use plan. As the development process progresses and more details on project phasing becomes available, these figures can be refined to identify impacts over time. For the purposes of this section, a "trip" is defined as a "one-way journey that proceeds from an origin to a destination by a single type of vehicular transportation."

Table 18 shows historic traffic volumes along the Queen Kaahumanu Highway at points both to the north of the site (south of Waikaloa Road) and to the south of the site (north of Keahole Airport Road). They show significant growth in traffic volumes since the roadway opened in 1975.

Table 18: Highway Traffic Counts
Queen Kaahumanu Highway, South of Waikaloa Road

		<u>Southbound</u>	<u>Northbound</u>	<u>Total</u>
24-Hour Average	1976	575	607	1,182
	1978	842	850	1,692
	1980	785	645	1,430
	1982	1,489	1,346	2,835
	1984	1,893	1,707	3,600

Queen Kaahumanu Highway, North of Keahole Airport Road

		<u>Southbound</u>	<u>Northbound</u>	<u>Total</u>
24-Hour Average	1976	851	858	1,709
	1978	1,183	1,127	2,310
	1980	643	755	1,418
	1982	1,520	1,478	2,998
	1984	1,945	1,966	3,911

Source: State of Hawaii, Department of Transportation, Highways Division;
Belt, Collins & Associates, 1985.

Each land use activity within the development has its own, unique trip generating characteristics (Table 19). Utilizing trip generation indices developed in recent analyses of similar developments in the region (Belt, Collins & Associates, 1985; Traverse Group, Inc., 1985) and national averages of trip generation by specific land uses (Institute of Traffic Engineers, 1983), the project can be expected to generate a total of 6,609 external vehicle trips per day. Full-time residents and visitors residing in the resort condominiums account for 46% of the traffic volume; with the hotel facilities responsible for 50% of this volume. Off-site patrons of the golf course and clubhouse are estimated to generate a total of 100 trips per day. It should be noted that this level of trip generation is based on a

daily average over a one-year period, and does not reflect seasonal variations in traffic generation. In addition, the figure does not include internal trips, such as hotel guests driving from the hotel to the golf clubhouse.

Table 19: Traffic Generation

<u>Land Use</u>	<u>Units</u>	<u>Trips/Day</u>	<u>Ratio</u>	<u>Total Trips</u>
Hotel	600 rooms	5.5/room	80% occup.	3,300
Resort Condo	900 units	6.0/unit	56% occup.	3,024
Resort Comm.	37,000 SF	5.0/1000 SF	100%	185
Golf Course	18 holes		100/18 holes	100
Total				6,609

Source: Helber, Hastert, Van Horn & Kimura, Planners; Peat, Marwick, Mitchell & Co., 1986.

For the purposes of this study, it is assumed that the morning peak-hour will represent approximately 7.5 percent of total daily trips. Afternoon peak hour represents approximately 10.5 percent of the total daily trips. Directionality is estimated for the evening peak-hour at 45 percent entering the resort development and 55 percent exiting the development. Based on 6,609 vehicle-trips, the morning peak flow is estimated at 496 vehicles per hour, while the afternoon peak flow is estimated at 694 vehicles per hour.

Cumulative Impacts

Currently Queen Kaahumanu Highway is operating well below capacity, which has been estimated at 1,800 to 2,000 vehicles per hour (vph) for both directions. The current level of service is "A" (best possible) at all times in the project vicinity. Recent traffic analysis performed for other nearby resorts suggest that the highway will operate at least a "C" level of service until around the year 2000. However, it is anticipated that the capacity of the existing two-lane roadway will be exceeded near the turn of the century as a result of continuing regional growth. At that time additional lanes will be needed between Kailua-Kona and Waimea-Kawaihae Road. In all likelihood, the State Department of Transportation would undertake these improvements as part of its facility.

Mitigation Measures

Pursuant to more detailed development plans being prepared, additional study will be made of the potential impacts of traffic generated by the project on the surrounding roadways. It is likely, however, that the "T" intersection of Queen Kaahumanu Highway and the Awake'e access road will require one or more of the following improvements:

- o Acceleration and deceleration lanes to and from the southbound lanes of the highway;
- o Separate right and left turn lanes from the development access road (eastbound) onto the highway; and
- o Left turn lane to separate turning traffic from northbound lanes of highway.

The developer will continue to monitor traffic conditions and coordinate roadway improvement plans with the State Department of Transportation, Highways Division. All intersection improvement costs will be borne by the developer. All internal roads will be built to Hawaii County standards.

6.1.2 Keahole Airport

Located approximately four miles south of the property, the Keahole Airport consists of a modern terminal complex and a single runway 150 feet wide and 6,500 feet long. Planes generally approach the runway from a northerly direction and take off in a southerly direction. An update of the 1971 Keahole Airport Master Plan is being prepared. The airport experienced 83,320 aircraft landings and takeoffs in 1984, up 25.1 percent from the previous year. The major users of the facility are air taxis (35 percent) followed by general aviation (23 percent), military (21 percent), and commercial air carriers (20 percent) (Hawaii State Department of Transportation, 1985).

In 1984, over 1.42 million passengers passed through the airport, a 16 percent increase over the previous year. At present three daily direct-flights to Los Angeles are provided. In addition to the scheduled Mainland flights, numerous interisland flights are scheduled each day.

Impacts

The Awake'e development will be responsible for additional air passenger traffic through the Keahole Airport. The aggregate demand on airport facilities from West Hawaii developments will require future terminal expansion and lengthening of the runway to accommodate fully-loaded wide-bodied aircraft.

6.1.3 Honokohau Small Boat Harbor

The Honokohau Small Boat Harbor is the major pleasure-craft, commercial, and charter fishing anchorage in West Hawaii. The harbor is located approximately seven miles south of the property. Currently the man-made harbor can accommodate a total of 165 boats. All available slips are filled with a waiting list of "over 60 seriously interested" parties. The long range master plan for the facility calls for a total of 455 slips to be developed on the 65.5 acre harbor site (25.1 acres of water area and 40.4 acres of land area). Short-term improvement plans for the harbor will be ancillary commercial and light industrial development (Hallstrom Appraisal Group, 1985).

6.1.4 Kawaihae Deepwater Port

Located approximately 20 miles north of the property is the Kawaihae Deepwater Port, one of two deepwater ports that serve the island. Developed in 1959, the harbor has a 40-foot-deep entrance channel and a 35-foot-deep harbor basin with an area of 53.8 acres. The harbor provides the only port facilities for deep-draft vessels on the west side of the island. Cargo handled includes building materials, consumer goods, large equipment, and machinery, as well as provisions and supplies for the resort facilities in South Kohala-North Kona.

6.2 Water Supply

6.2.1 Potable Water

Existing Conditions

The closest developed water source south of the project is the North Kona system which consists of several wells and a shaft at Kahaluu. The cumulative capacity of this source is 10.4 mgd. Presently, all available water in the North Kona system is committed. Moreover, further development of this system may be limited by the quantity of suitable water that may be additionally drawn from the aquifer in Kahaluu. The northern extent of the North Kona water system terminates at the Keahole Airport area where an existing 12-inch waterline provides service for the airport facilities.

There are three existing wells located approximately three miles mauka of the project site that are privately owned or used. One well is located at elevation 1,580 feet while the other two are located at elevation 1,350 feet. The three wells are drilled to elevation -67 feet to -111 feet elevation. Chloride levels of the water range from 38 mg/L to 90 mg/L.

While the Department of Water, County of Hawaii has continually sought to develop new sources to meet the increasing demands in the West Hawaii region, major water source development is a long-term venture. Therefore, a new private water source will be developed for Awake'e. Wells will be drilled into the basal aquifer at the 1,400-1,600 foot elevation.

Impact

The proposed development is estimated to generate a water demand of approximately 1.38 mgd (See Table 20). It should be noted that the on-site sewage treatment plant will generate secondary treated effluent that will be used for the irrigation of the golf course and other landscaped areas.

Table 20: Estimated Water Demand

<u>Use</u>	<u>Gallons Per Day (gpd)</u>
Hotel	288,000
Resort Residential	373,500
Resort Commercial	35,150
Recreational	12,500
Other	3,500
<hr/>	
Total Domestic Demand	712,650
Irrigation Water Demand	663,360
<hr/>	
Total Average Demand	1,372,510

Cumulative Impacts

Development of a new private water source or a new water agreement among a consortium of developers would expand the net amount of water available in the region. If there is excess capacity, additional water could be made available to other users in the area. Negative impacts on the physical environment should be negligible if the water system is properly designed and operated.

Mitigation Measures

Potential water development alternatives include the following: (1) unilateral municipal expansion; (2) participating in an existing water agreement; (3) developing a new water agreement; or (4) developing and maintaining a new private water source. Based on currently available information, development of a new private water source is the most probable alternative for the Awake'e project. Discussions have taken place and will continue regarding the possibility of development of a joint water system between the developers of Awake'e and the adjoining Makalawena project.

Water requirements for the Awake'e development were based on the Generalized Resort Site Development Simulation contained in Appendix C. Based on the estimated water system requirements, a preliminary water system plan was developed. The basic components of the water system include:

1. Source well(s) at 1,400-1,600 feet elevation.
2. Transmission main from source wells to storage reservoir.
3. 1.2 mg storage reservoir at elevation 300 feet.
4. 3,000 feet of transmission main from storage reservoir to project site.
5. On-site water distribution system supplied by a 16" transmission main from the storage reservoir running along the primary resort arterial roadway. Primary distribution mains ranging from 8" to 12" branch off of the 16" transmission main to provide water to main blocks of resort hotels, resort condominiums and commercial areas. Secondary distribution mains ranging from 6" to 8" branch off of the primary distribution mains and the transmission main to serve individual buildings and building complexes.

Upon approval of the proposed changes in land use for this site, a geohydrological study will be conducted to investigate groundwater occurrence, movement and quality. At that time, the location and other elements for the source well(s) development will be determined. Appropriate clearances, approvals, and permits will be obtained from concerned authorities having jurisdiction over the development and utilization of public resources.

New well(s) and any water distribution system will be subject to all applicable terms of Chapter 20, Title 11 Administrative Rules.

Section 11-20-29 of Chapter 20 requires all new sources of potable water serving public water systems to be approved by the Director of Health prior to their use to serve potable water. Such approval is based primarily upon the satisfactory submission of an engineering report which adequately addresses all concerns as set down in Section 11-20-29. The engineering report must be prepared by a registered professional engineer and bear his or her seal upon it.

Section 11-20-30 requires that any new or substantially modified distribution systems for public water systems be approved by the Director of Health. Such approval depends upon the submission of plans and specifications for the project prior to construction and the demonstration that the new or modified portions of the system are capable of delivering potable water in compliance to all maximum contaminant levels as set down in Chapter 20 once the distribution system or modification is completed.

In addition, a well drilling permit will be required from the State of Hawaii Department of Land and Natural Resources for any new well(s).

6.2.2 Non-potable Water

Water infrastructure will be designed to meet water needs exclusive of sewage reclamation. However, the availability and use of secondary treated effluent for irrigation would reserve the main water supply for domestic consumption, except as needed to supplement recycled wastewater.

6.3 Wastewater Treatment and Disposal

Existing Conditions

Presently, there are no sewerage facilities in the Awake'e area. The closest public sewerage system is a small 0.04 mgd packaged treatment plant maintained by the State of Hawaii at the Keahole Airport to serve airport operations. To the north of Kailua, in the vicinity of the old Kona Airport, the Kailua-Kona municipal sewage treatment plant, operated and maintained by the County of Hawaii, has a capacity of 1.0 mgd. It has been reported that the Kailua-Kona Sewage Treatment Plant is approaching its capacity of 1.0 mgd, with flows estimated at 0.6 to 0.7 mgd in 1981.

A new wastewater treatment facility with a design capacity of 2.8 mgd is currently being designed for a site near the Honokohau Harbor. The distance between the Awake'e project site and the future sewage treatment facility is approximately 10 miles, making a hook-up economically unfeasible.

Impact

Estimated generation of domestic wastewater from the Awake'e development is .62 mgd (Table 21).

Table 21: Estimated Wastewater Flows

<u>Use</u>	<u>Gallons Per Day (gpd)</u>
Resort Hotel	204,000 gpd
Resort Condo	373,500 gpd
Commercial	27,750 gpd
Golf Course	12,500 gpd
Other	3,500 gpd
Total Average Flows	621,250 gpd

Mitigation Measures

For the Awake'e development, therefore, a local self-contained sewerage system comprised of collection lines, force mains, treatment plant, disposal system, and pertinent appurtenances is considered appropriate. The general design of this system will be based on the estimation of wastewater generated, sewerage hydraulics, and treatment and disposal alternatives.

Alternative treatment methods may include conventional activated sludge, contact stabilization, or aerated lagoons. Each of these methods has its advantages and disadvantages which will be further evaluated in the design phase. Disposal of treated effluents can be accomplished through several alternative methods. Injection wells, if found environmentally acceptable in this area, would likely be effective given the highly permeable volcanic formation of the region. Evapotranspiration could also be considered, given the low rainfall and high year-round temperature of the area.

Re-use of treated effluent for irrigation as a means of disposal appears appropriate in view of the water shortage concerns in this arid area. This method of disposal is an acceptable practice and, in fact, is gaining popularity in many water-deficient areas. The Department of Health, State of Hawaii sets forth basic guidelines using treated effluent in irrigation. The level of treatment required to re-use treated wastewater for irrigation in public areas (e.g. parks, golf course, etc.) is secondary treatment with disinfection. Filtration of treated effluent is often included in the process to minimize clogging of irrigation equipment.

6.4 Storm Water Drainage

Existing Conditions

In 1971, a drainage study was conducted for the planning and design of the Queen Kaahumanu Highway. That study indicated that mean annual rainfall in the area mauka of Awake'e increases from approximately 20 inches at sea level to 60 inches at elevation 2,000 feet; then decreases with increasing elevation above the 3,000 foot elevation. Mauka of the site, rain falls on a geologic formation generally comprised of rocks of the Hualalei volcanic series, the last active flow of which occurred in 1800-1801. This highly permeable formation lacks definitive drainage ways, indicating that surface runoff is virtually non-existent.

Drainage areas mauka of the highway and immediately above the project site are designated in the study as Drainage Basins 2E, 2F and 2G with runoff volumes of 60 cfs, 10 cfs, and 110 cfs respectively. Based on this analysis, three pipe culverts were installed under the highway mauka of the project parcel to accommodate storm runoff.

Impacts

On-site runoff volumes under post-development conditions are estimated to be as follows:

<u>Facility</u>	<u>Area</u>	<u>Runoff Quantity</u>
Hotels	33 acres	93 cfs
Condo	79 acres	222 cfs
Commercial	5 acres	14 cfs
Golf Course	166 acres	minimal
Other	66 acres	minimal

The runoff estimation, however is based on a generalized concept of development, and subject to further refinement.

Runoff on the golf course and open areas are assumed to be almost non-existent because of the low annual rainfall and the highly permeable pahoe-hoe and a'a lava which extends from the shoreline and up on the Hualalei slopes for a long distance.

Mitigation Measures:

Due to the sparse rainfall and highly permeable local soil formation, the principal drainage facility requirements for the Awake'e development can be met principally by swales, ditches, seepage pits and dry-wells. Grated inlets and underground pipings will be limited to large paved areas such as parking lots, and tennis courts. Open areas, including the golf course and landscaped areas, will serve to retain and allow seepage of storm runoff. A conceptual plan of proposed drainage improvements is presented in Appendix C.

6.5 Solid Waste Disposal

Existing Conditions

The County operates 25 solid waste transfer stations at 20 different locations around the island. Refuse collected at these stations is transferred to one of the three active landfill sites: Hilo, Kailua-Kona (Kealakehe) or Waimea (open dump). Refuse collected by private contractors cannot be deposited at the refuse transfer stations; instead it must be trucked to a landfill site. Hazardous wastes and sludge are not accepted at any of the County's landfills.

It is estimated that for the next 2-3 years, the requirements for solid waste disposal can be met by the sanitary landfill at Kealakehe in Kailua. When this municipal landfill reaches its capacity, a new landfill site at Puuanahulu will be opened. The Puuanahulu landfill is expected to serve the needs of the area for many years. Based on this available capacity, waste disposal methods other than disposal at the landfill does not appear economically or environmentally feasible.

Impact

The volume of solid waste to be generated by the Awake'e development can be estimated using a population projection and a municipal area load factor of 5 lb./capita/day. However, because the Awake'e development is a resort that will accommodate a highly transient population, the waste generation factor can be adjusted to 3.5 lb./capita/day for residents and overnight visitors, and 1.0 lb./capita/day for day visitors. Using projected resident and visitor populations formulated in the Generalized Resort Site Development Simulation for the full development configuration (See Appendix C), the estimated quantity of solid waste generated by the development will be approximately 8.5 tons per day or approximately 3,000 tons annually.

Cumulative Impacts

The solid waste to be generated by the proposed development makes up a small fraction of the projected solid waste quantities of the refuse district. It should not adversely impact the solid waste infrastructure, i.e., require the construction of a new landfill or significantly shorten the landfill's projected lifespan.

6.6 Power and Communications

Electrical Power

Existing electrical service in the surrounding area is provided by Hawaii Electric Light Company (HELCO) via a 69-KV overhead transmission line located approximately 3,000 feet mauka of Queen Kaahumanu Highway. Power for the Awake'e project will be tapped from this existing system.

Impact An estimated requirement of 7,500 KW would be expected for the ultimate development. A substation consisting of a transformer and switching gear would be required to handle the project's electrical demand. Plans for modification of the electrical system would be developed by HELCO.

Little direct impact to existing utility customers is expected since excess electrical capacity is available. However, implementation of the project could accelerate any existing schedules for infrastructure expansion since a portion of the existing excess capacity would be removed.

Mitigation Measure A significant portion of the Big Island's power is obtained from renewable sources such as bagasse burning, geothermal energy, hydroelectrical power, and wind power. The commercial viability of these sources, as well as the experimental Ocean Thermal Energy Conversion (OTEC) process, will help to lessen the consumption of petroleum, a non-renewable resource.

6.6.2 Telephone

Existing telephone service to the surrounding area is provided by Hawaiian Telephone Company. They share the same utility corridor with the HELCO facilities. Telephone service can be supplied to the project utilizing HELCO poles or by sharing direct burial trenches and concrete encased ducts for the electric lines.

Impact Existing telephone customers would not experience any adverse effect since excess telephone capacity is available.

6.6.3 Postal Service

A total of 33 post offices and stations are located around the island. The federal post office nearest to the project area is located in Kailua-Kona.

6.6.4 Cable Television

Anticipated population levels in the initial phases of the project are insufficient to warrant expansion of cable television service to the Awake's site. Should cable television service be desired, the developer would be required to fund capital construction costs either for extending the line from the Pacific Palisades subdivision, the closest cabled area, or installing a microwave relay transmitter and receiver.

6.6.5 Commercial Television and Radio

As of June 1984, residents of the Big Island were served by 4 AM and 3 FM commercial radio stations and 4 commercial TV stations.

6.6.6 Newspapers

Big Island residents receive the two Honolulu daily newspapers in addition to the daily Hawaii Tribune Herald and West Hawaii Today newspapers.

6.7 Police Protection

Existing Conditions

Police protection for the region is provided by the Hawaii County Police Department from its regional headquarters in Captain Cook. The area served by the Captain Cook station extends from Manuka State Park in South Kona to Anaeho'omalua Bay in North Kona. Planning is underway to move the Captain Cook headquarters to a new 10-acre facility in Kealahou, about 7 miles south of the project site. Presently a small substation is maintained in Kailua-Kona. As of July 1, 1986, the Kona District Police force consisted of 81 persons, including 71 officers and 10 administrative/clerical staff (Personal Communication, Capt. Henry Silva, June 1986).

Impacts

The Big Island police force averages 3.39 positions per 1,000 residents (Traverse Group, Inc., 1985). Applying this figure to the predicted increase in resident population of 453, the project will generate demand for 1.5 additional authorized police personnel.

Cumulative Impact

A secondary impact of the project is to increase the de facto off-site population with possible lowering of the service currently experienced by Kona residents (slower response time, for example).

Mitigation Measures

The hiring of a private guard service has become a common practice among resorts. The benefit of a private security unit would be to prevent crimes from occurring and also to handle minor disturbances. Any private security arrangement, either for the overall development or by individual businesses, would be coordinated with the County police force.

6.8 Fire Protection

Existing Conditions

The Hawaii County Fire Department provides fire protection services to Big Island residents. Fire stations are located in the Kona area at Captain Cook, Kailua-Kona, and Kawaihae. Service to Awake'e would be provided out of the Kailua-Kona station, with an approximate response time of 10 to 15 minutes. The Kailua-Kona Station is located on Palani Road above the Queen Kaahumanu intersection approximately 11 miles from the Awake'e site. It is presently composed of 1 engine company, 1 ladder company, 1 tanker, a medical unit and a rescue boat. The current staff is 16 firefighters. A crash/rescue unit is maintained by the State Airports Division at the Keahole Airport; however, the equipment and personnel are restricted to airport emergencies.

Impacts

The development of the Awake'e project will result in increased demands for fire protection services and facilities. These demands may be significant when considered in the context of the cumulative resort development plans in North Kona and South Kohala. A coordinated program for provision of fire protection services will be needed.

Mitigation Measures

The County fire department has prepared plans for the construction of a new fire station at Mauna Lani. At the present time, the only other plans for an additional station is in the Keauhou area. It is possible that at such

a future time as the cumulative resort development in North Kona dictates, a new station could be funded through an agreement between the County and an association of resort developers, whereby the County would provide the personnel and administrative and operational costs. Funding would be through the floating of bonds by the County wherein retirement (repayment) of the bond would be by the association of resorts.

6.9 Health Care Facilities/Emergency Ambulance

Emergency ambulance service is provided by the State Department of Health. Advanced life support ambulance units are located at the Lucy-Henriques Medical Center in Waimea (2 holding beds, X-ray), the Kailua-Kona Fire Station, and at the Captain Cook Fire Station. The Kona Hospital houses a basic life support ambulance unit. The Kailua-Kona Fire Station is equipped for off-shore emergencies.

Hospitals

The State Department of Health administers the Kona Hospital located in Kealahou. Built in 1975, the 83-bed skilled nursing facility provides both acute and intermediate level care to Kona residents. The hospital is reaching its capacity and funding to expand the number of available beds has been requested. A new \$40 million hospital opened in Hilo in 1985.

Impacts

The increase in *de facto* population attributable to the development will place a small additional demand on existing health facilities. One standard for calculating facility requirements is 4 hospital beds per 1,000 resident population. Resident population for the fully occupied development is estimated to be approximately 450, resulting in slightly less than 2 additional hospital beds.

6.10 Schools and Libraries

6.10.1 Schools

The North Kona District is serviced by three public schools and two private schools (Table 22). The major public high school for the region, Konawaena, is located in Captain Cook, south of Kailua-Kona. The most recent addition to the public school system was the construction of Kahakai Elementary School in 1982. At the present time the State Department of Education (DOE) has no plans to increase the number of schools serving the area. According to DOE, students residing in the proposed development would be serviced by Kealahou Elementary (K-5), Kealahou Intermediate (6-8), and Konawaena High School (9-12) (State Department of Education, September 1986).

Libraries The North Kona region is currently served by three public libraries (Table 23). Plans are currently under way to build a permanent Kailua-Kona Library once a site has been located.

Table 22 : Kona Schools

<u>District</u>	<u>School</u>	<u>Location</u>	<u>Grades</u>	<u>Enroll</u>
North Kona	Kealakehe School	Kailua-Kona	K-8	1,244
	Kahakai School	Kailua-Kona	K-6	440
	Holualoa Elementary	Holualoa	K-6	321
	Kona Adventist* International	Kailua-Kona	1-8	18
	Christian School*	Holualoa	K-12	116
South Kona	Konawaena Elem.	Kailua-Kona	K-6	613
	Konawaena Interm. and High School	Kailua-Kona	7-12	1,439

Notes: (1) Asterisk (*) denotes private school
(2) Official DOE enrollment as of 9/13/84

Source: 1984-1985 Directory, Department of Education

Table 23: Kona Libraries

<u>District</u>	<u>Library</u>	<u>Location</u>	<u>Vols.</u>
North Kona	Kailua-Kona Library	Kailua-Kona	6,000
	Holualoa Library	Holualoa	3,000
	Kealakekua Library	Kealakekua	11,220

Source: Department of Education

Impacts

Table 24 shows projected new secondary public school students that are expected to be attributable to the resort's expansion. The projections shown are based on student per housing unit multipliers for luxury and middle-income residences, as supplied by the Hawaii State Department of Education.

The impact on the public school system is expected to be slight with about 30 additional students by 1995, increasing to about 70 additional students by 2010 as shown in the exhibit. Recent written communications from the superintendent of schools support this conclusion. About half of all new students shown are expected to be in grades kindergarten through 6; the other half in grades 7 through 12.

It may be expected that additional staff would eventually be required to meet the increased demand projected.

**Table 24: Student Generation for Hawaii County Public Schools
Attributable to Development of Awake'e Resort (1)**

1995 to 2010

<u>Grade Level</u>	<u>1995</u>	<u>2000</u>	<u>2005</u>	<u>2010</u>
K - 6	16	23	28	33
7 - 8	8	12	14	17
9 - 12	<u>8</u>	<u>12</u>	<u>14</u>	<u>17</u>
Total	<u>32</u>	<u>47</u>	<u>56</u>	<u>67</u>

(1) By on-resort residents and off-resort in-migrant operational employees.

Sources: State of Hawaii, Department of Education, 1985,
and Peat, Marwick, Mitchell & Co.

The increased demand for library services created by the project is not expected to be significant.

6.11 Recreational Facilities

Existing Conditions

Recreational facilities in both South Kohala and North Kona are extensive. Those in North Kona include a golf course, beaches, small boat harbors, historic sites, hunting areas and other amenities and attractions. The district has three County beach parks (Kahaluu, Pahoehe and White Sands), the Old Kona Airport State Park, and the Hulihee Palace State Monument. Throughout the district are numerous historic sites, including fishponds, trails, heiaus and buildings. The U.S. Army Corps of Engineers has established wetlands at Honokuhau and Kiholo Bay. Several hiking trails are also available in the North Kona District. Bikeways are proposed throughout most of the district.

Impacts

Development of the proposed project will provide additional recreation opportunities for both resort users and residents of the North Kona district in the form of an 18-hole golf course and driving range. Development will improve access to the shoreline, currently limited to unpaved and seasonally unstable beach trails. Public parking for beach and ocean users will be provided in conjunction with commercial development near the shoreline. No new facilities for boat launching or new boat ramps are anticipated to be provided, however it is possible that existing boat launching activities may be allowed to continue. Access through the site to the neighboring beach at Makalawena will be maintained.

Access to archaeological sites will have the beneficial effect of exposing visitors and guests to Hawaiian culture. On the other hand, it has the potential adverse effect of increasing the likelihood of vandalism.

Mitigation Measures

As noted previously, the proposed development includes provision for continued and improved public access, including paved roads, sidewalks (where necessary) and beach parking. Local residents should be informed about the existence of these facilities with appropriate signage and notations on County recreational maps.

A document called Guidelines and Standards for Public Shoreline Access prepared for the County of Hawaii noted the desirability of providing more access points to the shoreline in the area from Anaho'omalulu to Kailua (Kasamoto and Yoshimura, 1981). Specific reference was made to implementing the Ala Kahakai (Trail by the Sea) concept. Discussions with the County's Department of Parks and Recreation have indicated that there is no formal program as yet for such a trail system; however, the preliminary land use plan for the Awake'e project would be compatible with this type of feature.

CHAPTER VII



CHAPTER VII

ALTERNATIVES TO THE PROPOSED ACTION

7.1 Introduction

Chapter 200 of Title 11, Environmental Impact Statement Rules, requires a discussion of "any known alternatives...which could feasibly attain the objectives of the action." The rules further specify that the alternatives be explored and evaluated in light of enhancement to environmental quality or the avoidance or reduction of adverse environmental effects.

Three alternative actions that could reduce or eliminate environmental risks or costs were considered: (1) "no action" (no amendment to the existing land use classifications at either the State or County level); (2) "major resort" development; and (3) "retreat resort" development. It should be noted that the subject action combines several types of land uses, including intermediate resort. The second and third alternatives could be expanded similarly into packages of uses. However, in order to limit the combinations of land uses considered and to focus attention on the probable consequences of a given action, this analysis is limited to three concepts which typify varying intensities of development and non-development.

7.2 No Action Alternative

The no action alternative would preserve the existing situation at Awake'e. The undeveloped coastal property, now characterized by a relatively barren landscape, would remain largely underutilized, except by recreationists.

Advantages: No further expenditure of resources by the developer or any public agency would be required. Areas that are considered environmentally sensitive, such as the near-shore waters and archaeological sites would remain undisturbed since environmental impacts of the type discussed in Chapter 4 would not materialize. However, changes in the environment still could occur from other causes, such as natural cycles, indirect impacts from land uses on surrounding parcels, and the existing low-intensity use of the land.

Disadvantages: The absence of land development would also preclude economic benefits that might accrue from the project, such as additional employment, increased tax revenues, and increased economic activity in the region overall. Opportunities to implement State and County economic objectives and policies would be lost. Similarly, privately funded environmental programs designed to take positive actions toward resource management for public benefit and enjoyment would not be available.

7.3 Major Resort

The Hawaii County General Plan has defined and established standards for specific types of resort-oriented developments. A "major resort" area is described as "a self-contained resort destination area which provides basic and support facilities for the needs of the entire development. Such facilities shall include sewer, water, roads, employee housing and recreational facilities, etc." A general breakdown of land uses is provided as follows:

Maximum hotel and condominium-hotel units: 3,000 rooms

Resort acreage: 90 acres minimum

Active/passive recreation areas: 50 acres minimum

Accessory use within hotel or resort zoned area shall be based on 50 square feet of floor area per hotel room

A maximum of 640 acres for residential use when other zoned lands are not available in close proximity for support use

Advantages: Strictly in terms of land-use intensity, this alternative represents the highest use of the property. If this level of development were warranted by market demand, it could contribute significantly to the economic vitality of the region. Through economies of scale, fiscal revenues are expected to rise faster than outlays to fund public services and utilities.

Disadvantages: With approximately 350 acres, Awake'e does not contain sufficient land area to develop a high-quality resort area at the major-resort scale. Although a unit count that exceeds the 1,500 rooms allowed by the intermediate resort category could be accommodated physically on the site, the development would be congested and contrary to the unrestricted, open feeling that is characteristic of the Kona Coast. A major resort development would put Awake'e in a less competitive position compared to existing major resort areas that incorporate larger acreages.

7.4 Retreat Resort Area

The Hawaii County General Plan characterizes retreat resort as "generally an area which provides the user with rest, quiet, and isolation for an environmental experience. It shall have sewer, water, roads, employee housing, and recreational facilities, etc." Standards for land use include:

Maximum hotel and condominium-hotel units: 100 rooms

Resort acreage: 15 acres minimum

Provide active and passive recreation area commensurate with the scale of development

Accessory uses within hotel or resort zoned area shall be based on 50 square feet of floor per hotel room

The Kona Coast has an example of a premier retreat resort in the form of the Kona Village, whose secluded site is set well back of the main highway. The individual thatched-roof bungalows are clustered in a village setting. Contrary to expectations of a luxury resort, man-made amenities are few, thus reinforcing the sense of isolation.

If a retreat resort is developed at Awake'e, similar guest accommodations would have to be provided together with a substantial amount of recreational facilities. The commercial and condominium uses would not be compatible with a retreat resort.

Advantages: Because of its extremely low density, this alternative could result in a lower magnitude of impacts on the natural environment. At the same time, there would be greater flexibility in the layout of urban facilities to minimize adverse impacts on existing archaeological and environmental features.

Disadvantages: The high capital cost of developing infrastructure to serve the development, combined with a low projected rate of return would call into question the economic feasibility of this alternative action.

7.5 Analysis and Conclusion

The EIS rules concerning "rigorous exploration and objective evaluation" of feasible alternatives apply both to public and private actions. However, feasibility is evaluated differently in the two cases. The benefits of public actions are measured by their contribution to the public good, which is determined through an inherently political process. On the other hand, the feasibility of a private action, is ultimately determined by expected future returns, including a return on investment, compensation for risk, and a margin of profit. The importance of a development project's economic feasibility, measured in these market terms, is underscored by the weight this factor is given in certain public decisions, such as those made by the State Land Use Commission, which require data regarding the petitioner's financial condition. Therefore, although the EIS rules state that alternatives be evaluated, "even though more costly," the consequences on a private action's bottom line set a minimum standard for establishing the feasibility of the alternative.

The "no action" alternative would not materially degrade the environment beyond that which would otherwise occur in the absence of the project. However, this alternative has an opportunity cost since economic benefits, as well as any positive

resource management programs that might be established in conjunction with the resort, are not realized.

While the "major resort" alternative would seek to provide benefits that are not available in the "no action" alternative, it is uncertain whether this type of resort would meet the development objective of providing a high-quality resort environment. Without the qualitative merits of a superior resort development, the economic feasibility aspect would be diminished.

In many respects, the "retreat resort" alternative combines the benefits of the two previous alternatives: minimal environmental disruption supplemented by resource management programs (that would be integrated with the resort's offerings of guest amenities), and an infusion of capital into the regional economy. However, the cost-revenue balance of this type of resort development would not meet the feasibility requirement of the development program.

None of the three alternatives considered compares more favorably than the proposed action in establishing an economically feasible resort that meets the developer's standards of quality, offering a potentially viable mix of land uses, and also fulfilling public policies and objectives.

CHAPTER VIII



CHAPTER VIII

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Construction and operation of the Awake'e development will involve the irretrievable loss of certain environmental and fiscal resources. The commitment these resources, however, should be evaluated in light of future benefits to the residents of the region and the County, and the alternative of taking no action.

The proposed development will urbanize approximately 350 acres at Awake'e. Construction of buildings and other man-made amenities will narrow the range of future non-urban uses for this site, although not significantly. The site is currently undeveloped, however, the lack of on-site productive resources limits its appropriateness for certain uses, such as agriculture.

Future construction of the resort hotel, resort commercial and condominiums will remove most of the existing vegetation. While the ground level environment will be altered, the visual "resource" attached to the site, namely its coastal and open space vistas, will be preserved to the extent possible by the golf course and other undeveloped areas, which amount to over 166 acres. The development of additional water sources (potable and treated) and their distribution will allow greener, more tropical landscaping than is possible at present.

"No build" areas have been designated around the site's anchialine ponds, and will be around many of the historic sites that are deemed to possess significant cultural value. Some historic sites may be destroyed by construction; however, prior to such action, information will be extracted or other work performed in accordance with the recommendations of the historic preservation assessment which is being coordinated with the State Historic Preservation Office.

Construction and operation of the project will require the expenditure of labor, materials, and energy, most of which are non-renewable and irretrievable. Water for domestic use will require the commitment of a resource that is not readily accessible at present; water for irrigation use will be obtained from recycled and treated wastewater.

The proposed action will not require any new commitment of publicly supported services and facilities that is not compensated by increases in tax revenues.

CHAPTER IX



CHAPTER IX

RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF THE ENVIRONMENT AND MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

Analyses of various on-site environmental features have found the Awake's property to be well endowed with physical attributes that are desirable both as amenities in a resort community and for their own sake. These include pristine near-shore waters, the anchialine pond system and sites of cultural significance. The studies have also indicated that the proposed development is compatible with the existing natural environment. Specific recommendations to mitigate adverse impacts are being formulated in the planning phase and would be followed through in the design, construction, and operations phases of the project.

No short-term exploitation of resources that will have long-term consequences has been identified. The visitor accommodations and amenities that will be provided will be of high quality and designed to last for decades. If the development proposal is implemented as planned, little environmental degradation is expected to occur nor would it pose a significant risk to the health and safety of residents or visitors in the resort area or vicinity.

Improved public access to the shoreline, open space and view corridors, and archaeological and ecological features designed to enhance public education and enjoyment are contained in the project's conceptual plan. These proposals represent long-term community gains.

As the property develops, its productivity in terms of generating tax revenues will increase. Employment opportunities generated on the site will have benefits that ripple through the regional economy. Income from personal, property, and excise taxes are expected to more than offset expenses associated with expanded public services to meet the requirements of the resort and indirect population growth.

Environmental benefits and costs have not been quantified. However, where the potential for adverse environmental impacts related to the project has been identified, measures to mitigate the undesirable consequences of development have been proposed, including: a historic preservation program (data recovery, salvaging, and preservation), a marine baseline assessment for future monitoring efforts, and improved shoreline access and public parking. Also, as was noted in Chapter VII, the property is unsuitable for certain alternative land uses in which productivity is measured by the value of their cultivated or extracted products.

CHAPTER X



CHAPTER X

CONSULTED PARTIES AND PARTICIPANTS IN THE DEIS PREPARATION PROCESS

10.1 Consulted Parties

The Environmental Impact Statement Preparation Notice (EISPN) for the proposed Awake's project was published in the OEOC Bulletin on August 8, 1986. The thirty-day review period, announced in the OEOC Bulletin, ended on September 8, 1986. In addition, a more detailed EISPN, including maps of the project, was mailed directly to the agencies, organizations, and individuals listed below. The list contains parties believed to have an interest in the project or who requested consulted party status.

We note that the development plan evaluated in this report differs from the plan contained in the EISPN. The earlier plan was revised subsequent to the EISPN, based on consultant reports and recommendations.

"*" indicates agencies or individuals who sent a written response to the EISPN.

"#" indicates agencies or individuals who did not respond in writing, but whose comments were solicited by telephone or in personal interviews.

Federal Agencies

- * Department of Agriculture, Soil Conservation Service
- * Department of the Army, Engineering Division
- * Department of Housing and Urban Development
- * Department of Interior
Fish and Wildlife Service
- Department of Transportation, Federal Aviation Administration
- Environmental Protection Agency, Region IX-San Francisco

State Agencies

- * Department of Agriculture
- * Department of Education
- * Department of Health
- * Department of Land and Natural Resources
Division of State Parks and Historic Sites
- * Department of Planning and Economic Development
- * Department of Transportation

Hawaii County

- * Office of the Mayor
- * Department of Parks and Recreation
- * Department of Public Works
- Department of Research and Development
- Department of Water Supply
- * Fire Department
- * Office of Housing and Community Development
- * Planning Department
- * Police Department

Public Utilities

- * Hawaii Electric Light Company, Inc.
- Hawaiian Telephone Company

Community Organizations and Other Groups/Individuals

Sierra Club, Moku Loa Group

10.2 Participants in the DEIS Preparation Process

The DEIS was prepared for Kahala Capital Corporation by Helber, Hastert, Van Horn & Kimura, Planners. The following list identifies individuals and organizations who were involved in the preparation of the DEIS and their respective contributions.

Helber, Hastert, Van Horn & Kimura, Planners

Richard H. Van Horn, AICP
Kevin M. Young, ASLA
Stephen Nakamitsu
Toshiko Matsushita

Principal-in-charge and Project Manager
Principal DEIS Author and Project Planner
Graphic Artist
Graphic Artist

Subconsultants

Peat, Marwick, Mitchell and Company

Paul H. Rosendahl, Ph.D., Inc.
Char and Associates
Wilson, Okamoto and Associates, Inc.
Steven J. Dollar, Ph.D.

Market Study
Public Cost-Benefit Analysis
Economic and Fiscal Impact Assessment
Archaeological Reconnaissance Survey
Flora and Fauna Surveys
Preliminary Civil Engineering and Utilities
Marine Environment and
Anchialine Pond Assessment

CHAPTER XI



CHAPTER XI

COMMENTS AND RESPONSES RECEIVED DURING PREPARATION OF THE DEIS

Seventeen letters were recieved in response to the Environmental Impact Statement Preparation Notice (EISPN); the individuals and agencies are listed below.

The following pages contain a copy of the EISPN and the cover letter requesting review of the proposed development with respect to issues that should be addressed in the DEIS. The comments we received and our follow-up responses are also reproduced.

Federal Agencies

Department of Agriculture, Soil Conservation Service
Department of the Army, Engineering Division
Department of Housing and Urban Development
Department of the Interior, Fish and Wildlife Service

State Agencies

Department of Agriculture
Department of Education
Department of Health
Department of Land and Natural Resources
Department of Planning and Economic Development
Department of Transportation

County Agencies

Department of Parks and Recreation
Department of Public Works
Fire Department
Planning Department
Police Department
Office of Housing and Community Development

Public Utilities

Hawaii Electric Light Company, Inc.

21 August 1986

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& KIMURA
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Richard H.
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A.I.C.P., A.I.A.

Glenn T.
KIMURA

Associates

Nancy I.
NISHIKAWA

A.I.C.P.

Thomas A.
FEE

A.I.C.P.

Awake'e Resort
North Kona, Hawaii
Environmental Impact Statement
Preparation Notice (EISPN)

Dear

The official preparation notice (EISPN) for the proposed Awake'e Resort was published in the August 8 edition of the OEOC Bulletin (copy enclosed). The 30-day review period for written comments to the EISPN is September 8.

Your agency has been identified as one which may be interested in participating as a consulted party in the EIS preparation. To aid in your evaluation of potential project-related impact, we have enclosed a more detailed EISPN with maps.

We would greatly appreciate your assistance in this process by responding either with written comments or by identifying an individual within your organization whom we may contact to discuss the project further. We look forward to hearing from you.

Sincerely,

HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS

Richard H. Van Horn

Encl.

146 SOUTH KING STREET, HONOLULU, HAWAII 96813 TELEPHONE (808) 465-8415

OEOC BULLETIN

OFFICE OF ENVIRONMENTAL QUALITY CONTROL

GEORGE R. ARIOYOSHI
GOVERNOR

LEITIAN UVEHARA
DIRECTOR

Volume III August 8, 1986 No. 15

REGISTER OF CHAPTER 343, HRS DOCUMENTS

All Chapter 343, HRS documents submitted for publication in the GEOC Bulletin must be addressed to the Office of Environmental Quality Control, 465 South King Street, Room 104, Honolulu, Hawaii 96813. Documents addressed otherwise will not be considered for publication.

EIS PREPARATION NOTICES

The following proposed actions have been determined to require an environmental impact statement. Anyone can be consulted in the preparation of the EIS by writing to the listed contacts. 30 days are allowed for requests to be a consulted party.

AWAKE'E DEVELOPMENT, NORTH KONA, HAWAII,
Kahala Capital Corporation/County of Hawaii Planning Dept.

A General Plan Amendment is being sought by the applicant to change the Land Use Pattern Allocation Guide map designation from Conservation and Open to Resort, Medium Density Urban and Open designations, in order to accommodate a proposed resort community. The applicant's master plan would include the following:

Proposed Resort Facilities

- Resort Hotel (45 acres)--Two hotel sites, one located adjacent to Kaholawa Bay with views of Puu Kuli

and the second, larger site fronting Awake'e Bay. The two hotels would provide approx. 750 rooms.

- Resort Condominiums (80 acres)--Approx. 750 units in several locations throughout the site. One group of condominiums would be situated on the slope between Puu Kuli and the coast. Another grouping of condominiums would be along the entrance road to the proposed hotel site on Kaholawa Bay. The remaining condominiums would be located in the interior of the site oriented around the golf course. The proposed density is a maximum of 10 units per acre.

- Golf Course (148 acres)--One par 72, 18-hole golf course is proposed for the interior of the site and is an important recreational and aesthetic amenity of the proposed resort development. The clubhouse will be sited near the center of the property, adjacent to the main access boulevard. It is anticipated that the golf clubhouse would contain a standard mix of commercial enterprises, including a restaurant/coffee house and pro shop.

over--

- Resort Commercial (5 acres)--Two small commercial areas have been identified: a small resort shopping complex near Awake'e Bay adjacent to the hotel, and a restaurant located on the slopes of Puu Kuli, south of a condominium cluster. The Awake'e Bay site will provide sufficient parking spaces to accommodate local recreational uses of the coastal area.

- Other (66 acres)--The balance of the project area will be used for public beach parking, roads, a sewage treatment plant, utility easements, and open space.

The project site, comprised of approx. 349.05 acres, is located on the west coast of the island of Hawaii, North Kona Judicial District, Awake'e ahupua'a. The property is identified as TMA 7-2-04103. The site is approx. 4 mi. north of the Kahala Airport and 11 mi. north of Kailua-Kona. The subject property is situated on the makai side and approx. 1,800 ft. from the Queen Kahuamahu Hwy. It is surrounded by vacant land on three sides with the fourth side abutting the Pacific Ocean. The State of Hawaii owns a 3,400-acre tract of land which surround the project site. Bishop Estate owns a vacant 631-acre parcel which lies south of the subject property in the Makalawena ahupua'a. The subject property is held in trust by Long & Malone, Ltd. and the applicant, Kahala Capital Corporation has been authorized to develop the property.

Requests to be consulted and comments should be sent to:

Helber, Haskert, Van Horn & Kilauea,
Planners
Governor Center, PH1 Tower
733 Bishop Street, Suite 2590
Honolulu, Hawaii 96813

With a copy to:

Mr. Albert Lono Lyman, Director
Planning Department
County of Hawaii
25 Aupuni Street
Hilo, Hawaii 96720

Deadline: September 8, 1986.

**ENVIRONMENTAL IMPACT STATEMENT
PREPARATION NOTICE**

**AWAKE'E
RESORT DEVELOPMENT
NORTH KONA, HAWAII
TMK 7-2-04:03**

I. IDENTIFICATION OF APPLICANT

- A. Applicant:**
Kahala Capital Corporation
- B. Consultant for EIS:**
Helber, Hastert, Van Horg & Kimura, Planners
Grosvenor Center, PFI Tower
733 Bishop Street, Suite 2590
Honolulu, HI 96813

II. IDENTIFICATION OF APPROVING AGENCY (ACCEPTING AUTHORITY)

Planning Department
County of Hawaii
25 Aupuni Street
Hilo, HI 96720

III. SUMMARY OF PROPOSED ACTION

The applicant, Kahala Capital Corporation, seeks to change the General Plan designations from Conservation and Open to Resort, Medium Density Urban and Open area designations.

IV. AGENCIES CONSULTED IN PREPARING ASSESSMENT

- A. County Agencies**
1. Hawaii County Planning Department

V. PROJECT DESCRIPTION

- A. Location and Ownership**
The project site, comprised of approximately 349.05 acres, is located on the west coast of the island of Hawaii, North Kona Judicial District, Awake'e

shupua's (Figure 1). The property is identified as tax map key (3rd Division) 7-2-04: 03. The entire area is being requested for a General Plan amendment from the existing Conservation and Open land use designations to Open, Intermediate Resort, and Medium Density Urban.

The site is surrounded by land on three sides with the fourth side abutting the Pacific Ocean. The State of Hawaii owns a 3,400-acre tract of land (TMK: 7-2-04: 04 and 17), which surrounds the property entirely. This tract includes the shupua's of Maniniowai, Kukio 2nd, and the mauka portion of Awake'e. Bishop Estate owns a 631-acre parcel which lies south of the subject property in the Makalawena shupua's (TMK: 7-2-04:01).

The subject property is held in trust by Long & McInnes, Ltd. and the applicant, Kahala Capital Corporation has been authorized to develop the property.

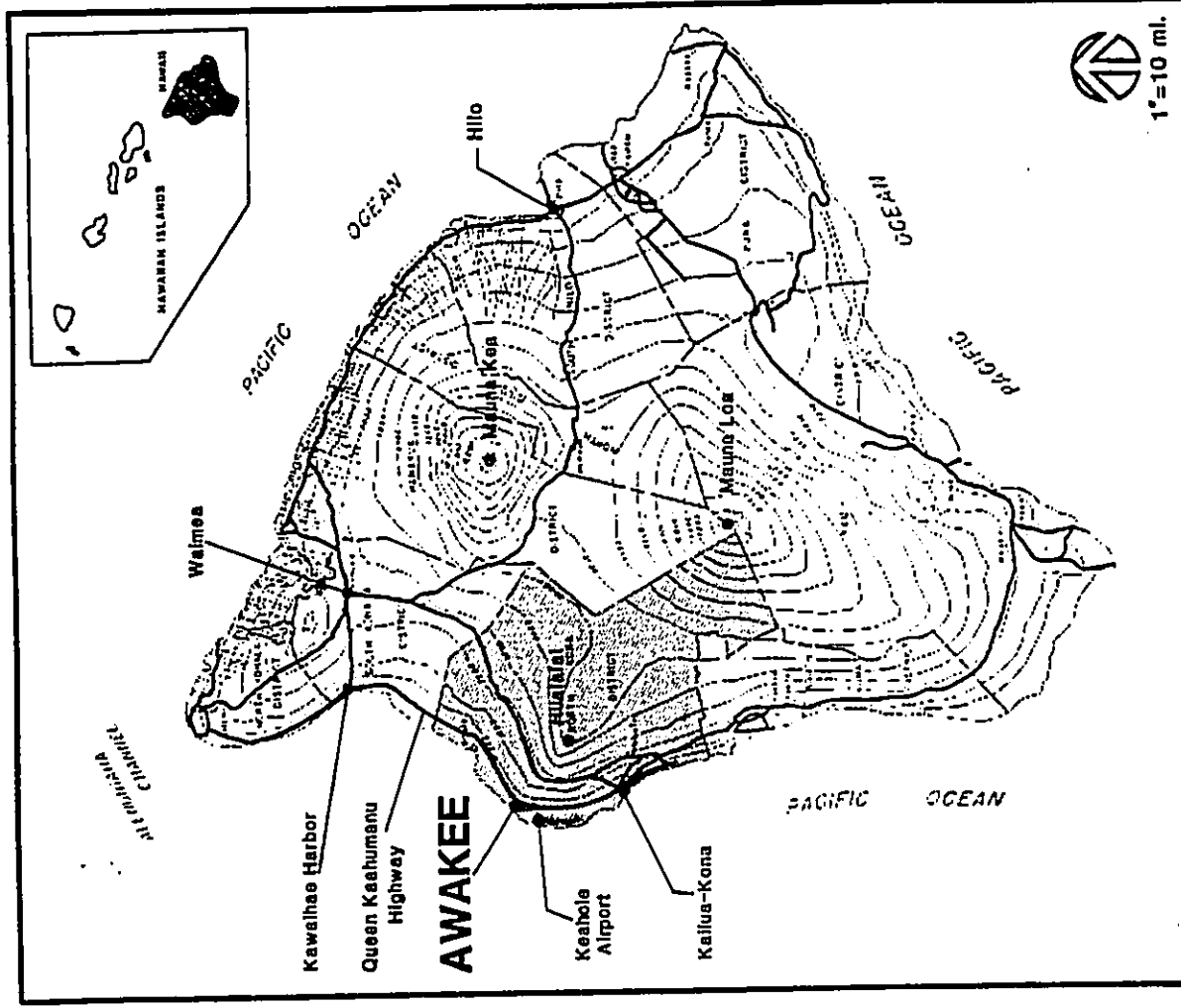
B. Conceptual Plan

A General Plan amendment is being sought by the applicant to change the Land Use Pattern Allocation Guide (LUPAG) map designation from Conservation and Open to Resort, Medium Density Urban and Open designations, in order to accommodate a proposed resort community. The applicant's master plan would include the following:

I. Land Use

The master plan (Figure 2) for the entire project site consists of the following land uses:

- (a) **Resort Hotel (45 acres).** Two hotel sites: one located adjacent to Kahala Bay with views of Puu Kuli and the second, larger site fronting Awake'e Bay. The two hotels would provide approximately 750 rooms.
- (b) **Resort Condominiums (80 acres).** Approximately 750 units in several locations throughout the site. One group of condominiums would be situated on the slope between Puu Kuli and the coast. Another grouping of condominiums would be along the entrance road to the proposed hotel site on Kahala Bay. The remaining condominiums would be located in the interior of the site oriented around the golf course. The proposed density is a maximum of 10 units per acre.
- (c) **Golf Course (148 acres).** One par-72, 18-hole golf course is proposed for the interior of the site and is an important recreational and aesthetic amenity of the proposed resort development. The clubhouse is sited near the center of the property, adjacent to the main access boulevard. It is anticipated that the golf clubhouse would contain a standard mix of commercial enterprises, including a restaurant/coffee house and pro shop.
- (d) **Resort Commercial (15 acres).** Two small commercial areas have been identified: a small resort shopping complex near Awake'e Bay adjacent to the hotel and a restaurant located on the



Project Location Map
AWAKEE
 HELBER, HASTERT, VAN HORN & KIMURA
 1000 KALANANAKU AVE., SUITE 1000, HONOLULU, HAWAII 96813
 TEL: 808/551-1000 FAX: 808/551-1001

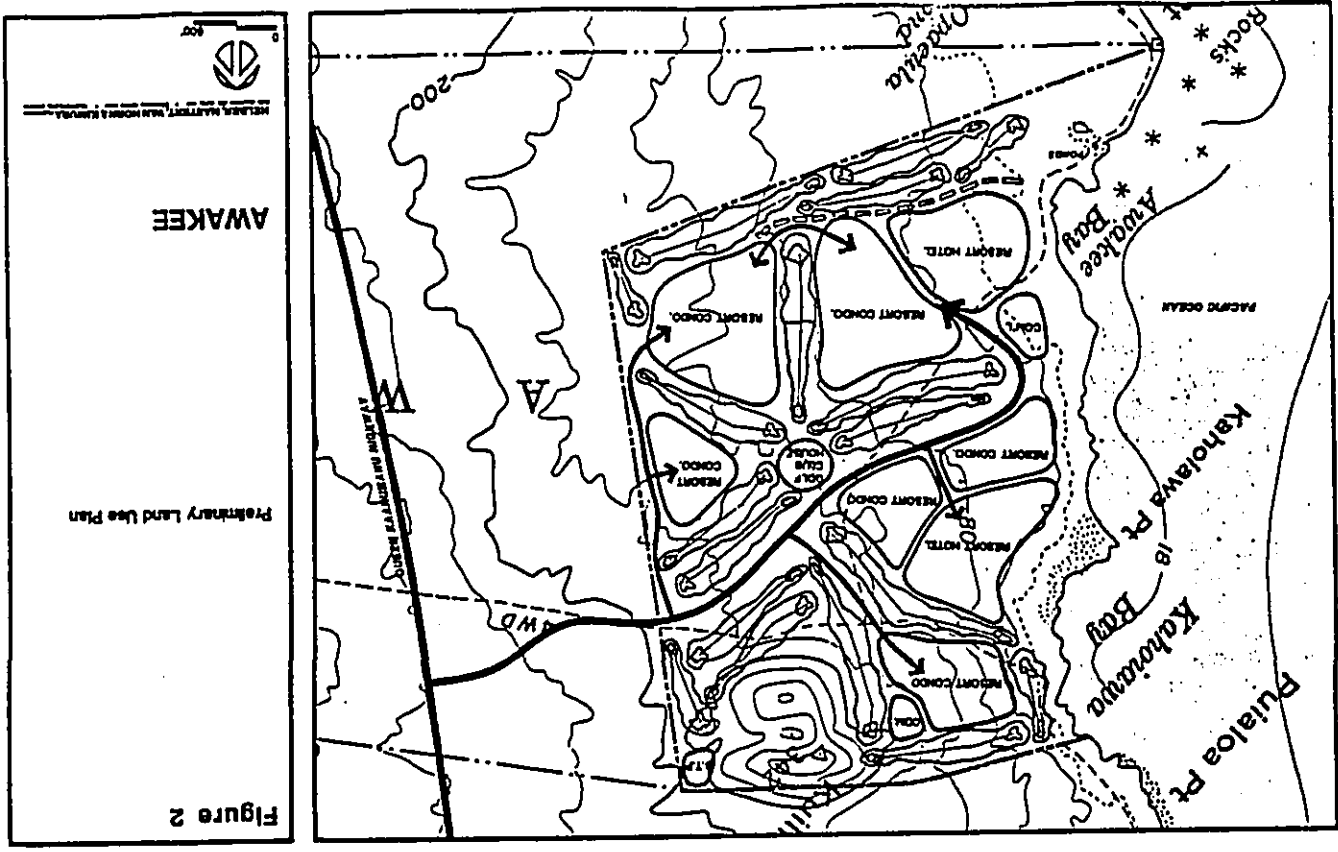
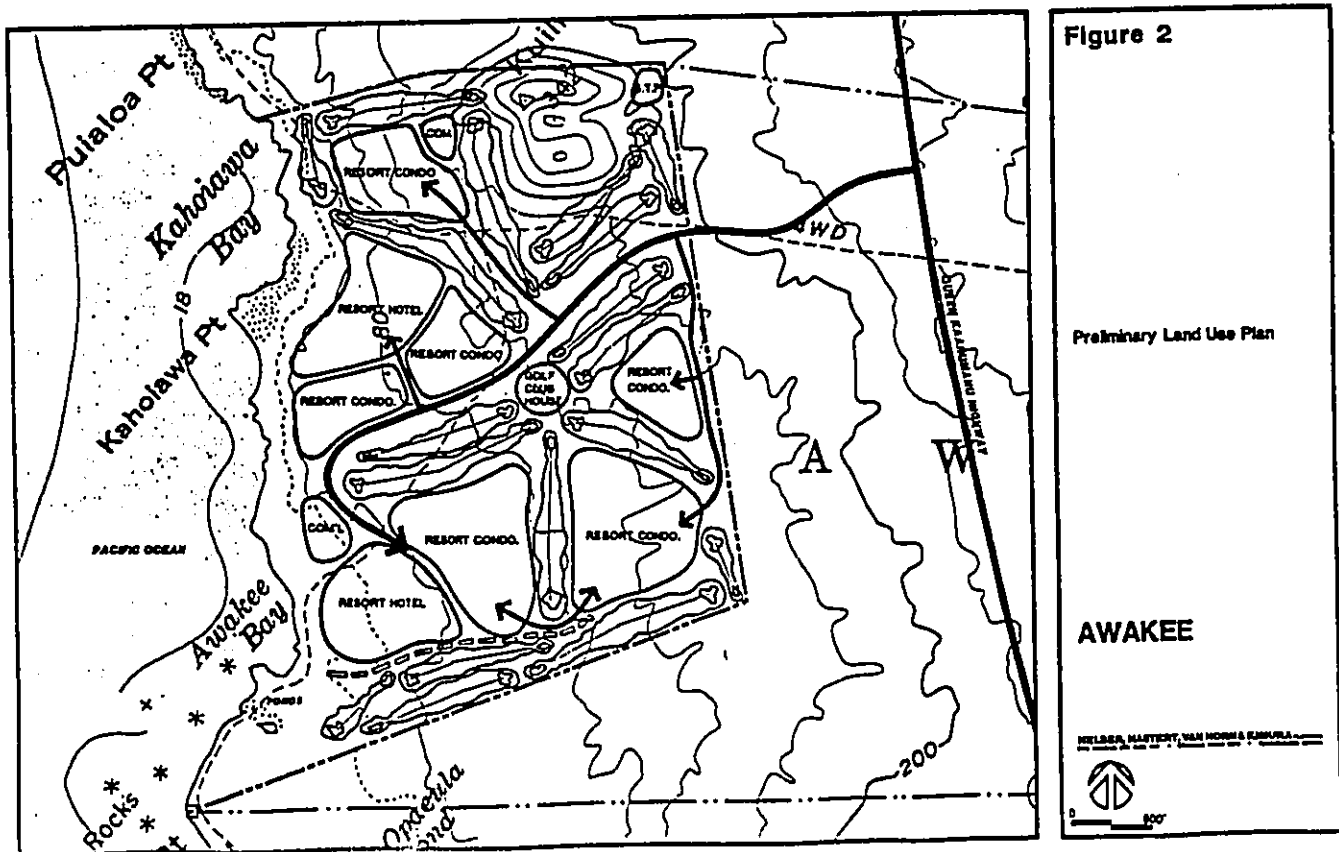
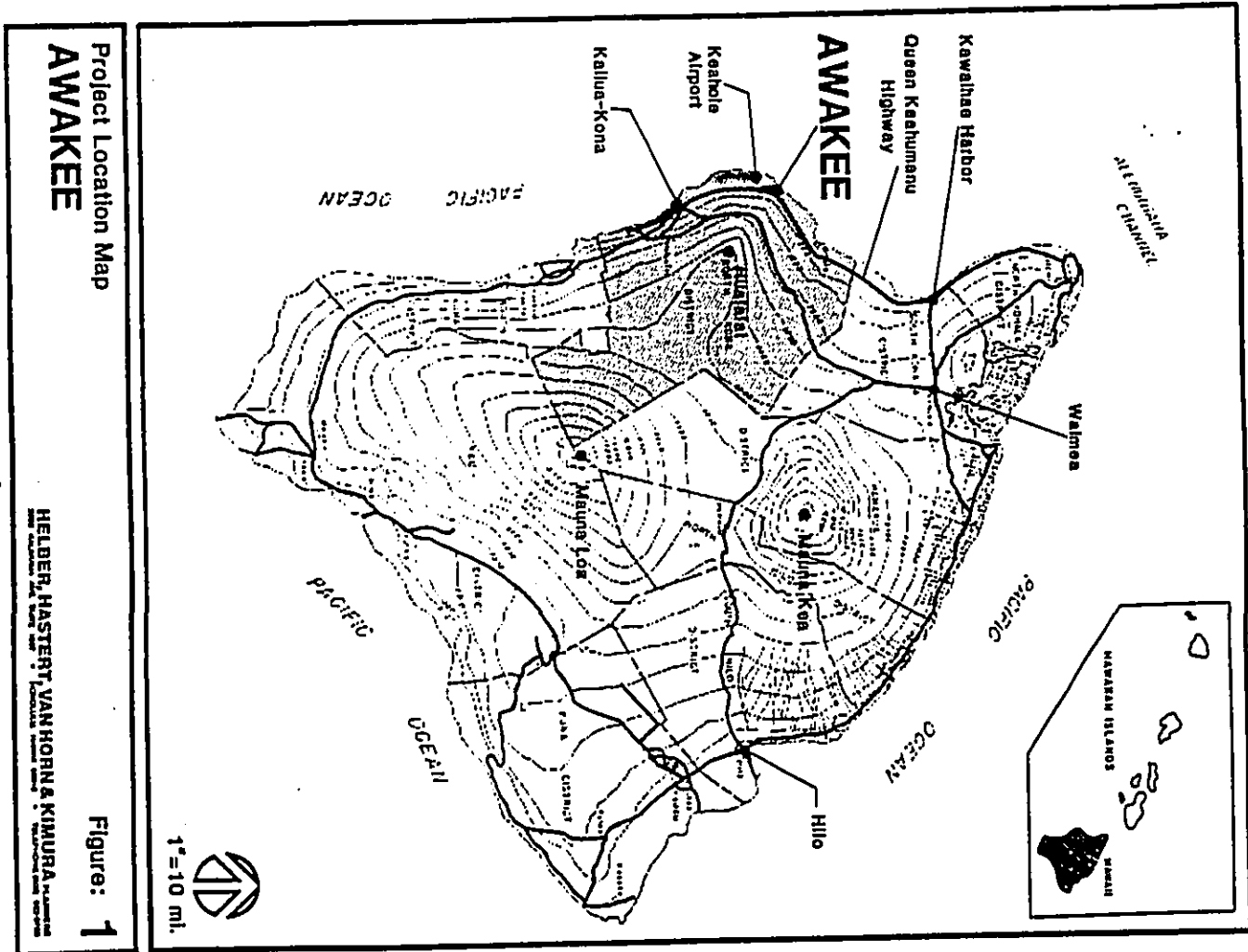


Figure 2
 Preliminary Land Use Plan
 HELBER, HASTERT, VAN HORN & KIMURA
 1000 KALANANAKU AVE., SUITE 1000, HONOLULU, HAWAII 96813
 TEL: 808/551-1000 FAX: 808/551-1001



VI. DESCRIPTION OF AFFECTED ENVIRONMENT

A. Topography

The project site and environs (Figure 3) were formed by progressive layering of prehistoric lava flows from Hualalai. The lavas are primarily pahoehoe with thicknesses ranging from 0.5-100 feet. Elevations of the property range from sea level at the coastline to approximately 200 feet mean sea level (MSL) at the northern-mauka boundary. The land slopes gently, averaging a 5-7 percent slope. The Kuli cinder cone in the northwest portion of the site reaches a height of approximately 340 feet MSL. From the peak of Kuli to the shoreline, the average slope increases to 17 percent.

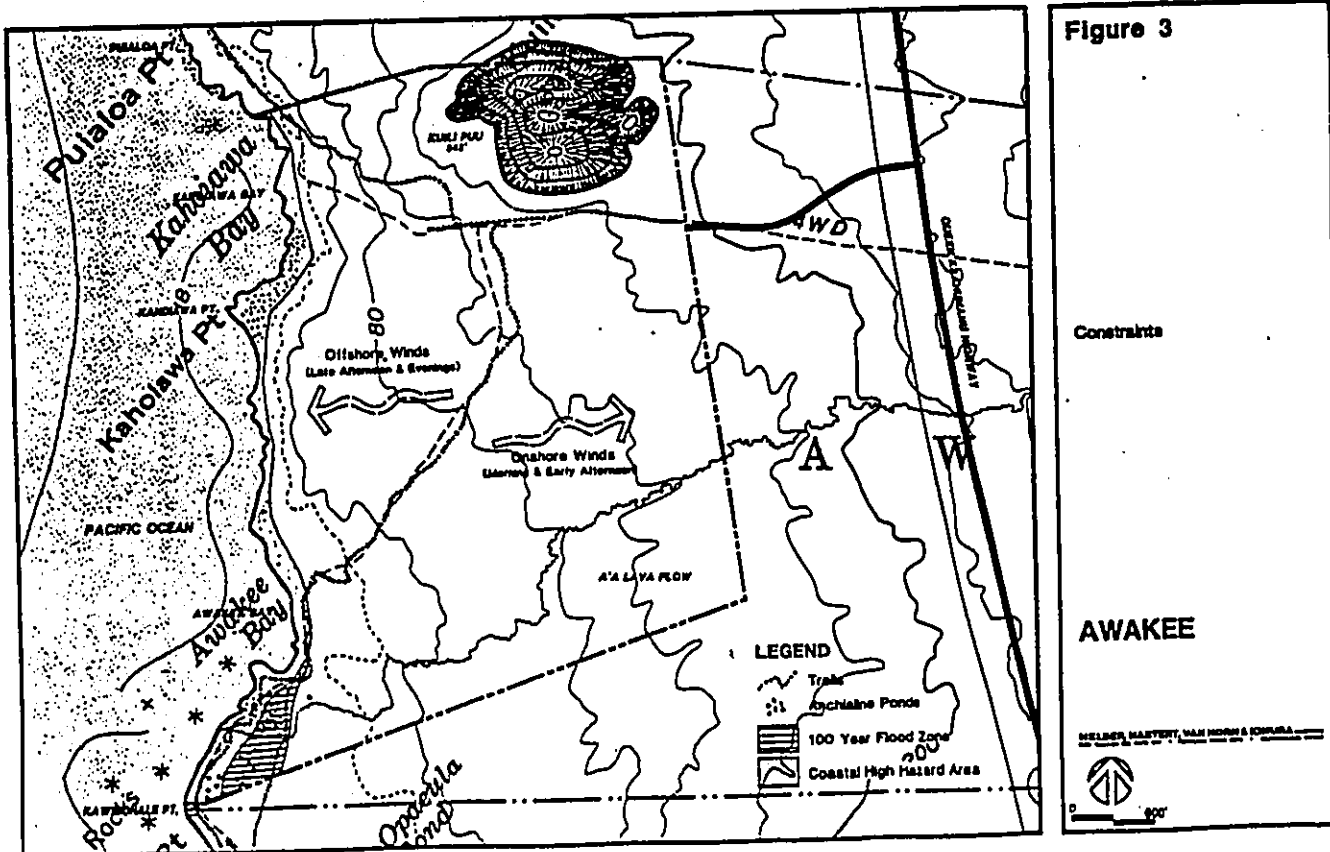
C. Phasing

Project development will be phased generally from mauka to maka. Infrastructure improvements, including site access and installation of water, sewer, and electrical systems, will be sized to accommodate facility requirements at full development.

- (a) **WATER.** It is estimated that the fully developed resort project will require approximately 0.75 mgd of potable water.
- (b) **Wastewater.** All wastewater will be treated and disposed of on site by a private sewage treatment plant, the effluent from which will be used to irrigate the golf course and other landscaped areas.
- (c) **Electrical System.** Electrical power is to be acquired from HELCO through the island-wide power grid.
- (d) **Drainage.** A drainage system will be designed and constructed in accordance with County standards.
- (e) **Transportation and Public Access.** Access to the proposed development will be via a corridor between Queen Kaahumanu Highway and the resort site, across State-owned lands. A permitted access must be reestablished with the State Department of Transportation before any construction can begin. Improvements at the Queen Kaahumanu Highway "T" intersection will consist of additional acceleration and deceleration lanes, increased road signage, grading, and paving. All interior roadways will be built to County standards.

2. Public Facilities

- (a) **Other (66 acres).** The balance of the project area will be used for public beach parking, roads, a sewage treatment plant, utility easements, and open space.



VII. SUMMARY OF MAJOR IMPACTS AND MITIGATION MEASURES

B. Flora and Fauna

The project site is characterized by a desert-like appearance with vegetation consisting primarily of sparse, dry grasses and kiawe growth. The beach zone, a narrow belt along the coast, contains a greater diversity of plant life.

Two species of endemic birds are known to exist in this coastal region: the endangered Hawaiian stilt and the Hawaiian owl. The Hawaiian stilt is known to be present in fishponds to the north and south of the project site and may overfly the area. The Hawaiian owl may feed on rodents in this area. Other common introduced birds also have been observed.

As an undeveloped area, the project site is probably a habitat for introduced mammals such as the mongoose, various species of rats, feral cats and dogs, and goats. In addition, the endangered Hawaiian hoary bat is suspected to feed on insects along the coastal areas of the site.

C. Archialine Ponds

The anchialine ponds along the Kona Coast, including the subject property, were surveyed between 1972 and 1973 by Maciolek and Brock. These ponds are commonly located in recent lava flows which have depressions deep enough to reach the water table and are made up of brackish water. Approximately 22 ponds in the southern coastal area of Awake'e have been categorized as Class B ponds. Class B ponds are sites of significant aquatic natural value, whose importance is increased because of anthropological or waterbird habitat value. More than half of the anchialine ponds in the Awake'e site are of intermediate size with a surface area of 10 to 100 square meters. The remainder are small ponds of less than 10 square meters in size.

D. Historic and Archaeological Resources

Previous archaeological studies of the leeward coast indicate that significant features, such as caves and habitations with relatively large quantities of middens, exist closer to the coastline. The archaeological knowledge of Awake'e is not extensive. The only documented survey of the subject area itself is a study by Reinecke conducted in 1930, which identified six house sites as having significance.

E. Marine Environment

The nearshore waters off the subject property are pristine with no industrial or domestic wastes affecting the area and no natural stream discharges. These waters are classified "AA" by the State Department of Health and discharges are prohibited.

The coastal areas are frequented by local fishermen, beachcombers, and persons transiting the area (via the unimproved coastal trails) to access Awake'e, Makalawena, and Kahoia Bay. Awake'e Bay has a black rock beach which has been used as a launching ramp for small boats that are towed to the beach on trailers.

A. Coastal Resources

1. **Shoreline.** Permanent structures will be constructed in a manner which complies with State and County shoreline setback regulations, minimizing the hazard of possible tsunami inundation, and provides unobstructed coastal vistas and access.

2. **Water Quality.** To minimize siltation of coastal waters, storm waters will be collected on site and allowed to percolate slowly into the water table. Treated wastewater effluent will be used for irrigation. No nutrient enrichment or bacterial contamination of the coastal waters is expected to occur from subsurface seepage of the effluent due to nutrient uptake by plants and the distance inland at which irrigation would occur. The possible effects of increased runoff, including freshwater intrusion, eutrophication, pesticide contamination, etc., will require further study as part of the EIS.

3. **Public Access.** The currently restricted access to beaches will be enhanced by the development. A new roadway will provide convenient access from Queen Kaahumanu Highway. Beach right-of-way and public parking are planned.

B. Flora and Fauna

To date, no endangered plants have been found to inhabit the site. Although the endangered Hawaiian stilt and Hawaiian owl may feed in the area, they are not believed to nest on the site. Terrestrial flora and fauna characteristics on the site will change significantly due to landscaping and irrigation, but both native and introduced species will continue to exist on the site. Disturbance of coastal vegetation will be minimized, particularly through observance of the shoreline setback.

C. Archialine Ponds

The flora and fauna of the anchialine ponds will experience some disturbance due to increased human activity in the area. Because of their potential sensitivity, the area of highest pond concentration will be managed in an attempt to preserve their unique qualities.

D. Archaeological Sites

An archaeological survey will be conducted as part of the EIS preparation. Sites that are found to be significant will be incorporated into the project design, where possible. Impacted archaeological sites will be recorded in detail and thoroughly excavated in order to remove valuable archaeological information.

E. Population and Employment

Employment opportunities will result from the construction activities, hotel services, vacation rentals, and other retail operations. Directly and indirectly, the proposed development is estimated to increase regional employment by approximately 1,470 jobs. Total regional resident population growth of approximately 2,400 persons is anticipated. The increased economic activity is expected to yield concomitant increases in State and County tax revenues through income, property, and excise taxes.

VIII. DETERMINATION OF SIGNIFICANCE

An Environmental Impact Statement (EIS) will be required because of potentially significant impacts resulting from the proposed development. This determination is based on the criteria for significance in Section 131 of the Environmental Quality Commission EIS Regulations, including the following:

- (1) The proposed action may involve an irrevocable commitment of resources;
- (2) The proposed action may involve substantial secondary impacts, such as population changes or effects on public facilities;
- (3) The proposed action is individually limited, but cumulatively may have an effect upon the environment or involve a commitment for larger actions;
- (4) The proposed action may affect a rare, threatened, or endangered species of animal or plant or their habitat; and/or
- (5) The proposed action may affect coastal water quality.

IX. AGENCIES TO BE CONSULTED IN THE PREPARATION OF THE EIS

- A. Federal Agencies
 1. U.S. Army Corps of Engineers
 2. U.S. Dept. of Agriculture, Soil Conservation Service
 3. U.S. Dept. of Interior, Fish and Wildlife Services
 4. U.S. Dept. of Transportation, Federal Aviation Administration
- B. State Agencies
 1. Dept. of Agriculture
 2. Dept. of Education
 3. Dept. of Health
 4. Dept. of Land and Natural Resources
 5. Dept. of Planning and Economic Development
 6. Dept. of Transportation, Highways and Airports Divisions

C. County Agencies

1. Mayor's Office
2. Dept. of Parks and Recreation
3. Dept. of Planning
4. Dept. of Public Works
5. Dept. of Research and Development
6. Dept. of Water Supply
7. Fire Dept.
8. Office of Housing and Community Development
9. Police Dept.

D. Public Utilities

1. Hawaii Electric Light Company
2. Hawaiian Telephone Company

E. Community Organizations

X. DESCRIPTION OF THE ASSESSMENT PROCESS

The proposed project is subject to the EIS requirements, pursuant to Chapter 343, Hawaii Revised Statutes, because of a County General Plan amendment request that has been initiated by a private applicant (Sec. 343-5(a)(6), HRS). The applicant has submitted an environmental assessment to assist the County in its evaluation of the proposed action. The environmental assessment document, titled "Awake'e General Planning and Environmental Considerations" (Helbert, Haster, Van Horn & Kimura, Planners, June 1986), should be consulted for more detailed information on the project and associated impacts.

Since the County has determined that an EIS is required, this notice to prepare an environmental impact statement is being filed with the Office of Environmental Quality Control (OEQC).

After the OEQC publishes the EIS Preparation Notice in the OEQC Bulletin, the public has 30 days to respond to the notice. The respondent should indicate the types of issues that the EIS should address and whether he or she wishes to be notified when the Draft EIS is available. The response should be sent to the EIS consultant with a copy to the County agency.

UNITED STATES
DEPARTMENT OF
AGRICULTURE

SOIL
CONSERVATION
SERVICE

P. O. BOX 50004
HONOLULU, HAWAII
96850

September 10, 1986

Mr. Richard H. Van Horn
HYVEX Planners
733 Bishop Street, Suite 2590
Honolulu, HI 96813

Dear Mr. Van Horn:

Subject: Awake's Resort Development, North Kona, Hawaii
Kahala Capital Corporation

We reviewed the subject preparation notice for an environmental impact statement and offer the following comments:

The steps to be taken to reduce erosion and sediment during grading and construction should be discussed as well as control measures to reduce wind-blown soil.

Since it will be necessary to bring in soil material for landscaping purposes, erosion control measures will also be needed to protect both stockpiled and spread material until vegetation has been established.

A source and distribution system for irrigation water should be in place before any grading, stockpiling or landscaping is started.

The GIS should also describe potential impacts on the existing anchialine pools and what measures will be taken to protect endangered species habitat.

Thank you for the opportunity to review the document....

Sincerely,

Richard M. Duncan
RICHARD M. DUNCAN
State Conservationist

16 October 1986

Mr. Richard N. Duncan
State Conservationist
Soil Conservation Service
P.O. Box 50004
Honolulu, HI 96850

Dear Mr. Duncan:

Awake's Resort, North Kona, Hawaii, T.M.K.: 7-2-04:03
Environmental Impact Statement Preparation Notice

Thank you for responding to our EIS preparation notice for the subject project by letter dated 10 September 1986.

Your comments regarding erosion control as well as the supply and distribution of irrigation water have been noted, and will be addressed in the Draft EIS.

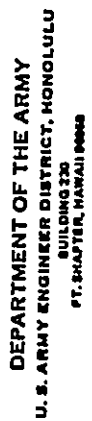
With regard to the anchialine ponds which exist on the subject property, Mr. Steve Dellar is currently preparing a study of the marine environments and the anchialine ponds. His study will discuss both the condition of the existing ponds, and the potential impacts of development on them. The Draft EIS will address these issues as well as the future management of the pond environments.

If you have any further concerns, please contact me at 545-2055.

Sincerely,

HELBERT, HASTERT, VAN HORN & KIMURA, PLANNERS

Kevin M. Young
Kevin M. Young, AIA
Project Planner



**REPLY TO
ATTENTION OF:**

RECEIVED
SEP 9 1966

SEYMOUR WEINSTEIN
 & KENNETH PLUMMER
 BELDER, HASTLER, VAN NOORD
 BOON, MY, TILLEY

Mr. Richard H. Van Horn
Helber Mastert Van Horn and Kimura
Grosvener Center
733 Bishop Street, Suite 2590
Honolulu, HI 96813

Dear Mr. Van Horn:

Thank you for the opportunity to review and comment on the EIS preparation Notice for the Awake'e Resort Development, North Kona, Hawaii. The following comments are offered:

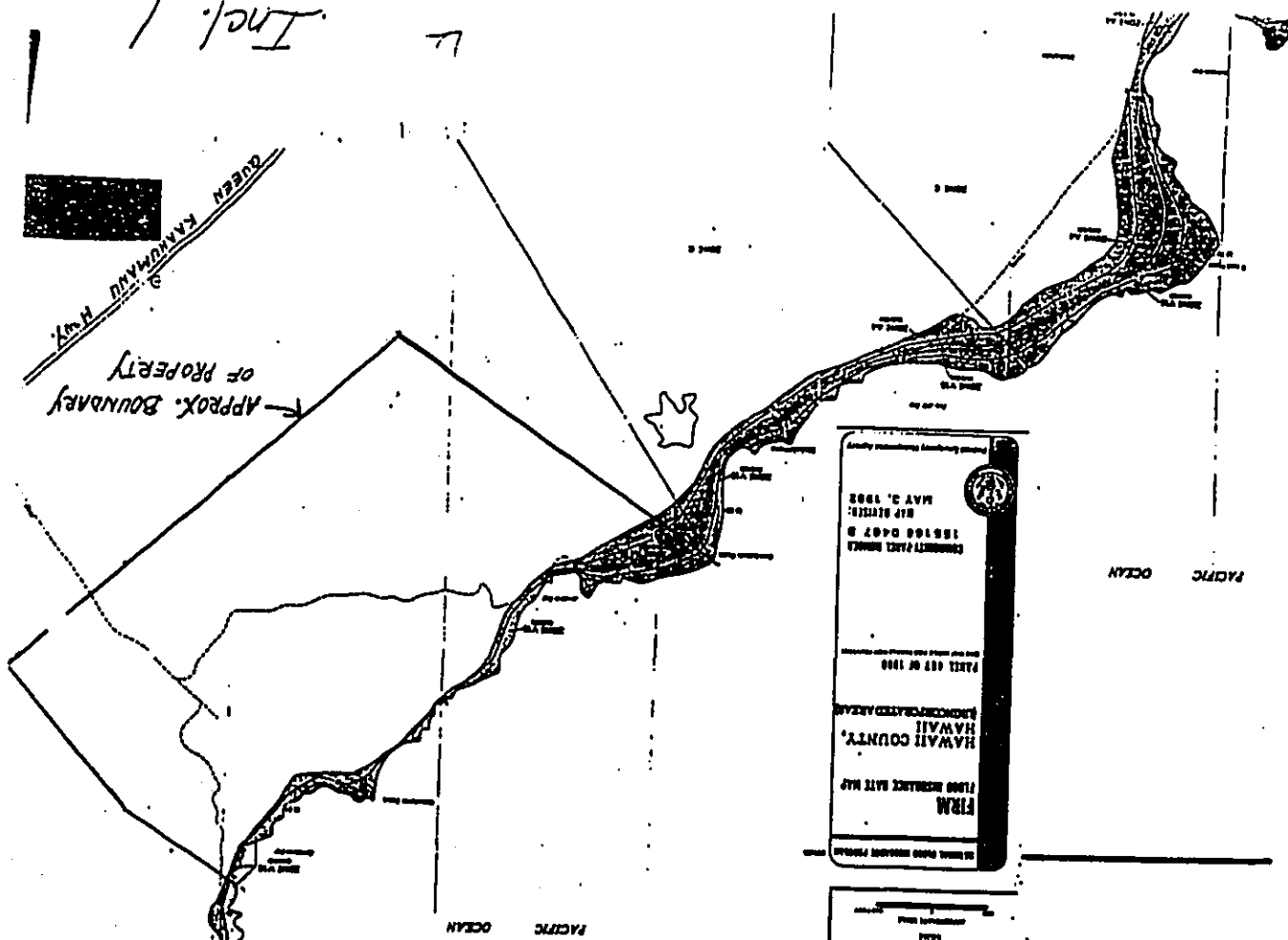
a. A Department of the Army permit will be required for any construction activity in the ocean waters or any fill in the anchialine ponds found within the project area. Further correspondence and coordination regarding the project development plans and permit requirements should be directed to our Operations Branch.

b. Most of the subject property is in Zone C, an area of minimal flooding. Along the coastal shoreline area, the projects is subject to coastal flooding from tsunami (Enclosure 1). This coastal inundation area is in Zone V15 and Zone A4 with a base flood elevation line of eight feet above mean sea level. An explanation of the zone designations is attached as Enclosure 2.

Sincerely,

John Cheung
John Cheung
Chief, Engineering Division

Enclosure



01-10



DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, HONOLULU
BUILDING 228
PT. SHAFER, HAWAII 96860

September 4, 1986

MR. VAN HORN
ATTENTION OF:

RECEIVED
SEP 8 1986
KLEIN, HUSTON, VAN HORN
& KIMURA PLANNERS

Mr. Richard H. Van Horn
Helber Haster Van Horn and Kimura
Grovenor Center
733 Bishop Street, Suite 2590
Honolulu, HI 96813

Dear Mr. Van Horn:

Thank you for the opportunity to review and comment on the EIS preparation Notice for the Wake's Resort Development, North Kona, Hawaii. The following comments are offered:

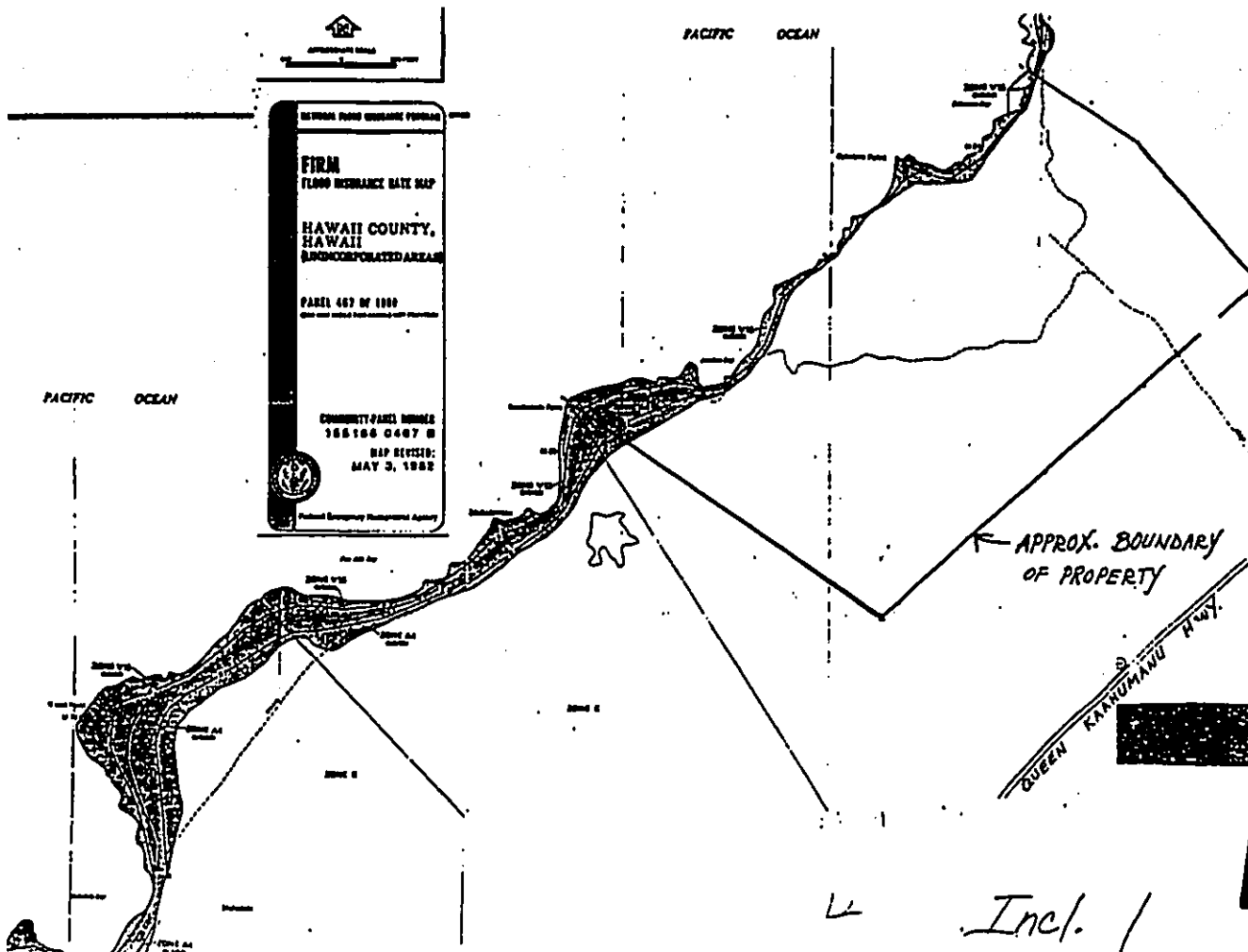
a. A Department of the Army permit will be required for any construction activity in the ocean waters or any fill in the anchialine ponds found within the project area. Further correspondence and coordination regarding the project development plans and permit requirements should be directed to our Operations Branch.

b. Most of the subject property is in Zone C, an area of minimal flooding. Along the coastal shoreline area, the projects is subject to coastal flooding from tsunami (Enclosure 1). This coastal inundation area is in Zone V15 and Zone A4 with a base flood elevation line of eight feet above mean sea level. An explanation of the zone designations is attached as Enclosure 2.

Sincerely,

Frank Chung
Frank Chung
Chief, Engineering Division

Enclosures



Incl. 1

EXPLANATION OF ZONE DESIGNATIONS

ZONE	EXPLANATION
A	Areas of 100-year flood; base flood elevations and flood hazard factors not determined.
AD	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; average depths of inundation are shown, but no flood hazard factors are determined.
AE	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; base flood elevations are shown, but no flood hazard factors are determined.
AI-A30	Areas of 100-year flood; base flood elevations and flood hazard factors determined.
A39	Areas of 100-year flood to be protected by flood protection systems under construction; base flood elevations and flood hazard factors not determined.
B	Areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood. (Medium shading)
C	Areas of minimal flooding. (No shading)
D	Areas of undetermined, but possible, flood hazards.
V	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors not determined.
VI-V30	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors determined.
a	The map scale indicates the magnitude of difference between the 100-year and 500-year flood elevations. For example, between 1-20, the difference is one half of the value; for values greater than 20, the difference is 10 less than the number shown. This information is used in establishing insurance rates.
—10—	100-year tsunami or surge elevation line, with elevation in feet above mean sea level.
—	Zone boundary line

14 October 1986
 Mr. Kisuk Cheung, Chief
 Engineering Division
 U.S. Army Engineer District, Honolulu
 Building 230
 Ft. Shafter, HI 96858

Dear Mr. Cheung:

Awake's Report, North Kona, Hawaii, T.M.K.: 7-2-0403
 Environmental Impact Statement Preparation Notice

Thank you for responding to our EIS preparation notice for the subject project by letter dated 4 September 1986.

We appreciate the information regarding tsunami inundation areas and the identification of flood zones for the subject property. The issue of natural hazard, including tsunami inundation and flooding will be addressed in the Draft EIS.

Mr. Steven Dollar is currently preparing a baseline study of the marine environments and existing anchorage ponds. Preliminary findings indicate that there are a total of eighteen ponds of varying sizes on the subject property. Mr. Dollar's study will address, in depth, the potential impacts of the proposed development on the ponds.

If you have any further concerns, please contact me at 545-2055.

Sincerely,

HELBERT, HASTERT, VAN HORN & KIMURA, PLANNERS

Kevin M. Young, ASLA
 Project Planner

U.S. Department of Housing and Urban Development
Hawaii Office, Region IX
300 Ala Moana Blvd., Room 3318, Box 50007
Honolulu, Hawaii 96850-4891

86-270

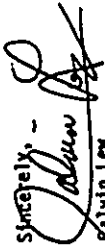
September 4, 1986
Mr. Richard H. Van Horn, Project Planner
Helber Hastert Van Horn and Kimura
Grosvenor Center, P.R.I. Tower
733 Bishop Street, Suite 2590
Honolulu, HI 96813

Dear Mr. Van Horn:
SUBJECT: Awake's Resort Development
EIS Preparation Notice

We have reviewed the EIS Preparation Notice for the subject project that will provide 750 hotel rooms; 750 resort condominiums; a golf course; and a commercial area for shopping.

We understand that approximately 1,470 jobs will be created by the project. Many of these jobs will be filled by low- and moderate-income persons. The housing needs for this group should be discussed and coordinated with Hawaii County. Coordination with Hawaii County is important due to the number of large scale resort developments proposed along the Kona Coast.

We appreciate the opportunity to comment on your project and look forward to receiving the Draft EIS.

Sincerely,

Calvin Lew
Director
Community Planning and
Development Division, 9.2C

14 October 1986

Mr. Calvin Lew, Director
Community Planning and Development
Dept. of Housing and Urban Development
Honolulu Area Office, Region IX
300 Ala Moana Blvd., Room 3318
Honolulu, HI 96850

Dear Mr. Lew:

Awake's Resort, North Kona, Hawaii, T.M.K.: 7-2-04:03
Environmental Impact Statement Preparation Notice

Thank you for responding to our EIS preparation notice for the subject project by letter dated 4 September 1986.

The Draft EIS will address the total housing impact of the proposed resort development. We will also coordinate our planning efforts with the Hawaii County Department of Housing and Community Development to ensure that their concerns are presented in the Draft EIS.

If you have any further concerns, please contact me at 545-2055.

Sincerely,

HELBERT, HASTERT, VAN HORN & KIMURA, PLANNERS

Kevin M. Young, ASLA
Project Planner



United States Department of the Interior
FISH AND WILDLIFE SERVICE

100 ALA MOANA BOULEVARD
P.O. BOX 50187
HONOLULU, HAWAII 96800

RECEIVED
ES
ROOM 6307
SEP 19 1986

Mr. Richard H. Van Horn
Helber, Hastert, Van Horn, and Kimura, Planners
Grovenor Center, PFI Tower
733 Bishop Street, Suite 2590
Honolulu, Hawaii 96813

Re: Environmental Impact Statement Preparation Notice for the
Awake'e Resort Development, North Kona, Hawaii

Dear Mr. Van Horn:

We have reviewed the referenced Preparation Notice and offer the following comments for your consideration.

The Service recommends that the Draft Environmental Impact Statement (DEIS) include the following suggestions:

a. There are a number of anchialine ponds south of Awake'e Bay that are part of the pond complex reported at Makalaweana-Awake'e (Aquatic Survey of the Kona Coast Ponds, Hawaii Island, J.A. Maciolek and R.E. Brock, 1974). The DEIS should include a map showing the location of all anchialine ponds on the property relative to the proposed development. Biological surveys of all anchialine ponds in the proposed development boundaries should be conducted and the results of these surveys should be included in the DEIS. Surveys should include water quality measurements, day and night sampling of the pond biota, a description of pond algae and substrates, mapping of vegetation types, and determination of invertebrate populations.

b. In addition to supporting populations of rare endemic crustaceans such as the 'opae ula (*Halicaridina rubra*), the anchialine ponds at Awake'e are also used by the Federally listed endangered Hawaiian Stilt (*Himantopus mexicanus knudseni*). The ponds would need to be surveyed on a quarterly basis to determine their current use by the Hawaiian Stilt. We recommend that these surveys be coordinated with our office and the State Department of Land and Natural Resources.

c. We recommend that an anchialine pond management plan be developed through consultation with the Service and the State Department of Land and Natural Resources to insure the long-term protection and maintenance of these ponds.

d. Current surveys of the nearshore marine habitats and fishery resources should be included in the DEIS. These surveys should include the distribution of corals, fishes, macro-invertebrates, and threatened and endangered species such as the humpback whale, green sea turtle, and the hawksbill turtle.

e. We recommend that the DEIS discuss the primary, secondary, and cumulative impacts of the proposed resort development upon these resources. Specifically, the Service believes that impacts to endangered waterbird habitat (e.g. reduced use of the anchialine ponds because of increased human disturbance), to anchialine ponds from modified groundwater conditions and filling, and to nearshore fishery resources from increased access and runoff from resort development should be discussed.

The Service considers the anchialine pond habitats at Awake'e and Makalaweana as Resource Category 1 (Federal Register Vol. 46, No. 15, January 23, 1981). Under this category, the habitat to be impacted is of high value for the evaluation species (anchialine animals like the 'opae ula) and is unique and irreplaceable on both a national basis and an ecoregion basis. The mitigation goal for this category is no loss of existing habitat value. Under the Service's Wetland Protection Policy, we will recommend that no anchialine ponds be filled or modified.

We appreciate this opportunity to comment. My staff and I would be happy to meet with you to discuss our concerns and recommendations.

Sincerely,

Ernest Kosaka
Ernest Kosaka
Project Leader
Office of Environmental Services

cc: NMFS - WPPO
EPA, San Francisco
DLNR
DOPAW
DAR
DEPD, Land Use Division (Attn: Joan Yim)
CE, Operations Branch
County of Hawaii, Planning Department
RD, Portland, OR



Save Energy and You Serve America!



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
215 Fremont Street
San Francisco, Ca. 94105

16 October 1986

Mr. Ernest Kouksa
Project Leader
Office of Environmental Services
U.S. Department of the Interior
Fish and Wildlife Service
300 Ala Moana Boulevard
P.O. Box 50167
Honolulu, HI 96850

Dear Mr. Kouksa:

Awake's Resort, North Kona, Hawaii, T.M.K.: 7-2-04:03
Environmental Impact Statement Preparation Notice

Thank you for responding to our EIS preparation notice for the subject project by letter dated 19 September 1986.

Mr. Steve Dollar is currently preparing a baseline study of the marine environments and anchorage ponds. Preliminary investigations have shown that there are eighteen ponds within the Awake's site. Mr. Dollar's report will provide maps showing the location and distribution of the ponds. It will also include an in-depth discussion of the water quality, biota, algae and substrates, vegetation, and invertebrate populations associated with the ponds.

The study, which will be incorporated into the Draft EIS, will discuss the future management and protection of the pond environments.

As stated earlier, Mr. Dollar's study will also deal with the nearshore marine environment adjacent to the Awake's site, and the potential impacts the planned development may have on it.

If you have any further concerns, please contact me at 545-2055.

Sincerely,

HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS

Kevin M. Young
Kevin M. Young, AIA
Project Planner

24 SEP 1986

Richard H. Van Dorn
Project Planner
Helber, Hastert, Van Horn,
and Kimura
Grosvenor Center, PRI Tower
733 Bishop Street
Suite 2590
Honolulu, Hawaii 96813

Dear Mr. Van Dorn:

Per our telephone conversation on September 19, 1986, please send me a copy of the Draft Environmental Impact Statement and subsequent documents for the proposed Awake's Resort Development at the above address.

Thank you for your assistance.

Sincerely,

Nancy Dubbs

Nancy Dubbs
Life Scientist
Federal Activities Branch

RECEIVED

SEP 26 1986

HELBER, HASTERT, VAN HORN &
KIMURA PLANNERS

GEORGE R. ANIYOSHI
GOVERNOR



JACK K. SUMA
CHAIRPERSON, BOARD OF AGRICULTURE
SUZANNE D. PETERSON
DEPUTY TO THE CHAIRPERSON

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 So. King Street
Honolulu, Hawaii 96814-2112
September 5, 1986

Mailing Address:
P.O. Box 22159
Honolulu, Hawaii 96822-0159

Mr. Richard H. Van Horn
September 5, 1986
Page -2-

area in a comprehensive fashion, it is essential that consideration be given to existing plans and programs for the development of water source and distribution facilities.

Sincerely,

Jack K. Suma
JACK K. SUMA
Chairman, Board of Agriculture

cc: Mr. A. Lono Lyman
OEQC

RECEIVED
SEP 10 1986

HELEN HASTERT, VAN HORN
& KIMURA PLANNERS

Mr. Richard H. Van Horn, Project Planner
Helen, Hastert, Van Horn & Kimura, Planners
733 Bishop Street, Suite 2590
Honolulu, Hawaii 96813

Subject: Environmental Impact Statement (EIS) Preparation
Notice for Avake's Resort, North Kona, Hawaii
THK: 7-2-04: 3; 349.05 acres

Dear Mr. Van Horn:

The Department of Agriculture has reviewed the subject EIS Preparation Notice and has the following comments to offer.

According to the subject document, the applicant is seeking a General Plan Amendment for the subject parcel in order to develop a proposed resort community.

The parcel has Land Study Bureau Overall Productivity Ratings of E254, E284, E319 and E324. By this method of classification, the parcel has poor productivity potential for most agricultural uses.

This parcel is not classified according to the Agricultural Lands of Importance to the State of Hawaii (ALISH) system.

The Soil Conservation Service Soil Survey identifies the soils as rock land (R0) and A'a lava (RLV). Their soil capability classifications are VIIa and VIIIs, respectively (soils with limited agricultural potential due to stoniness or other textural problems).

The Draft EIS should describe in detail the source of the potable water supply and any adverse impacts on the agricultural activities in the area. To develop the required water resources for the subject project and other projects in the North Kona

14 October 1986

Mr. Jack K. Suwa
Chairman
Board of Agriculture
State of Hawaii
P.O. 22159
Honolulu, HI 96822

Dear Mr. Suwa:

Awake'e Resort, North Kona, Hawaii, T.M.K.: 7-2-04:03
Environmental Impact Statement Preparation Notice

Thank you for responding to our EIS preparation notice for the subject project by letter dated 5 September 1986.

The information which you provided us regarding agricultural productivity, and soil types will be incorporated into the Draft EIS.

Our engineering consultants are currently investigating the most viable means of water supply for the proposed project. In addition, they will be addressing the probable impacts of that supply system on the surrounding area.

If you have any further concerns, please contact me at 545-2055.

Sincerely,

HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS

Kevin M. Young, ASLA
Project Planner

GEORGE A. ANTONSON
Commissioner



STATE OF HAWAII
DEPARTMENT OF EDUCATION

P. O. BOX 200
HONOLULU, HAWAII 96810

OFFICE OF THE SUPERINTENDENT

September 2, 1986

RECEIVED
SEP 4 1986

HELBER, HASTERT, VAN HORN
& KINURA PLANNERS

Mr. Richard H. Van Horn
Project Planner
HRT/HAK
Grosvenor Center, PRT Tower
733 Bishop Street, Suite 2590
Honolulu, Hawaii 96813

Dear Mr. Van Horn:

SUBJECT: Awake's Resort Development
North Kona, Hawaii
TMK: 7-2-04:03

XI-17

Our review of your proposed development indicates that the project will have negligible enrollment impact on the following schools:

Kealahou Elementary - (K-5)
Kealahou Intermediate - (6-8)
Kona High School - (9-12)

Thank you for the opportunity to review the project.

Should you have any questions, please call Mr. Richard Inouye at 737-4743.

Sincerely,

Francis M. Hatanaka
Francis M. Hatanaka
Superintendent

FMI:j1

cc: OHS
K. Asato, Hawaii Dist.

AN AFFIRMATIVE ACTION AND EQUAL OPPORTUNITY EMPLOYER

14 October 1986

Mr. Francis M. Hatanaka
Superintendent
State of Hawaii
Department of Education
P.O. Box 2360
Honolulu, HI 96804

Dear Mr. Hatanaka:

Awake's Resort, North Kona, Hawaii, T.M.K.: 7-2-04:03
Environmental Impact Statement Preparation Notice

Thank you for responding to our EIS preparation notice for the subject project by letter dated 2 September 1986.

The information contained in your letter regarding school enrollments will be included in the Draft EIS.

If you have any further concerns, please contact me at 545-2035.

Sincerely,

HELBER, HASTERT, VAN HORN & KINURA, PLANNERS

Kevin M. Young, ASLA
Project Planner



STATE OF HAWAII
DEPARTMENT OF HEALTH

P. O. BOX 1373
HONOLULU, HAWAII 96813

LESLIE S. MATTHEWS
DIRECTOR OF HEALTH

IN REPLY, PLEASE REFER TO
EPM-80

RECEIVED
SEP 5 1986

RECEIVED
SEP 5 1986

Mr. Richard H. Van Horn
Heiber, Hestert, Van Horn & Kimura
733 Bishop St., Suite 2590
Honolulu, Hawaii 96813

Dear Mr. Van Horn:

Subject: EIS Preparation Notice for Awake's Resort Development, North Kona,
Hawaii, TMK 7-2-04: 03

Thank you for allowing us to review and comment on the subject EIS preparation notice. We provide the following comments:

Air Pollution

The impact on ambient air quality needs discussion.

Wastewater Disposal

The domestic wastewater should be routed to the regional sewerage system as soon as it becomes available.

Drinking Water

Due to the size, scope and location of this project, water availability is a critical issue which should be addressed in the Draft EIS. Water need is estimated at 0.75 mgd of potable water, but how needs are to be met are not identified. Recently, there have been several other large resort projects proposed for the North Kona area. These projects will also compete for the available undeveloped water resources in this region. The possible sources and transmission facilities to supply the Awake's Resort should be identified and discussed in the Draft EIS. Should the developer intend to develop new sources, approval must be sought from the Department of Health.

The Department of Health is vested with the responsibility to ensure that public water systems in the State are providing water which is in compliance with the State's drinking water regulations known as Chapter 20, Title 11, Administrative Rules, and are in compliance with all other applicable terms and conditions of Chapter 20. A public water system is defined as a system serving 25 or more individuals at least 60 days per year or having a minimum number of 15 service connections. In the event that the new well is intended to serve these minimum numbers of persons or service connections, please be advised that the well and distribution system will be subject to the terms of Section 11-20-29 and Section 11-20-30 of Chapter 20 respectively.

Mr. Richard A. Van Horn
September 5, 1986
Page 2

Briefly, Section 11-20-29 of Chapter 20 requires all new sources of potable water serving public water systems to be approved by the Director of Health prior to their use to serve potable water. Such approval is based primarily upon the satisfactory submission of an engineering report which adequately addresses all concerns as set down in Section 11-20-29. The engineering report must be prepared by a registered professional engineer and bear his or her seal upon submittal.

Section 11-20-30 requires that new or substantially modified distribution systems for public water systems be approved by the Director of Health. Such approval depends upon the submission of plans and specifications for the project prior to construction and the demonstration that the new or modified portions of the system are capable of delivering potable water in compliance to all maximum contaminant levels as set down in Chapter 20 once the distribution system or modification is completed.

In the event that the proposed well is solely intended to serve irrigation or other non-domestic purposes, or if the proposed well will not serve the minimum number to qualify as a public water system as defined earlier, then the new well and distribution system are not subject to Chapter 20 requirements. However, if at some point in the future, the decision is made to use the water for potable purposes, or if the system expands to meet the minimum service population or number of service connections, the source and distribution system will be subject to Section 11-20-29 and Section 11-20-30 respectively prior to their use to serve the new public water system.

Should you have any questions regarding Chapter 20, Title 11, Administrative Rules, please contact the Drinking Water Program at 548-2235.

Sincerely yours,

James K. Ikeda
JAMES K. IKEDA
Deputy Director for
Environmental Health

KSi:ao

cc: Mr. Albert Lono Lyman

14 October 1986

Mr. James Ikeda, Deputy Director for Environmental Health
Department of Health
P.O. Box 3378
Honolulu, Hawaii 96801

Dear Mr. Ikeda:

Awake's Resort, North Kona, Hawaii, T.M.K.: 7-2-04-03
Environmental Impact Statement Preparation Notice

Thank you for responding to our EIS preparation notice for the subject project by letter dated 5 September 1986.

The Draft EIS will address in greater detail the concerns raised in your letter. Those issues include the following: (1) impacts of the project on ambient air quality, (2) disposal of domestic wastewater, and (3) sources for the supply of domestic water.

Our engineering consultants are currently looking at options for the most viable means of providing water for the Awake's Resort. Their analyses and findings will be included in the Draft EIS.

If you have any further concerns, please contact me at 545-2055.

Sincerely,

HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS

Kevin M. Young, ASLA
Project Planner

GEORGE B. ARYONG
Assistant to Director



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
P. O. BOX 521
HONOLULU, HAWAII 96809

RECEIVED
OCT 10 1986
HELBER, HASTERT, VAN HORN
& KIMURA PLANNERS

DOCUMENT NO.: 650

OCT 8 1986

Helber, Hastert, Van Horn & Kimura, Planners
733 Bishop St., Suite 2590
Honolulu, HI. 96813

Attn: R.A. Van Horn

Gentlemen:

SUBJECT: Comments on the EISP for the Awake's Resort
Development, N. Kona, Hawaii; THK: 7-2-04-03

Thank you for the opportunity to participate as a consulting party with regard to the proposed Awake's Resort development. After review of the EISP, we suggest the following concerns should be addressed in the EIS.

The proposed resort development will include two hotels, resort condominiums, a golf course, two commercial complexes, public beach areas, and open space. The project site is next to the proposed Bishop Estate Makalavena Resort.

It lies within the Resource and General Subzone of the Conservation District. The hotels are proposed to be located within the Resource Subzone. The objective of the Resource Subzone is to develop, with proper management, areas to ensure sustained use of the natural resources of those areas. Hotels are usually held to be inconsistent with the objective of the Resource Subzone.

ACCESS

Public access is a major concern. A more detailed discussion on shoreline access is requested. This should address the potential impacts of development on ancient trails as well as any modification to existing and customary patterns of public access to, and uses of the shoreline for fishing and other recreational uses. Lateral public access should be provided along the entire shoreline fronting the subject land.

AQUATIC RESOURCES CONCERNS

We suggest the EIS describe thoroughly the activities planned, aquatic resources on the project site(s) and in adjacent coastal waters, existing levels of public use of these resources, and anticipated effects of the project on the resources and uses. The means which would be used to prevent, reduce, or mitigate effects which are likely to be adverse to resources and users should be detailed also.

In Aquatic Survey of the Kona Coast Ponds, Hawaii Island, Macirolek and Brock describe numerous anchialine ponds with surface areas from less than 10 square meters to more than 100 square meters located on or near the project site. A major concern is the cumulative deterioration of Hawaii's unique anchialine ponds by human activities. The EIS should discuss impacts on the pond habitat and mitigation measures to ensure the survival of the native aquatic species inhabiting these ponds.

More specifically, the EIS should address the following:

1. the potential impacts of development on ancient trails as well as any modification to existing and customary patterns of public access to, and uses of the shoreline for fishing and other recreational uses;
2. effects on the coastal brackish water lens if ground water is withdrawn for irrigation of the proposed golf course, landscaping and other residential development;
3. effects of sewage disposal and wastewater treatment on coastal resources, e.g. from dissolved nutrients and solid residues and;
4. contamination of coastal waters and resources from land fills, soil erosion, urban contaminants, landscaping and agriculture chemicals, construction materials, petroleum products, etc.

HISTORIC SITES CONCERNS

In order to evaluate impacts of this proposed development on significant historic sites and to develop plans to reduce adverse impacts, it is vital that:

1. all historic sites be inventoried, with sufficient information gathered to evaluate their significance;
2. the significance of all sites be evaluated in consultation with the Historic Sites Section and the County Planning Department and;
3. acceptable mitigation plans be developed to try to reduce any adverse impacts to significant sites;

As the applicant notes (p. 7), only one archaeological survey has been done in Awakee--in 1930, long before modern archaeological survey began. Thus, it is highly likely other historic sites are present. The applicant notes (p. 8) that an archaeological survey is currently being done. We urge that the applicant be sure that this survey gathers enough information to identify all the sites and evaluate their significance, so items 2 and 3 above can be adequately addressed in the EIS. We encourage the applicant to consult with our office before the EIS is prepared, so they can be sure step 1 is taken care of, so significance can be reviewed and officially fixed, and so preservation review process and make it more efficient.

WILDLIFE CONCERNS

The project site is adjacent to the proposed Bishop Estate Makalawena Resort. Figure 2 shows there is to be no land use planned up to the Makalawena boundary. This area should be left undeveloped as a buffer around the fenced Opaenua Pond Wildlife Sanctuary. Consideration should be given to protection of the anchialine ponds as habitat for resident endangered waterbirds, migratory water fowl and shorebirds.

WATER AND LAND DEVELOPMENT

The EIS should indicate the source of potable water for the project. If the developer intends to drill new wells or modify existing wells, a permit from the Department of Land and Natural Resources will be required. We note the intention irrigation--a practice we fully support.

R. H. Van Horn

-4-

DOC. NO.: 650

Control of erosion and sediment during project construction should be addressed in the EIS. Measures to prevent degradation of near shore and anchialine pond water should also be identified.

Thank you for the opportunity to review and comment during the preparation phase of the EIS.

Very truly yours,

S. Uno
Susumu Uno, Chairperson
Board of Land and Natural Resources

cc: Planning Department
County of Hawaii



DEPARTMENT OF PLANNING
AND ECONOMIC DEVELOPMENT

Ref. No. P-4067

September 5, 1986

HAWAIIAN ISLANDS, 200 SOUTH KING ST., HONOLULU, HAWAII
HAWAIIAN ISLANDS, 200 SOUTH KING ST., HONOLULU, HAWAII

GEORGE S. ANDERSON
KENT M. BISHOP
MURRAY E. SCHWARTZ
ROGER A. UICHELLETTE

DIRECTOR
DEPUTY DIRECTOR
ASSISTANT DIRECTOR
PLANNING
RESEARCH AND ECONOMIC ANALYSIS
ADMINISTRATIVE SERVICES
INFORMATION OFFICE

RECEIVED

SEP 9 1986

Mr. Richard H. Van Horn
Project Planner
Heiber, Mastert, Van Horn and Kimura,
Planners

Grosvener Center, P.O. Tower
733 Bishop Street, Suite 2590
Honolulu, Hawaii 96813

Dear Mr. Van Horn:

SUBJECT: EIS Preparation Notice, Awaiki'e Resort Project, North Kona,
Hawaii

We have reviewed the subject EIS preparation notice and have the following comments to offer.

1. Regarding recreational resources, the Draft EIS should further describe existing recreational uses along the bays and shoreline areas, and the proposal's effects on these recreational uses. The number and location of public shoreline accessways and associated facilities should be provided in as much detail as possible.
2. Effects on scenic and open space resources should be described, especially makai views from the coastal highway.
3. The Draft EIS should describe the nature and extent of development surrounding the anchialine pond cluster, including an assessment of the ponds' water quality and ecosystem, groundwater flows, and potential contaminants.
4. State Land Use District boundaries and County land use designations should be elaborated and mapped.
5. The Draft EIS should address the current uses of the adjacent lands and indicate the spatial and functional relationship of this resort project to others planned in the North Kona/South Kohala region.

Mr. Richard H. Van Horn
Page 2
September 5, 1986

6. The Draft EIS should address how the proposed development will meet the appropriate objectives, policies and priority guidelines of the Hawaii State Plan, and the policies and implementing actions of the applicable Functional Plans. Appropriate objectives and policies of the Hawaii Coastal Zone Management Program should also be addressed.

Thank you for the opportunity to provide these comments.

Very truly yours,

Murray S. Towell
Kent M. Keith

cc: Hon. Albert Lono Lyman,
Planning Director,
County of Hawaii
Office of Environmental Quality Control

14 October 1986

Mr. Kent Keith, Director
Department of Planning and Economic Development
P.O. Box 2359
Honolulu, Hawaii 96804

Dear Mr. Keith:

Awake's Resort, North Kona, Hawaii, T.M.K.: 7-2-04:03
Environmental Impact Statement Preparation Notice

Thank you for responding to our EIS preparation notice for the subject project by letter dated 5 September 1986.

The Draft EIS will address in greater detail the concerns raised in your letter. Those issues include the following: (1) existing and future recreational uses along the site's shoreline and bays, (2) public shoreline access, (3) effects on scenic and open space resources, (4) the nature and extent of anchialine ponds and potential impacts on them, and (5) the relationship to surrounding and nearby land uses.

With regard to those concerns, Mr. Steven Dollar is currently preparing a baseline study of the site's marine environments and existing anchialine ponds. Mr. Dollar's study will address, in depth, the potential impacts of the proposed development on the ponds.

In addition, one section of the Draft EIS will be devoted to the relationship between the project and policies and objectives established by the State and County. A list of permits and approvals required for the development, as well as a proposed time frame for development will be included.

If you have any further concerns, please contact me at 545-2055.

Sincerely,

HELDER, HASTERT, VAN HORN & KIMURA, PLANNERS

Kevin M. Young, ASLA
Project Planner

GEORGE A. ARTCHES
GOVERNOR



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
100 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

WAYNE J. YAMASAKI
DIRECTOR

DEPUTY DIRECTORS
JONATHAN K. SHIMADA, JR.
WALTER T. MO
CHERYL D. BOON
ADAM D. WICKERT

W. HEAVY METAL CO.

STP 8.1623

Mr. Richard H. Van Horn
Page 2

STP 8.1623

The developer should provide for public access to the shoreline.

Should you have any questions, please contact Dan Tanaka of our Statewide Transportation Planning Office at 548-6526.

Very truly yours,

Wayne J. Yamasaki
Wayne J. Yamasaki
Director of Transportation

RECEIVED
OCT 16 1986

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OCT 16 1986
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OCT 16 1986

Mr. Richard H. Van Horn, Project Planner
HHVH and K
Grosvonor Center, P.O. Tower
733 Bishop Street, Suite 2590
Honolulu, Hawaii 96813

Dear Mr. Van Horn:

EISPN - Awake's Resort Development
North Kona, Hawaii

Thank you for this opportunity to provide written comments on the subject development.

Currently, there is no access point from this development to Queen Kaahumanu Highway. The State Department of Land and Natural Resources (DLNR) officially moved the access point from Awake's (Sta 475+00) to Maniniowai (Sta 504+00). Therefore, DLNR approval must first be obtained for access through State land before any design work to finalize the resort development is initiated. Once the access point has been determined, a traffic Impact Analysis Report (TIAR) must be conducted and submitted to the State Highways Division for review. The TIAR should also include a discussion on mitigation measures. All required intersection improvements such as street lighting, deceleration, acceleration, and left-turn storage lanes meeting current design standards shall be constructed by the developer. In addition, any utility lines crossing the highway shall be placed underground.

All plans for work within the State Highway right-of-way must be reviewed and approved by the State Highways Division.

CC WCA 4-12-86



PLANNING DEPARTMENT

25 ALUPUNI STREET • HILO, HAWAII 96720
PHONE 961-0308

DANTE K. CARPENTER
Mayor

ALBERT LONO LYMAN
Deputy Mayor

ILUMA A. PILANAI
Deputy Director

September 10, 1986

COUNTY OF
HAWAII

Mr. Richard H. Van Horn
Helber, Hastert, Van Horn
and Kimura
Grosvener Center, P.O. Box 2590
733 Bishop Street, Suite 2590
Honolulu, HI 96813

Dear Mr. Van Horn:

Comments - EIS Preparation Notice for Awake'e

For your information and appropriate action, enclosed is a copy of the comments to the EIS Preparation Notice - Awake'e Resort Development from the County Department of Public Works.

Please be informed that according to that agency the word "inspection" should be read as "impact."

Sincerely,

a. d. lyman

ALBERT LONO LYMAN
Planning Director

AK:ds
Enc.

Patricia G. Engelhard
Director

Ronald Okamura
Deputy Director



DEPARTMENT OF PARKS & RECREATION
COUNTY OF HAWAII

RECEIVED
JUG 28 1986

HELBER, HASTERT, VAN HORN
& KIMURA PLANNERS

August 26, 1986

Mr. Richard H. Van Horn, Project Planner
Helber, Hastert, Van Horn & Kimura
733 Bishop Street, Suite 2590
Honolulu, HI 96813

Subject: EIS Preparation Notice for Awake'e Resort Development
North Kona, Hawaii
TRK: 7-2-04:03

Dear Mr. Van Horn:

The following comments/concerns are offered for your review:

1. Trails -- Will the existing trail (dotted line, figure 3) be retained? Will the trail (dashed line, figure 3) parallel the shoreline be retained?
2. Public Access -- We would appreciate the opportunity to review proposed accesses to and along the shoreline and public parking facilities as details are developed.
Will vehicular access along the shoreline be prohibited? If so, will other provisions be made to accommodate small boat launchings at Awake'e Bay?
3. Anchialine Ponds -- We would appreciate the opportunity to review the pond management plan.

Thank you for the opportunity to review the EIS Preparation Notice, and we look forward to review of the EIS.

Sincerely,

Patricia Engelhard

Patricia Engelhard
Director

PE:GHA:l

cc: Planning Department

• 25 ALUPUNI STREET • HILO, HAWAII 96720 • TELEPHONE 961-0311

DEPARTMENT OF PUBLIC WORKS
COUNTY OF HAWAII
HONOOLULU, HAWAII

DATE September 3, 1986

Memorandum

TO : Planning Department

FROM : Chief Engineer

SUBJECT: AWAKE'S RESORT DEVELOPMENT

The EISP for the subject development needs to address Solid Waste by estimating the daily volume and its ~~impact~~ ^{impact} on County transfer station facilities.

[Signature]
HUGH Y. ONO
Chief Engineer
DENICSO

cc: Wastewater & Solid Waste Div.

XI-25

16 October 1986

Mr. Hugh Y. Ono
Chief Engineer
Department of Public Works
County of Hawaii
25 Aupuni Street
Hilo, HI 96720

Dear Mr. Ono:

Awake's Resort, North Kona, Hawaii, T.M.K.: 7-2-04:03
Environmental Impact Statement Preparation Notice

Thank you for responding to our EIS preparation notice for the subject project by memo dated 3 September 1986.

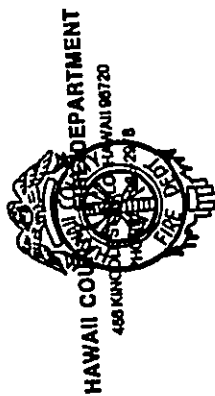
The Draft EIS will discuss issues relating to solid waste for the subject development and its potential impact on County transfer station facilities.

If you have any further concerns, please contact me at 545-2035.

Sincerely,

HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS

[Signature]
Kevin M. Young, AELA
Project Planner



DAVID K. CARPENTER
Mayor

FRANCIS E. SMITH
Fire Chief

HAWAII COUNTY FIRE DEPARTMENT
466 KINOOLE STREET
HILO, HAWAII 96720

August 25, 1986

RECEIVED
JUG 28 1986

HELBER, HASTERT, VAN HORN
& KIMURA PLANNERS

Mr. Richard H. Van Horn, Project Planner
Helber, Hastert, Van Horn & Kimura
Grosvenor Center
PRI Tower
733 Bishop Street, Suite 2590
Honolulu, Hawaii 96813

Dear Mr. Van Horn:

Subject: Awake'e Resort Development
North Kona, Hawaii
TMK: 7-2-04:03

No objections to proposed development plans for Awake'e Resort. Developer shall provide adequate water supply and distribution system as required by AIA formulas and relative County Water Department regulations.

Automatic fire sprinkler systems are recommended for all commercial and residential structures because of expected delayed response from present 24-hour fire stations.

Very truly yours,

Francis E. Smith
FRANCIS E. SMITH
FIRE CHIEF

PES/mo

14 October 1986

Mr. Francis E. Smith, Fire Chief
Hawaii County Fire Department
466 Kinooole Street
Hilo, Hawaii 96720

Dear Chief Smith:

Awake'e Resort, North Kona, Hawaii, T.M.K.: 7-2-04:03
Environmental Impact Statement Preparation Notice

Thank you for responding to our EIS preparation notice for the subject project by letter dated 25 August 1986.

The Draft EIS will address the issue of water supply for the proposed development.

If you have any further concerns, please contact me at 545-2055.

Sincerely,

HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS

Kevin M. Young, ASLA
Project Planner

SEP 18 1986

RECEIVED

SEP 18 1986

PLANNING DEPARTMENT

28 ALUPA STREET • HILO, HAWAII 96720
(808) 961-8388

HEIDER, HASTERT, VAN HORN
& KIMURA
ALBERT LONG LYMAN
Division
ILIMA A. PRANATA
Deputy Director

September 5, 1986



COUNTY OF
HAWAII

Mr. Richard H. Van Horn
Heiber, Hastert, Van Horn
and Kimura
Grosvonor Center, PRI Tower
733 Bishop Street, Suite 2590
Honolulu, HI 96813

Dear Mr. Van Horn:

Comments - EIS Preparation Notice for Awake's

Enclosed is a copy of the comments to the EIS Preparation
Notice - Awake's Resort Development from the County Office of
Housing and Community Development for your information and
appropriate action.

Sincerely,

A. Long
ALBERT LONG LYMAN
Planning Director

AK:aeb
enclosure

A. SCOTT LEITHEAD
Administrator



COUNTY OF HAWAII
OFFICE OF HOUSING AND COMMUNITY DEVELOPMENT

50 WAILUKU DRIVE • HILO, HAWAII 96720
PHONE: (808) 961-8378

RECEIVED
SEP 1986

HEIDER, HASTERT, VAN HORN
& KIMURA PLANNERS

August 28, 1986

Mr. Richard H. Van Horn
Project Planner
HHVH & K
Grosvonor Center
PRI Tower
733 Bishop Street, #2590
Honolulu, HI 96813

SUBJECT: Awake's Resort Development, North Kona, Hawaii
TWK: 7-2-04:03

Thank you for your letter of August 21, 1986, regarding the deadline for
the 30 day review period on the Environmental Impact Report preparation
notice and the enclosed copy of the Notice for Awake's Resort Development.

This letter is to advise you that we will be making our formal comments
through the County of Hawaii Planning Department prior to the
September 8, 1986, deadline.

If you have any questions, or require any further information please
contact William Moore of this office at 961-8379.

Again thank you for your consideration in this matter.

A. Scott Leithead
Administrator



DANTE K. CARPENTER
Mayor



COUNTY OF HAWAII
OFFICE OF HOUSING AND COMMUNITY DEVELOPMENT
50 WAILUKU DRIVE • HILO, HAWAII 96720
PHONE: (808) 961-4379

A. SCOTT LEITHHEAD
ADMINISTRATOR

August 28, 1986

MEMORANDUM

TO: Al Lono Lyman
Planning Director

FROM: A. Scott Leithhead
Administrator

SUBJECT: Awake'e Resort Development, North Kona, Hawaii
THK: 7-2-04:03

This memorandum is in response to a letter received from Richard Van Horn of Helber, Hastert, Van Horn and Kimura advising us that the deadline for 30-day review period is September 8, 1986. We will be taking this opportunity to comment on the proposed development and enumerate issues we would like to see addressed in the Draft EIS.

We understand that the proposed Awake'e Resort Development project site encompasses 349.05 acres of the Awake'e ahupua'a, North Kona. Further, we understand that the proposed development will include resort hotels with a total of 750 units, 750 resort condominiums units, an 18-hole golf course, and 5 acres of resort commercial development as well as over 60 acres of roads, open spaces, utilities and services.

There are several issues relating to employment and housing that should be addressed in the Draft EIS. These issues are primarily related to the cumulative impacts of the Awake'e development along with the other permitted and proposed developments along the S. Kohala/M. Kona Coastline.

In particular, we would like to see discussion and analysis concerning the impact of rapid, slow, limited or full scale resort development on the ability of Awake'e to draw employees or for those employees to find adequate housing and community amenities. This analysis should include both construction and operational employment and housing impacts. The County needs to evaluate the individual projects on this coastline as a part of the development of the region. Only in this way can these impacts be effectively assessed.



Memo to A. Lyman
August 28, 1986
Page 2

Further, this analysis is necessary to allow the County to evaluate saturation levels and depletion points for housing (market and low income; rental and for-sale) as well as for the overall residents, in-migration figures, projected resort destination region economics and demographics, and alternative growth rate scenarios need to be presented in order to adequately assess the proposed development's overall impacts on the Kona/Kohala community and the County as a whole.

We are especially concerned that there will be a significant impact to the residents and in-migrating workers looking for affordable housing during construction as well as at completion of these proposed projects.

Again, we thank you for this opportunity to make our concerns regarding this development known.

ASL:jlc/mab

September 20, 1986

Mr. Albert Lono Lyman, Director
Planning Department
County of Hawaii
25 Aupuni Street
Hilo, HI 96720

Dear Mr. Lyman:

Comments - Office of Housing and Community Development
Draft Environmental Impact Statement- Awake's Resort

Thank you for your letter dated September 3, 1986 transmitting comments to the EIS Preparation Notice for Awake's Resort from the County Office of Housing and Community Development.

In those comments, Mr. A. Scott Leithend, the administrator, highlighted several issues related to employment and housing which he asked be addressed in the EIS. As part of our work on the Draft EIS, we retained Peat, Marwick, Mitchell and Co. (PMMC) to prepare an economic and fiscal impact statement for the project. Among the issues which their study addressed were the expected impacts of the resort development on employment and housing over both the short-term (construction) and long-term (operation). This study is summarized in the Draft EIS which we will be submitting to your department shortly, and the entire statement is appended to the EIS. We feel that it adequately addresses the issues of housing and employment as they relate to the Awake's Resort development.

In his comments to your department, Mr. Leithend requested that the EIS address the issue of cumulative impacts of the many proposed developments along the Kona coast and their combined implications on the ability of the Awake's Resort to draw employees and for those employees to find adequate housing. While we are aware that many new resort projects are being proposed at this point in time, we have no control over, or real ability to predict which of these projects will be approved or constructed. It is also very speculative as to what the development time-frame of each development may be, as it is difficult to project fluctuations in future tourism and resort markets and demands. In addition, a comprehensive assessment of cumulative effects would require an assessment of employment increases or decreases in other island of Hawaii industries such as agriculture and aquaculture.

Attached is a response to those concerns, also prepared by our economic consultant, PMMC. We will be including this letter in our Draft EIS, as well. In making this assessment, PMMC has assumed a maximum resort development scenario. It is our feeling, that in general, the ability to assess the cumulative

impacts of the many proposed developments in North Kona and South Kohala districts lies with the County. However, it is our hope that the information and analysis provided by PMMC will aid the County in their efforts.

Again, we thank you for responding to our EIS preparation notice. If you have any further concerns, please feel free to contact either myself or Kevin Young.

Sincerely,


Richard H. Van Horn, AICP, AIA
Vice-President

RHVH:kmy
Encl.



Peat, Marwick, Mitchell & Co.
Financial Plaza Of The Pacific
P.O. Box 4120
Honolulu, Hawaii 96813
808-531-7226

November 17, 1986

Mr. Richard H. Van Horn
Heiber, Hastert, Van Horn and Kimura
Suite 2590
733 Bishop Street
Honolulu, Hawaii 96813

Dear Mr. Van Horn:

As you requested, we are responding to the Memorandum dated August 28, 1986, from Mr. A. Scott Leithead, Administrator, Office of Housing and Community Development, to Mr. Albert Lono Lyman, Planning Director, County of Hawaii. The Memorandum addresses concerns about the cumulative effects of the proposed South Kohala and North Kohala resort developments on island of Hawaii population and housing.

BACKGROUND

Peat, Marwick, Mitchell & Co. (Peat Marwick) prepared an economic and fiscal impact statement for proposed resort developments at Aiea'e, North Kona, Hawaii. This statement has been included in your draft environmental impact statement (DEIS) for submission to the County of Hawaii in support of the request for a change in the County's land use classifications for the property.

APPROACH

As it is not certain as to how many of the proposed proposed resort developments will be approved by the County and eventually developed, projected impacts have been made only for the proposed resort development at Aiea'e only. A comprehensive assessment on cumulative effects would require not only knowledge of which resort developments would be approved, and also an assessment of employment increases or decreases in other island of Hawaii industries such as agriculture and aquaculture.

Thus, in order to assess potential cumulative impacts, broad assumptions as to total resort development have been made. As a "maximum" impact scenario, we have assumed that all proposed and permitted resort projects will be developed and achieve full operating levels. This scenario would most likely require a minimum of 0 to 30 years to achieve.

Mr. Richard H. Van Horn
November 17, 1986
2

PROJECTED MAXIMUM RESORT FACILITY DEVELOPMENT

In assessing the maximum resort facility development on the island of Hawaii, the resort accommodation inventory was primarily based on the tabulation provided in the Hawaii Visitor Bureau. Visitor Plant Inventory, February 1986. Adjustments to this inventory were based on discussions with resort developers and other economic and fiscal impact statements. The resultant tabulation indicates that if all proposed and permitted resort projects on the island of Hawaii are developed, about 14,500 hotel units and 16,800 resort condominium units would be added, as shown in Exhibit A.

MAXIMUM PROJECTED OPERATIONAL EMPLOYMENT IMPACT

Direct operational employment at the resorts would be created by the development and operation of the hotel units, condominium units, and commercial and recreational amenities. The hotel units are assumed to create 1.1 full-time equivalent jobs per unit. This multiplier includes both on-resort and off-resort direct operational jobs. Resort condominiums are assumed to create 0.2 full-time equivalent jobs per unit. Because information regarding what commercial and recreational facilities would be included in the planned resorts is not available, of these facilities were based on the mix of facilities proposed at other island of Hawaii resort development proposals. Thus, commercial facilities are assumed to create 0.25 full-time equivalent jobs for each hotel job created. Resort administration, which includes categories such as accounting, sales, property development, and maintenance of golf course and infrastructure is assumed to create 0.6 full-time equivalent jobs for each hotel job created.

Based on the above assumptions, direct on- and off-site operational employment for full development of all proposed and permitted resort projects on the island of Hawaii is projected to be about 24,000 full-time equivalent positions, as shown in Exhibit B. About 90% of direct employment, or about 22,000 full-time equivalent positions could be expected to be captured on the island of Hawaii, as shown in Exhibit 8.

Indirect and induced jobs are assumed to be created at a ratio of 0.9 for each hotel and resort employee and 0.6 for each commercial sector employee. Assuming that 30% of indirect and induced employment occurs on the island of Hawaii, about 6,000 indirect and induced operational full-time equivalent jobs could be attributed to full development of proposed and permitted resorts, as also shown in the exhibit. Total on-island direct, indirect, and induced operational employment would amount to about 28,000 full-time equivalent positions.

Mr. Richard H. Van Horn
November 17, 1986
3

ADDITIONAL HOUSING REQUIREMENTS

This section discusses additional housing requirements generated by resort construction and operational employees on the island of Hawaii.

Construction Employees

In the economic and fiscal impact statement prepared for the Awa'e'e Resort, about 115 short-term rental units were projected to be required to house construction employees. In view of the large numbers of resort hotel and condominium units planned for the island of Hawaii and the housing allowances paid to construction workers, the short-term rental market was concluded to be able to accommodate construction workers' needs even if several projects were constructed during the same period.

Operational Employees

Operational employment, due to its permanent nature, would create long-term housing requirements on the island. The approximately 28,000 on-island direct, indirect and induced operational jobs would be filled from the following sources:

- unemployed and underemployed on the island of Hawaii
- persons moving from other jobs on the island
- labor market entrants due to increasing rates of labor force participation and natural population increases
- in-migrants

It is estimated that 50% of the underemployed and unemployed would find jobs in the newly created resort positions. The remainder of the resort operational employment would be filled by persons changing jobs on the island, the increase in the labor force through natural population growth and increased labor force participation, and in-migrants. Persons changing jobs would create vacancies which would have to be filled by in-migrants or by labor market entrants. Both of these categories would require additional housing. Thus, all on-island direct, indirect and induced operational employees, with the exception of most of labor market entrants due to increasing rates of labor force participation unemployed, those who are underemployed would require housing.

Mr. Richard H. Van Horn
November 17, 1986
4

The number of unemployed on the island of Hawaii based on a monthly average from January through to July 1986 was 4,571. 50% of the unemployed would meet the operational employment requirement generated by full development of proposed resorts, approximately 25,700 employees would require housing, as shown in the table below. This estimate is most likely high as some underemployed and labor market entrants would not require housing.

Of the employees requiring housing, about 11% are assumed to be managerial employees who would require one housing unit per employee, and the remaining nonmanagerial employees are assumed to require one housing unit per 1.5 employees as some would share housing. Whereby these assumptions, the net housing requirement is estimated to be about 18,000 units, as also shown in the table below.

Projected Maximum Housing Unit Requirement
Attributable to Development of all
Proposed and Permitted Resorts

Island of Hawaii

On-island direct, indirect and induced resort employment	28,000
Unemployed on island of Hawaii	4,600
Less 50% of unemployed	2,300
Subtotal	25,700
Managerial employees @ 11%	2,800
Housing required at one managerial employee per unit	2,800
Nonmanagerial employees	22,900
Housing required at 1.5 nonmanagerial employees per unit	15,300
Total, rounded	18,000

(1) Monthly average, January-July 1986, First Hawaiian Bank, "Economic Indicators," September/October 1986/

* * * * *



Mr. Richard H. Van Horn
November 17, 1986
5

We appreciate the opportunity to respond to the comments of Mr. Leithead. We hope that this letter will aid in the land use planning process which is underway on the island of Hawaii. Please contact me or Dr. Ann Bouslog if we can provide any further information.

Very truly yours,

PEAT, MARWICK, MITCHELL & CO.

Malcolm J. Tom
Malcolm J. Tom, Partner

MJT:egj
Enc.

Exhibit B

Projected Direct, Indirect and Induced Operational
Employment Attributable to Development of all
Proposed and Permitted Resorts

	Total	On-Island (1)
Direct Operational Employment:		
Hotel (2)	16,000	14,400
Condominium (3)	3,400	3,100
Commercial (4)	4,000	3,600
Resort Administration (5)	1,000	900
Subtotal, rounded	24,000	22,000
Indirect and Induced Employment Hotel and Resort (6)	18,400	5,500
Commercial (7)	2,400	700
Subtotal, rounded	21,000	6,000
Total	45,000	28,000

(1) 90% of direct and 40% of indirect and induced operational employment assumed to occur on-island.

(2) Based on 1.1 direct employees per hotel room.

(3) Based on 0.2 direct employees per condominium unit.

(4) Based on 0.25 employees per hotel employee.

(5) Based on 0.06 employee per hotel employee.

(6) Based on 0.9 indirect and induced employee per hotel and resort employees.

(7) Based on 0.6 indirect and induced employee per commercial employee.

Exhibit A

Planned Hotel and Resort Projects

Island of Hawaii

Name of Facility/Resort	Hotel Units	Condominium Units	Expected date of completion
South Kohala			
Hyatt Regency Waikoloa	1,244	120	1989
Shores at Waikoloa		2,000	1988
Other Waikoloa	1,200	450	Indefinite
South Kohala Resort	350		1991-1996
Mauna Lani-Ritz Carlton	400		1991
Other Mauna Lani	600	1,600	Indefinite
Bluffs at Hapuna		150	1991
Mauna Kea Beach Resort		26	
Subtotal	3,794	4,346	
North Kona			
Awake'e	600	150	1993
Other Awake'e		750	Indefinite
Kaupulehu	600	600	Indefinite
Kukio Beach	1,000	1,000	Indefinite
Makalawena	1,000	1,000	Indefinite
Kapalapa		65	Indefinite
Maie Kihau		28	1987
Villas at Keauhou		72	1988
Other Keauhou	1,700	1,068	Indefinite
Kohalaiki Resort	700	800	Indefinite
Donna II	600	600	
Subtotal	6,200	6,133	
North Kohala			
Kahua		242	Indefinite
Kahua Makai		878	Indefinite
Kohala Makai		440	Indefinite
Mahukona Resort	1,500	3,200	Indefinite
Subtotal	1,500	4,760	
Ka'u			
Hawaiian Palace Resort	1,075		Indefinite
Pohue Bay	1,200	300	Indefinite
Seamountain	805	1,300	Indefinite
Subtotal	3,080	1,600	
	14,574	16,839	

SOURCE: (1) Hawaii Visitors Bureau, "Resort Plant Inventory", February 1985



PLANNING DEPARTMENT

25 ALUPLING STREET • HILO, HAWAII 96720
PHONE 961-2288

COUNTY OF
HAWAII



POLICE DEPARTMENT

COUNTY OF HAWAII
349 KAPICLANI STREET
HILO, HAWAII 96720



GUY A. PAUL
CHIEF OF POLICE
WAYNE B. CANTALANO
DEPUTY CHIEF

OUR REFERENCE

YOUR REFERENCE

September 8, 1986

RECEIVED
SEP 11 1986

September 8, 1986

REIDER, RICHARD, VAN HORN
& KIMURA PLANNERS

Mr. Richard H. Van Horn
Project Planner
Reider, Haster, Van Horn and Kimura
Grosvonor Center, P.O. Box 2590
733 Bishop Street, Suite 2590
Honolulu, HI 96813

Dear Mr. Van Horn:

Preparation Notice - Awake's
Tax Map Key 7-2-04:03

We thank you for giving us the opportunity to comment on the official preparation notice for the Awake's Resort Development. However, please be informed that we do not have any comments at this time.

Sincerely,

A. Lono
ALBERT LONO LYMAN
Planning Director

AK:wk

cc: Mayor's Office

RECEIVED
SEP 11 1986

REIDER, RICHARD, VAN HORN
& KIMURA PLANNERS

Mr. Richard H. Van Horn
Project Planner
HRVH&K Planners
Grosvonor Center
733 Bishop Street, Suite 2590
Honolulu, Hawaii 96813

SUBJECT: AWAKE'S RESORT DEVELOPMENT
NORTH KONA, HAWAII
THK: 7-2-04:03

We have reviewed the ZISP for the Awake's Resort Development and foresee no adverse effect from the requested land use.

Guy A. Paul
GUY A. PAUL
CHIEF OF POLICE

cc: Kona Police

HAWAII ELECTRIC LIGHT COMPANY, INC. - PO BOX 1027 - HILO, HI 96721-1027

CUST
H-W/G



October 9, 1986

RECEIVED
OCT 10 1986
HELBER, HASTERT, VAN HORN
& KIMURA PLANNERS

Helber, Hastert, Van Horn & Kimura, Planners
Grosvenor Center, P81 Tower
733 Bishop Street, Suite 2550
Honolulu, Hawaii 96813

Attention: Mr. Richard H. Van Horn
Gentlemen:

Subject: Awake's Resort Development

This is our response to the existing conditions and the proposed development as related to the above project.

A. Existing Conditions:

There is no transmission or distribution lines available in the immediate area of the proposed development. The nearest 69KV transmission line is approximately one mile above Queen Kaahumanu Highway and the project.

B. Proposed Development:

1. The estimated power demand based on the information provided is 4,376 KVA.
2. A 5,000 KVA 69-12KV substation transformer is required to serve the proposed development.
3. A 120' X 120' minimum lot near the development must be deeded over to HELCO above Queen Kaahumanu Highway. A contribution to the construction of a distribution system is required from the developer. The substation cost is estimated at \$635,000 minimum in 1986 dollars.
4. The 69KV overhead transmission line off-site costs and 12KV underground distribution line on-site costs are not included. These costs will be given after electrical plans are submitted and a request is opened with the Engineering Department. The electrical plans should include service equipment locations, demand KVA loads and service voltages.

A Hawaiian Electric Industries Company

14 October 1986

Mr. Guy A. Paul, Chief of Police
Hawaii County Police Department
349 Kapiolani Street
Hilo, Hawaii 96720

Dear Chief Paul:

Awake's Resort, North Kona, Hawaii, T.M.K.: 7-2-04:03
Environmental Impact Statement Preparation Notice

Thank you for responding to our EIS preparation notice for the subject project by letter dated 8 September 1986.

If you have any further concerns, please contact me at 545-2055.

Sincerely,

HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS

Kevin M. Young, ASLA
Project Planner

Helber, Haster, Van Horn & Kimura
October 9, 1986
Page 2

If there are any questions on this, please contact Melvin Yamaki at 969-0323.

Very truly yours,

Clyde H. Nagata
Clyde H. Nagata
Sr. Electrical Engineer
Planning Division

CHM:MSY:ts

cc: M. Yamaki

14 October 1986

Mr. Clyde H. Nagata
Sr. Electrical Engineer
Planning Division
Hawaii Electric Light Company, Inc.
P.O. Box 1027
Hilo, HI 96721

Dear Mr. Nagata:

Awake's Resort, North Kona, Hawaii, T.M.K.: 7-2-04:03
Environmental Impact Statement Preparation Notice

Thank you for responding to our EIS preparation notice for the subject project by letter dated 9 October 1986.

The information which you provided us regarding existing conditions, and the estimated power requirements for the proposed development will be incorporated into the Draft EIS. Should the development program change, we will be back in touch with you.

If you have any further concerns, please contact me at 545-2055.

Sincerely,

HELBER, HASTER, VAN HORN & KIMURA, PLANNERS

Kevin M. Young, ASLA
Project Planner

CHAPTER XII



CHAPTER XII

REFERENCES

- Char and Associates. October 1986. Botanical Survey - Awake'e Resort Development.
- Char and Associates. October 1986. Faunal Survey for the Proposed Resort Complex at Awake'e, North Kona, Island of Hawai'i.
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- _____. November 1983. Draft Kona Regional Plan Revisions. Hilo.
- _____. September 1971. General Plan County of Hawaii. Hilo.
- _____. July 1982. Kona Regional Plan (Draft). Hilo
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- Phillips, Brandt, Reddick & Associates (Hawaii) Inc. May 1986 Kukio Beach Resort Final Environmental Impact Statement. Honolulu.
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- U.S. Department of Agriculture, Soil Conservation Service. 1973. Soil Survey of Island of Hawaii. State of Hawaii. U.S. Government Printing Office, Washington D.C.
- Wilson, Okamoto and Associates. October 1986. Preliminary Engineering Report for the Proposed Awake'e Resort Development.

CHAPTER XIII



CHAPTER XIII

CONSULTED PARTIES AND THOSE WHO PARTICIPATED IN THE PREPARATION OF THE FEIS

The agencies, organizations, and individuals listed below were sent copies of the DEIS with a request for their comments on the project. This list was developed from the Office of Environmental Quality Control's distribution list, and supplemented where necessary to cover all those believed to have an interest in the project or who requested consulted party status. Written comments and responses to those comments are reproduced in the following pages.

"*" indicates agencies or individuals who responded in writing to the DEIS.

"!" indicates agencies or individuals who sent substantive written comments requiring written response.

Federal Agencies

- * Army-DAFE (Facilities Eng.-USASCH)
- * Community Planning and Development Division- Dept. of Housing and Urban Development
- * National Park Service
- * Navy
- * Soil Conservation Service
- * U.S. Army Corps of Engineers
- * U.S. Coast Guard
- * U.S. Environmental Protection Agency
- * U.S. Fish and Wildlife Service
- * U.S. Geological Survey

State Agencies

- * Office of Environmental Quality Control
- * Dept. of Agriculture
- * Dept. of Defense
- * Dept. of Education
- *! Dept. of Health
- *! Dept. of Land and Natural Resources
- *! Dept. of Planning and Economic Development
- DPED - Library
- Dept. of Social Services and Housing
- *! Dept. of Transportation
- * Hawaii Housing Authority
- Office of Hawaiian Affairs
- State Archives
- * State Land Use Commission
- * State Public Works Engineer-D.A.G.S.

University of Hawaii

- *! Environmental Center
- *! Water Resources Research Center

News Media

Honolulu Star-Bulletin
Honolulu Advertiser
Hawaii Tribune Herald
West Hawaii Today-Kona

County of Hawaii

- Honorable Russell S. Kokubun, County Council
- * Dept. of Parks and Recreation
- *! Dept. of Public Works
- Dept. of Research and Development
- * Dept. of Water Supply
- Office of Housing and Community Development
- *! Planning Department
- University of Hawaii- Hilo Campus Library

Non-Governmental Agencies

American Lung Association
The Hawaiian Electric Company- Planning Division
The Kamehameha Schools/B. P. Estate

Libraries

U.H. Hamilton Library, Hawaiian Collection
Legislative Reference Bureau
State Main Library
Kaimuki Regional Library
Kaneohe Regional Library
Pearl City Regional Library
Hilo Regional Library
Wailuku Regional Library
Lihue Regional Library
Holualoa Library
Kailua-Kona Library
Thelma Parker Memorial Library/Waimea Area Library

Individuals/Community Organizations

- * Mr. Roy Crytser

U.S. Department of Housing and Urban Development
Honolulu Office, Region 10
300 Ala Moana Bldg., Room 3318, Box 50007
Honolulu, Hawaii 96850-4991

86-364

RECEIVED
JAN 8 1987

HELBERT, HASTERT, VAN HORN
& KIMURA PLANNERS

December 18, 1986

Mr. Albert L. Lyman
Director
Planning Department
County of Hawaii
25 Aupuni Street
Hilo, HI 96720

Dear Mr. Lyman:

SUBJECT: Draft Environmental Impact Statement
Awake'e Resort North Kona, Hawaii

We have reviewed the draft EIS for the proposed action that will provide 750 hotel rooms, 750 resort condominiums, a golf course and a commercial area for shopping. The concerns we raised in the EIS Preparation Notice appear to be resolved by the close cooperation that will be maintained between the developer and County and State officials to ensure that employee housing needs are met.

We have no further concerns at this time and look forward to receiving a copy of the final EIS.

Sincerely,

Calvin Lew
for Calvin Lew
Director
Community Planning and
Development Division, 9.2C

NATIONAL PARK SERVICE



LETITIA R. UTTERAGE
Director
TELEPHONE NO.
544-8815

STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
465 South King Street, Room 115
HONOLULU, HAWAII 96813

December 5, 1986

Dear Reviewer:

Attached for your review is an Environmental Impact Statement (EIS) that was prepared pursuant to Chapter 343, Hawaii Revised Statutes and Chapter 11-200, Administrative Rules, EIS Rules:

TITLE: Awake'e Resort

LOCATION: North Kona, Hawaii

CLASSIFICATION: Applicant Action

Your comments or acknowledgments of no comments on the EIS are welcomed. Please submit your reply to the accepting authority or approving agency:

Mr. Albert L. Lyman, Director

County of Hawaii Planning Department

25 Aupuni Street

Hilo, HI 96720

RECEIVED

Please send a copy of your reply to the proposing party:

DEC 8 1986

Mr. Kevin M. Young, Project Planner

Helber, Hastert, Van Horn & Kimura, Planners

PACIFIC AREA OFFICE

Grosvenor Center, PRL Tower

733 Bishop St., Suite 2590

Honolulu, HI 96813

Your comments must be received or postmarked by: January 7, 1987.

If you have no further use for this EIS, please return it to the Office of Environmental Quality Control.

Thank you for your participation in the EIS process.



DEPARTMENT OF THE NAVY
COMMANDEER
NAVAL BASE PEARL HARBOR
BOX 110
PEARL HARBOR, HAWAII 96822-0110

RECEIVED
DEC 15 1986

Mr. Albert L. Lyman, Director
County of Hawaii Planning Department
25 Aupuni Street
Hilo, HI 96720

Dear Mr. Lyman:

DRAFT ENVIRONMENTAL IMPACT STATEMENT
AWAKE'E RESORT

The Draft EIS for Awake'e Resort has been reviewed and we have no comments. Since we have no further use for the EIS, it is being returned to the Office of Environmental Quality Control.

Thank you for the opportunity to review the Draft EIS.

Sincerely,

T. C. CRAVE
Captain, CEC, U.S. Navy
Facilities Engineer
By direction of the Commander

Enclosure

Copy to:
Mr. Kevin M. Young, Project Planner
Helber, Hastert, Van Horn & Kimura, Planners
Grosvenor Center, PBI Tower
733 Bishop St., Suite 2590
Honolulu, HI 96813

Office of Environmental Quality Control

cc: K. Young

UNITED STATES
DEPARTMENT OF
AGRICULTURE
SOIL
CONSERVATION
SERVICE
P. O. BOX 50004
HONOLULU, HAWAII
96850

January 6, 1987

RECEIVED
JAN 8 1987

Mr. Albert L. Lyman
Director, Planning Department
County of Hawaii
25 Aupuni Street
Hilo, Hawaii 96720

Dear Mr. Lyman:

Subject: Draft EIS - Awake'e Resort, North Kona, Hawaii

We have reviewed the subject draft environmental impact statement and have no comments to make.

Thank you for the opportunity to review the document.

Sincerely,

RICHARD M. DUNCAN
State Conservationist

cc:

✓ Mr. Kevin M. Young, Project Planner
Helber, Hastert, Van Horn & Kimura, Planners
Grosvenor Center, PBI Tower
733 Bishop St., Suite 2590
Honolulu, HI 96813



DEPARTMENT OF THE ARMY
U. S. ARMY ENGINEER DISTRICT, HONOLULU
BUILDING 230
FT. SHAFTER, HAWAII 96829

REPLY TO
ATTENTION OF:
FODED-PV

December 22, 1986

RECEIVED
JAN 8 1987
HEIDER, HASTERT, VAN HORN
& KIMURA PLANNERS

Mr. Albert L. Lyman, Director
Planning Department
County of Hawaii
25 Aupuni Street
Hilo, Hawaii 96720

Dear Mr. Lyman:

Thank you for the opportunity to review and comment on the EIS for Awake'e Resort, North Kona, Hawaii. We have no further comments to offer.

Sincerely,

Kisuk Cheung
Chief, Engineering Division



United States Department of the Interior

FISH AND WILDLIFE SERVICE

100 ALA MOANA BOULEVARD
P.O. BOX 50157
HONOLULU, HAWAII 96850

RECEIVED
JAN 3 1987
HEIDER, HASTERT, VAN HORN
& KIMURA PLANNERS

07 JAN 1987

Mr. Albert L. Lyman, Director
County of Hawaii Planning Department
25 Aupuni Street
Hilo, Hawaii 96720

Re: Draft Environmental Impact Statement Preparation Notice for the Awake'e Resort Development, North Kona, Hawaii

Dear Mr. Lyman:

The Service has reviewed the draft environmental impact statement (DEIS) for the proposed Awake'e Resort, North Kona, Hawaii. The specific issues and comments raised in our letter of September 19, 1986 regarding the preparation notice have been adequately addressed in DEIS.

On January 5, 1987, our staff biologists John Ford and Peter Stine met with Mr. Richard Van Horn and Mr. Kevin Young of Helber, Hastert, Van Horn & Kimura, Planners in Honolulu to discuss the fate of the anchialine ponds on the southwestern edge of the Awake'e Resort property. We were pleased to note that the development plans at Awake'e propose protection and management of these ponds. Maintenance of this unique anchialine pond complex and adjacent wetlands would provide outstanding educational and scenic amenities, as well as perpetuating these rare ecosystems.

We look forward to continuing our discussions toward this end in the hope of enhancing the valuable natural attributes of Awake'e.

Sincerely,

Ernest Kosaka

Ernest Kosaka
Project Leader
Fish and Wildlife Enhancement

cc: Mr. Kevin Young, HBV&K
NMFS-WPPO
DLNR
DOFAW
DAR



Save Energy and You Serve America!



United States Department of the Interior

GEOLOGICAL SURVEY
Water Resources Division
P.O. Box 50166
Honolulu, Hawaii 96850
December 9, 1986

JOHN D. WAHKE III
GOVERNOR



JACK K. SUWA
CHAIRPERSON, BOARD OF AGRICULTURE
SUZANNE D. PETERSON
DEPUTY TO THE CHAIRPERSON

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 So. King Street
Honolulu, Hawaii 96814-2512
Mailing Address:
P. O. Box 22159
Honolulu, Hawaii 96822-0159

January 5, 1987

RECEIVED
DEC 13 1986

HELMER, HASTERT, VAN HORN
& KIMURA PLANNERS

Mr. Albert L. Lyman, Director
County of Hawaii Planning Department
25 Aupuni Street
Hilo, Hawaii 96720

Subject: Draft EIS Awake's Resort, North Kona, Hawaii

Dear Mr. Lyman:

The subject Draft EIS has been reviewed by personnel from the Hawaii District Office of the U.S. Geological Survey, Water Resources Division. We have no comments to make regarding this draft EIS, and have returned the copy of the draft to the State Office of Environmental Quality Control.

We appreciate the opportunity to review the subject Draft EIS.

Sincerely,

Don A. Davis
Don A. Davis
Acting District Chief

Copy to: Kevin M. Young
Helmer, Hastert, Van Horn,
and Kimura, Planners

MEMORANDUM

To: Mr. A. Lono Lyman, Director
Planning Department, County of Hawaii

Subject: Draft Environmental Impact Statement (DEIS) for
Awake's Resort
Kahala Capital Corporation
THK: 7-2-04:3 North Kona, Hawaii
Area: 349.05 acres

The Department of Agriculture has reviewed the subject DEIS and finds that our concerns have been adequately addressed.

Thank you for the opportunity to comment.

Suzanne D. Peterson
SUZANNE D. PETERSON
Chairperson, Board of Agriculture

John Wadsworth
PROCESSED & RETURNED

FRANCIS M. HATANAKA
SUPERINTENDENT



STATE OF HAWAII
DEPARTMENT OF EDUCATION
P. O. BOX 2389
HONOLULU, HAWAII 96810

OFFICE OF THE SUPERINTENDENT

December 11, 1986

DEC 12 1986

RECEIVED
DEC 15 1986

HEIDER, HASTERT, VAN HORN
& KIMURA PLANNERS

Mr. Albert L. Lyman, Director
County of Hawaii Planning Department
25 Aupuni Street
H110, Hawaii 96720

Dear Mr. Lyman:

Awake'e Resort
North Kona, Hawaii

Thank you for providing us the opportunity to review the above subject project.

We have no comments to offer at this time regarding this project.

Yours truly,

Signed:

Jerry H. Matsuda
Major, Hawaii Air
National Guard
Contr & Engr Officer

cc: Heiber, Hastert, Van Horn & Kimura, Planners ✓

RECEIVED
DEC 19 1986

HEIDER, HASTERT, VAN HORN
& KIMURA PLANNERS

Mr. Albert L. Lyman, Director
County of Hawaii Planning Department
25 Aupuni St.
H110, HI 96720

SUBJECT: Environmental Impact Statement - Awake'e Resort

Dear Mr. Lyman:

Negligible enrollment impact is anticipated at Kealahou Elementary (K-5), Kealahou Intermediate (6-8), and Konaheena High (9-12) from the 900 unit resort condominiums and 600 hotel rooms planned for the project.

Should you have any questions, please call Mr. Richard Inouye at 737-4743.

Sincerely,

Francis M. Hatanaka

Francis M. Hatanaka
Superintendent

FHH:dk (W0)

cc Mr. Kevin M. Young

AN AFFIRMATIVE ACTION AND EQUAL OPPORTUNITY EMPLOYER

John Waihee
DEPARTMENT OF HEALTH
HONOLULU, HAWAII 96821



STATE OF HAWAII
DEPARTMENT OF HEALTH
P. O. BOX 3279
HONOLULU, HAWAII 96821

LESLIE S. MATSUBARA
DIRECTOR OF HEALTH

RECEIVED
JAN 2 1987
HELBEL, HASTERT, VAN HORN
& KIMURA PLANNERS

January 2, 1986

MEMORANDUM

To: Mr. Albert L. Lyman, Director
Planning Department, County of Hawaii

From: Director of Health

Subject: Draft Environmental Impact Statement for Awake's Resort Development,
North Kona, Hawaii

Thank you for the opportunity to comment on the subject project. The draft EIS presents a preliminary water system plan for the Awake's Development which includes a source well (at 1,400-1,600 feet elevation). Please be advised that the new well(s) and distribution system will be subject to all the applicable terms of Chapter 20, Title 11, Administrative Rules.

Section 11-20-29 of Chapter 20 requires all new sources of potable water serving public water systems to be approved by the Director of Health prior to their use to serve potable water. Such approval is based primarily upon the satisfactory submission of an engineering report which adequately addresses all concerns as set down in Section 11-20-29. The engineering report must be prepared by a registered professional engineer and bear his or her seal upon submittal.

Section 11-20-30 requires that new or substantially modified distribution systems for public water systems be approved by the Director of Health. Such approval depends upon the submission of plans and specifications for the project prior to construction and demonstration that the new or modified portions of the system are capable of delivering potable water in compliance to all maximum contaminant levels as set down in Chapter 20 once the distribution system or modification is completed.

Should you have any questions regarding Chapter 20, Title 11, Administrative Rules, please contact the Drinking Water Program at 548-2235.

LESLIE S. MATSUBARA

cc: Helber, Hastert, Van Horn & Kimura ✓

John Waihee
DEPARTMENT OF HEALTH
HONOLULU, HAWAII 96821



STATE OF HAWAII
DEPARTMENT OF HEALTH
P. O. BOX 3279
HONOLULU, HAWAII 96821

LESLIE S. MATSUBARA
DIRECTOR OF HEALTH

RECEIVED
JAN 22 1987
HELBEL, HASTERT, VAN HORN
& KIMURA PLANNERS

January 13, 1987

MEMORANDUM

To: Mr. Albert L. Lyman, Director
Planning Department, County of Hawaii

From: Director of Health

Subject: Draft Environmental Impact Statement for the Proposed Awake's
Resort at North Kona, Hawaii

The following air pollution comment was inadvertently omitted from our January 2, 1987 comment letter to you. They should be addressed in the environmental impact statement (EIS):

Air Pollution

The EIS should include the potential impact on the ambient air quality as a result of increased vehicular activity from the proposed project and all other projects which were previously approved but have not started construction. The report did mention that potentially significant net increases in air pollutants may result from the traffic generated and associated with the cumulative developments. Projections on the increased traffic volume and the impact on the ambient air quality should be for the associated corridors, roadways, and highways. The results should be compared to the State and Federal ambient air quality standards. Should a potential violation be determined, the EIS should address the mitigating actions which shall be implemented.

LESLIE S. MATSUBARA

cc: Helber, Hastert, Van Horn & Kimura ✓

17 February 1987

Mr. John C. Lewin, M.D.
Director of Health
State of Hawaii
Department of Health
P.O. Box 3378
Honolulu, Hawaii 96801

Dear Dr. Lewin:

Awake's Resort, North Kona, Hawaii, T.M.K.: 7-2-04:03
Environmental Impact Statement

Thank you for reviewing the Awake's Resort Draft EIS. This addresses the comments contained in two memorandums to Mr. Albert L. Lyman, Director, Planning Department, dated January 2, 1987 and January 13, 1987.

We have noted the comments regarding the proposed potable water system for Awake's. They will be reflected in the Final EIS.

With respect to the comments on the cumulative impacts on the ambient air quality as a result of increased vehicular traffic from the proposed project and all other projects in the region, it is difficult to predict which of the proposed developments will actually be constructed at any given point in time. Our experience shows that it is inappropriate to consider all developments that are enabled by land use approvals but for which project financing, development responsibilities, operators and other necessary elements for successful completion have yet to be established.

However, in general terms, based upon the conclusions of the air quality impact analysis prepared for Kaupulehu Resort (Belt, Collins & Associates, April 1986), it can be inferred that vehicular traffic associated with most, if not all, of the proposed resort developments along the West Hawaii coast will not produce individual emission levels which will exceed either federal or state standards.

With respect to the cumulative impacts of the various resorts, it is likely that the worst conditions for the build up of auto emissions would occur at the main intersections between resort access roads and Queen Kaahumanu Highway from the Kaupulehu study, it can be fairly well predicted that none of the proposed resorts will exceed emission standards at these intersections. Since these intersections occur in a limited number, with an average separation of about 1 mile, it is unlikely that they will result in any major cumulative impacts. In addition, traditional wind patterns in the region which are generally in an onshore/offshore direction would tend to disperse any build-up of emissions at the various resorts rather than cause them to accumulate along the highway corridor.

Mr. John C. Lewin, M.D.
February 17, 1987
Page 2

We appreciate your department's comments on the Awake's Resort Draft EIS. Your memorandum and this response will be appended to the Final EIS to ensure a document that adequately addresses pertinent development and environmental issues.

Sincerely,

HELBERT, HASTERT & KIMURA, PLANNERS

Kevin M. Young
Kevin M. Young, ASLA
Project Planner

cc: Hawaii County Planning Department

JOHN WAIHEE



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
P. O. BOX 621
HONOLULU, HAWAII 96809

JAN 30 1987

DOC. NO.: 2397B

Honorable Albert L. Lyman, Director
Planning Department
County of Hawaii
25 Aupuni Street
Hilo, Hawaii 96720

Dear Mr. Lyman:

SUBJECT: Comments on Draft Environmental Impact Statement
(EIS) -- Awake'e Resort
Awake'e, North Kona, Hawaii
THK: 7-2-04: 3

RECEIVED
JAN 30 1987

HILDA, KOKI, VAN HORN
& KIMURA PLANNERS

After reviewing the Draft EIS regarding the proposed Awake'e
Resort, the following comments are offered for your consideration:

Aquatic Resources Concerns

The Draft EIS has provided some information on mitigating
possible impacts of drainage water, landscaping and
agriculture chemicals, waste disposal, and nutrient
enrichment. Our Department should have the opportunity to
review more detailed provisions of forthcoming plans for
injection wells, irrigation and other wastewater disposal when
these are completed.

At the "Nanea Kai" conference on September 5, 1985, a
representative of the State's Department of Transportation
described numerous complaints about certain West Hawaii
developments which met minimum legal requirements for access
locations and fail to allow parking. The Final EIS should
detail specific provisions for maintaining and improving
public access to and enjoyment of the shore. Information
should be provided on public beach facilities and parking to
accommodate the public. Finally, any plan of shoreline
modification which may affect aquatic resource values should
be submitted to our Department for review.

Precautions should be taken to prevent contamination of
coastal waters and resources by eroded soils, construction
materials and debris, pesticides, herbicides, and petroleum
products.

Honorable Albert L. Lyman

- 2 -

DOC. NO.: 2397B

Historic Sites Concerns

It is likely that all sites in the project area have been
identified, totalling 84.

The criteria for evaluating site significance presented in the
Draft EIS text (IV:32-33) are not the significance criteria
used in Federal and State historic preservation laws or in the
County's pending historic preservation local commission
ordinance. It was agreed that in the future the correct
criteria will be discussed. Table 9 in the Draft EIS uses the
correct definitions in its Significance Category column.

Based on the briefing, we agree with the significance
evaluations recommended in Table 9, as follows:

1. 37 sites are no longer significant, because an
adequate and reasonable amount of their significant
information has been recorded and they were only
significant for their information content.
2. 47 sites are significant -- 28 solely for their
information content and 19 for multiple criteria.
Those significant as excellent examples of site
types are mostly significant at the North Kona
regional level.

Impacts to Significant Sites

We agree with the impact assessment; all sites will likely be
affected. Also, we agree that the effect will become "no
adverse effect" because archaeological data recovery will
preserve adequate amounts of the significant information in
those sites significant solely for their information content
and because preservation will preserve those sites significant
for multiple criteria.

Mitigation Plan

Table 9 very briefly, yet clearly, presents what is to be done
with the significant sites. The mitigation plan is as follows:

Honorable Albert L. Lyman

- 3 -

DOC. NO.: 2397B

1. 19 sites will be preserved. Some level of interpretive development is planned at 11 sites, and at these sites additional archaeological work will occur to aid interpretation. 8 sites will be preserved as is, including the 3 possible burial sites (T-105, T-152, T-163).

2. 28 sites will undergo archaeological data recovery. Based on the briefing, we believe that this mitigation plan is acceptable.

At this point, we have two recommendations:

1. Checks need to be included in the mitigation plan to ensure that it is acceptably executed. We recommend that our office and the County Planning Department (a) review and approve a specific archaeological data recovery plan and a specific plan for site interpretive work later in the planning process and (b) verify the acceptable completion of the data recovery and site interpretations.
2. The Draft EIS lacks the final archaeological report with detailed site descriptions. Our office was briefed on the archaeological findings that will go in the final report, and we were able to evaluate the significance assessments and the mitigation plan. However, the public and other governmental agencies will be unable to conduct such an evaluation until they are provided with the final report. To resolve this situation, we recommend that the final archaeological reconnaissance report be made available for timely review by other governmental agencies and the public, so useful comments can be obtained. Such comments might possibly lead to some changes in significance assessments and the mitigation plan. We believe that this corrective step will enable the intent of the EIS process relevant to historic preservation review to be adequately completed.

Honorable Albert L. Lyman

- 4 -

DOC. NO.: 2397B

Recreation Concerns

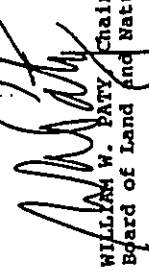
There are no known public park interests involved. Adjoining State-owned lands offer similar shoreline recreation opportunities. We note that public shoreline access is to be provided but we would like to have an opportunity to review more detailed access proposals.

Water and Land Development Concerns

Our concern is for the protection and management of ground and surface water resources. Development of a new water well source at the 1400-1600 feet elevation has been proposed; therefore, prior to construction a well drilling permit will be required from the Department of Land and Natural Resources, in accordance with Chapter 178, HRS. Table 4, page II-11 should be amended to indicate this permit requirement.

Thank you for consulting us.

Very truly yours,



WILLIAM W. PATY, Chairperson
Board of Land and Natural Resources

cc: Mr. Kevin M. Young, Project Planner,
Helber, Hastert, Van Horn & Kimura, Planners

17 February 1987

Mr. William W. Patsy
Chairperson
Board of Land and Natural Resources
P.O. Box 621
Honolulu, Hawaii 96809

Dear Mr. Patsy:

Awake's Resort, North Kona, Hawaii, TALK: 7-2-04:03
Environmental Impact Statement (EIS)

Thank you for reviewing the Awake's Resort Draft EIS. This addresses your comments contained in a letter to Mr. Albert L. Lyman, Director, Hawaii County Planning Department, dated 30 January 1987.

We have reviewed your comments and offer the responses detailed below.

Comment:

Our department should have the opportunity to review more detailed provisions of forthcoming plans for injection wells, irrigation and other wastewater disposal when these are completed.

Response:

As more detailed plans are developed, should injection wells be required, we will adhere to the provisions of the State of Hawaii's Underground Injection Control Program. In addition, any plans for large-scale irrigation and all wastewater disposal system plans will be submitted to your agency for review.

Comment:

Information should be provided on public beach facilities and parking to accommodate the public. Also, any plan of shoreline modification should be submitted to our Department for review.

Response:

At the present time, there are no plans for any shoreline modifications, and as a result, no adverse impacts on any aquatic resources are anticipated. In addition, the present public access to the Awake's and Makalawena shorelines will be maintained. The beach access track to Makalawena will be maintained from a point where it intersects the planned main roadway at Awake's. Public parking will be provided in conjunction with planned commercial development. At the present time, specific details regarding the exact number of parking stalls to be provided has not been determined. A public comfort station will also be provided adjacent to the planned parking.

Mr. William W. Patsy
February 17, 1987
Page 2

Comments:

Checks need to be included in the (archaeological) mitigation plan to ensure that it is acceptably executed. We recommend that our office and the County Planning Department (a) review and approve a specific archaeological data recovery plan and a specific plan for site interpretive work later in the planning process and (b) verify the acceptable completion of the data recovery and site interpretations.

Response:

We appreciated the opportunity for ourselves and our archaeologists (P. Rosendahl and A. Walker of PHRI) to meet with Mr. Ross Cordy of your staff to discuss the findings contained in the Preliminary Archaeological Reconnaissance Survey. As you may know, we have delayed the submission of the Final EIS so that the final archaeological report could be included. In order that your department may have an opportunity to adequately review that document, we are enclosing a copy of it with this letter. We are also sending copies of that report to the University of Hawaii Environmental Center and the Hawaii County Planning Department for their review and comment. While any comments which may be received regarding the final report will not be included in the Final EIS because of time constraints, we will review those comments and take whatever action is appropriate.

We concur with your recommendations regarding review and approval of the archaeological data recovery plan and site interpretive work. A statement has been included in the Final EIS which reflects the desirability of having your department and the Planning Department review both of the above-mentioned steps.

Comment:

We would like an opportunity to review more detailed [shoreline] access proposals.

Response:

As more detailed plans are developed regarding shoreline access and facilities, we will submit them to your department for review.

Comment:

Table 4, page II-11 should be amended to indicate that a well drilling permit will be required from the Department of Land and Natural Resources for any new well(s).

Response:

Table 4 has been amended in the Final EIS to reflect this requirement.

Mr. William W. Paty
February 17, 1987
Page 3

We appreciate your comments on the Awake's Resort Draft EIS. Your letter and this response will be appended to the Final EIS to ensure a document that adequately addresses pertinent development and environmental issues.

Sincerely,

HELBERT, HASTERT & KIMURA, PLANNERS

Kevin M. Young
Kevin M. Young, ASLA
Project Planner

cc: Hawaii County Planning Department



DEPARTMENT OF PLANNING AND ECONOMIC DEVELOPMENT

STATE OF HAWAII
DEPARTMENT OF PLANNING AND ECONOMIC DEVELOPMENT
150 SOUTH KALANIOU AVENUE, SUITE 200, HONOLULU, HAWAII 96813-1000
TELEPHONE: (808) 535-2000
FACSIMILE: (808) 535-2001

Ref. No. P-5688

January 7, 1986

RECEIVED

JAN 8 1987

HELBERT, HASTERT, & KIMURA
PLANNERS

The Honorable Albert Lono Lyman
Planning Director
Planning Department
County of Hawaii
25 Aupuni Street
Hilo, Hawaii 96720

Dear Mr. Lyman:

Subject: Draft Environmental Impact Statement (DEIS) Awake's Resort,
North Kona, Hawaii

We have reviewed the subject draft environmental impact statement (DEIS) and offer the following comments:

Need for the Project

The EIS should address the need for the project, based on DPED Series MF Projections. It would appear that the number of hotel and condominium units currently existing and proposed at Keauhou, Waikoloa, Mauna Lani and Mauna Kea Resorts could surpass the projected islandwide needs. In addition, the State Land Use Commission has recently approved additional resort developments at Kaupulehu and Kukio. Two other intermediate resort projects proposed for North Kona (Kohalaiki and Oona) are currently before the Land Use Commission with recommendations for approval by the County and State. Many of these projects are intended for the same first class market as the subject project.

Public Access and Views of Project from Adjacent Properties :

The coastline on both sides of the subject property contain some of the highest value coastal recreational resources on the island. As such, the public use of the coastline can be expected to increase tremendously. The EIS should address in more detail how the public will be accommodated, especially if this project is the only one, or is the first one to be developed between Keahole Airport and Kukio/Kaupulehu. The lack of public parks along this stretch of coastline can be expected to cause heavy use pressures on the resort's proposed public shoreline access.

The EIS should include a more detailed description of the number and location of public accessways and associated facilities, such as comfort stations and parking spaces.

The Honorable Albert Lono Lyman
Page 2
January 7, 1987

The EIS should also address the views of the subject project, particularly the structures, from adjacent properties. Efforts should be made to minimize the intrusions of the project on the scenic view corridors from adjacent properties, particularly the coastline.

Opauala Pond, Anchialine Ponds and Coastal Ecosystems

The DEIS fails to describe the existing and proposed surface and subsurface drainage pattern of the subject property. This is particularly important in evaluating the impacts on the adjacent Opauala Pond and on the anchialine ponds on the property. Due to the importance of Opauala Pond as a waterbird habitat, we are concerned that increased siltation, changes in nutrient levels, and water levels be avoided.

CZM policy provides for the promotion of water quantity and quality planning and management practices which reflect the tolerance of freshwater and marine ecosystems. Since certain fauna tend to appear only at night, a night survey of the anchialine ponds should be done. We also have questions with regard to the proposed management plan for these ponds. Would exotic species be removed? Will representative native species be reintroduced? Details of the plan and a time schedule for its implementation should be presented in the final EIS.

The impact of water withdrawal for Awake'e and other projects along the North Kona/South Kohala coast should be evaluated in terms of possible cumulative effects on the salinity of the aquifers and the anchialine ponds in the area. Impacts of such salinity changes on water users and on the pond biota should also be discussed.

We are concerned that biocide use in the proposed resort area may result in harmful effects on biota in the project area. The high permeability of the underlying rock strata makes the underlying water table especially susceptible to such application. A listing of the types and quantities of pesticides and herbicides to be used on the proposed project should be provided. An analysis of the potential impacts of these use patterns on water quality and on biota in the nearshore, shoreline, and anchialine pond environments should also be done.

Location of Major Resort Activities

The spatial distribution of privately-owned land and State lands between Kawaihae and Kailua-Kona have resulted in a clustering of resort development at Mauna Kea and Mauna Lani-Waikoloa. DPED is also advocating the concentration of resort activities in the vicinity of the existing Kona Village at Kaupulehu-Kukio. A proposed resort at Kohalaiki will contribute to a fourth concentration of resort activities around the Kealahou-Honokohau-Kaloko Urban District which is recognized by the State and County for future resort development. The clustering of major resort activities will promote

The Honorable Albert Lono Lyman
Page 3
January 7, 1987

the joint development and shared costs of water, sewer, drainage and transportation facilities. The concentration and grouping of resort facilities will also encourage and allow the preservation of natural resource and recreational areas that will be beneficial to both the resident and visitor populations. The EIS should discuss the impacts of an additional concentration of resort development in the vicinity of Makalaweana-Mahailua-Kaelohulu as proposed in amendments to the County General Plan at Makalaweana-Awakee. It is our understanding that this stretch of undeveloped coastline between Keahole Airport and Kaupulehu-Kukio contains coastal recreational resources of islandwide and statewide significance.

Relationship to Priority Guidelines

The EIS should discuss the relationship of the proposed project to the Priority Guidelines of the Hawaii State Plan, in particular, Sec. 226-104, HRS, population growth and land resources.

Thank you for the opportunity to comment on the DEIS.

Sincerely,

Roger A. Utveling

cc: Mr. Kevin M. Young
Heiber, Haster, Van Horn & Kimura, Planners
ORC

17 February 1987

Mr. Roger A. Ulveling, Director
Department of Planning Economic Development
P.O. Box 2359
Honolulu, Hawaii 96804

Dear Mr. Ulveling:

Environmental Impact Statement
Awake'e Resort, North Kona, Hawaii, T.M.R.: 7-2-04-03

Thank you for reviewing the Awake'e Draft EIS. This letter addresses comments contained in your letter to Mr. Albert Lono Lyman, Director of the Hawaii County Planning Department, dated 7 January 1986 (sic).

Comment:

The EIS should address the need for the project, based on DPED Series MF Projections.

Response:

Peat, Marwick, Mitchell & Co. prepared the Market Assessment for the proposed resort development at Awake'e. Their assessment of demand for additional visitor units considered the island's existing supply and the planned developments for which specific development plans, operators, developers and/or sites have been determined. Their analysis indicated that market support may be expected for the development of between 2,800 and 4,300 additional hotel units on the island by the year 2000. As Mr. Ulveling notes, significant additional zoned capacity for hotel and condominium development exists at the Keahou, Waikoloa, Mauna Lani and Mauna Kea resorts, the Kaupulehu and Kukio resorts have recently received State Land Use Commission approval for resort development, and there are several other resort development proposals now before state and/or county agencies for review. However, PMM's experience indicates that it is not appropriate to consider developments that are enabled by land use approvals but for which project financing, development responsibilities, operators and other necessary elements to successful completion have not been established.

Comment:

Address in more detail how the public will be accommodated, in terms of public use of the shoreline, especially if this project is the only one, or is the first one to be developed between Keahole Airport and Kukio/Kaupulehu.

Mr. Roger A. Ulveling, Director
February 17, 1987
Page 2

Response:

At the present time, minimal changes are planned for the shoreline along the Awake'e property. Currently, the sole access to the beach and shoreline areas of the adjacent Makalawena property is through Awake'e lands. This access will be maintained, and will be improved as a result of the development of improved, paved roadways throughout the Awake'e development. The existing track will be maintained from a point where it leaves the planned new roadways and accesses the shoreline and Makalawena.

Improved roadways will also increase access for users of the Awake'e shoreline. It is planned that adequate parking will be provided for shoreline users in conjunction with the planned commercial development. Actual numbers of parking spaces have not been determined at this preliminary phase of planning. A public comfort station will also be provided adjacent to planned public parking. No new boat launching facilities are planned.

In addition to shoreline facilities, it is our intention to create an adequate setback from the shoreline to include a major portion of archaeological features which have been identified in this area. It is envisioned that significant features will be enhanced through landscaping and interpretive treatments and be accessible to the public. Preliminary discussions have taken place with the U.S. Fish and Wildlife Service regarding the inclusion of the anchialine ponds in a possible Federal Wildlife Refuge which the Service is planning to develop at Makalawena. Should this occur, the ponds will be managed by the Service, and will likely be accessible to the public for interpretive purposes. It is also possible that certain archaeological features could be included in the interpretive activities associated with the ponds.

Comment:

The EIS should address the views of the subject project, particularly structures, from adjacent properties. Efforts should be made to minimize the intrusions of the project on the scenic view corridors from adjacent properties, particularly the coastline.

Response:

Based upon an topographical analysis of the properties adjoining Awake'e, it is unlikely that either would have extensive views across Awake'e to the ocean. The general elevations of lands at Makalawena to the northwest are

Mr. Roger A. Ulveling, Director
February 17, 1987
Page 3

lower or downhill from Awake'e. As a result, primary views to the ocean are directly makai or toward the ocean. Views of the ocean across Awake'e from the adjacent property on the north, are essentially blocked by Pu'u Kuli. As a result, any significant ocean views would be directly makai.

In order to minimize the visual impact of proposed structural development at Awake'e on adjacent properties, large corridors of open space have been planned. These open areas adjacent to the borders of the Awake'e property will be developed in golf course, or maintained as natural open space. To this end, the Kuli Pu'u has purposely been left in its natural state and free of development. Also, a large open space will be maintained in the western corner of the site, in the area of the anchialine ponds, and will be enhanced by landscaping and interpretive features.

Comment:

The report fails to describe the existing and proposed surface and subsurface drainage pattern of the subject property.

Response:

Appendix C of the Draft EIS, The Preliminary Engineering Report, addresses the existing off-site and on-site hydrology. It indicates that surface runoff from areas mauka of the project site is almost non-existent, and calculates post-development runoff volumes. Figure 1 of Appendix C shows a generalized conceptual plan for proposed drainage improvements required to mitigate expected storm runoff under post-development conditions.

Comment:

Since certain fauna tend to appear only at night, a night survey of the anchialine ponds should be done. Also, we have questions with regard to the proposed management plan for the ponds.

Response:

According to our marine consultant, Mr. Steve Dollar, the intent and scope of the baseline report included in the DEIS is to gain a basic understanding of the major physical, chemical and biological parameters that influence community structure in the subject environments. The purpose of gaining this understanding is to be able to assess the changes that might come about as a result of modification of environmental parameters by development construction. In the case of the Awake'e anchialine ponds, pond community

Mr. Roger A. Ulveling, Director
February 17, 1987
Page 4

structure has been greatly modified by the introduction of predatory fish at the expense of the shrimp population. As such, the ponds are far from their natural state. The presence or absence of certain nocturnal species does not change this scenario, and will not change the intent of any measures to return the ponds to their natural state. If, and when, a pond monitoring program is designed, night monitoring to assess the populations of endangered shrimp and other nocturnal species will undoubtedly be included.

While a specific and detailed plan for the management of the ponds has not been developed at this point in time, we have met with representatives of the U.S. Fish and Wildlife Service, at their request, to discuss the possibility of including the Awake'e anchialine ponds in a proposed National Wildlife Refuge at Makalawena. They have expressed their desire to manage the ponds in conjunction with Makalawena ponds, and we have indicated our preliminary approval of this concept, and our desire to work with them to develop a management plan for the ponds. In addition, the proposed development plan for Awake'e shows that the area of the site containing the ponds will be left totally undeveloped and separated from physical development.

Comment:

The impact of water withdrawal for Awake'e and other projects along the North Kona/South Kohala coast should be evaluated in terms of possible cumulative effects on the salinity of the aquifers and the anchialine ponds in the area.

Response:

At this point it is likely that water withdrawal will take place via new wells which will be drilled between the 1200' and 1600' elevations. Since the amount to be withdrawn is expected to be relatively small when compared to the total amount of groundwater passing beneath the property, it is not likely that it will have a significant effect on the anchialine ponds along the coastline.

As project engineers develop more detailed plans for the water source(s) supply system, better estimates of possible impacts on the salinity of aquifers can be developed.

Mr. Roger A. Ulveling, Director
February 17, 1987
Page 5

Comment:

We are concerned that biocide use in the proposed resort area may result in harmful effects on biota in the project area.

Response:

According to our marine consultant, as stated on page D-28, present usage of biocides on existing golf courses at resorts near Awake's is essentially non-existent. A report by C. L. Murdoch and R. E. Green of the University of Hawaii, investigating the environmental fate of fertilizers and pesticides on Hawaiian Golf Courses (1986), states that the biocides which present the greatest environmental hazard are only applied in limited quantity to high maintenance area turfgrass areas such as tees and greens. Such applications are used only in the event of specific outbreaks, which do not commonly occur, and not on a routine basis. These outbreaks are generally not widespread throughout a golf course, and it is unlikely that large acreages would be treated with biocides. Thus, the potential for these materials penetrating the soil mantle and reaching underlying porous bedrock is very small. Because no materials would be applied directly to waters, and storm runoff is very rare on the west coast of Hawaii, the potential for any biocidal material reaching the marine or aquatic environments in concentrations sufficient to affect natural populations is extremely remote.

Comment:

The spatial distribution of the privately-owned land and State lands between Kawaihae and Kailua-Kona have resulted in a clustering of resort development at Mauna Kea and Mauna Lani-Waikoloa. DPED is also advocating the concentration of resort activities in the vicinity of the existing Kona Village at Kaupulehu-Kukio. A proposed resort at Kohalaiki will contribute to a fourth concentration of resort activities around the Kealekehe-Honokohau-Kaloko Urban District. The EIS should discuss the impacts of an additional concentration of resort development in the vicinity of Makalawena-Mahaiula-Kaechululu as proposed in amendments to the County General Plan at Makalawena-Awake's.

Response:

Although the proposed development of resorts at Makalawena and Awake's, if both completed, would create an additional concentration of resort activities in that area, they should really be considered as part of a larger concentration which includes Kaupulehu and Kukio. Regional opportunities for these projects include the possible joint development of water source

Mr. Roger A. Ulveling, Director
February 17, 1987
Page 6

and supply system, as well as other infrastructure. On a local level, there will be an opportunity for improved access to significant coastal resources, primarily located at Makalawena, for both visitors and residents, and a potential National Wildlife Refuge to encompass the environmentally sensitive ponds at both Makalawena and Awake's. Such a refuge would result in the planned management of pond resources, help to insure their future preservation, and increase their interpretive value.

Potential negative impacts include the likely increase in traffic levels within the corridor between the Kailua-Kona and Kawaihae, and a minor increase in the need for public services and facilities.

Comment:

The EIS should discuss the relationship of the proposed project to the Priority Guidelines of the Hawaii State Plan, in particular, Sec. 226-104, HRS, population growth and land resources.

Response:

Section 3.1 of the EIS, which discusses the relationship of the proposed project to the Hawaii State Plan, will be amended to include a discussion of the above mentioned Priority Guidelines.

We appreciate your comments on the Awake's Resort Draft EIS. Your letter and this response will be appended to the Final EIS to ensure a document that adequately addresses pertinent development and environmental issues.

Sincerely,

HELBER, HASTERT & KIMURA, PLANNERS

Kevin M. Young
Kevin M. Young, ASCE
Project Planner

cc: Hawaii County Planning Department



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
165 KALANIOU AVENUE
HONOLULU, HAWAII 96813

January 21, 1987

IN REPLY REFER TO
STP 8.1803

Mr. Albert L. Lyman
Page 2

STP 8.1803

4. Page VI-8 to VI-9, Storm Water Drainage

It is the responsibility of the Developer to provide for the proper drainage of storm runoff from the Mauka side of their proposed development.

Thank you for this opportunity to provide comments.

Very truly yours,

Edward Y. Hirata
Director of Transportation

Mr. Albert Lono Lyman, Director
Planning Department
County of Hawaii
25 Aupuni Street
Hilo, Hawaii 96720

Dear Mr. Lyman:

Draft EIS
Awake'e Resort
North Kona, Hawaii

After reviewing the subject draft EIS, we have the following comments for your consideration:

1. Page I-8, Section 1.6
Since the proposed Awake'e Resort Development is located in an area zoned for restricted access, any new access permitted for the development must first be approved by the Department of Land and Natural Resources (DLNR) and the Department of Transportation (DOT).
2. Pages II-9 to II-11, Section 28
Plan approval will be required by DOT prior to any construction activity done within the State Highway Rights-of-way.
3. Page VI-4, Mitigation Measures
The channelization plan for the "T" intersection improvements at Queen Kaahumanu Highway and Awake'e access road will be subject to review and approval by the State Highways Division, DOT. The intersection channelization improvement cost will be borne by the Developer.

17 February 1987

Mr. Edward Hirata
Director
State of Hawaii
Department of Transportation
889 Punchbowl Street
Honolulu, Hawaii 96813

Dear Mr. Hirata:

Awake's Resort, North Kona, Hawaii, T.M.K.: 7-2-04:03
Draft Environmental Impact Statement

Thank you for reviewing the Awake's Resort Draft EIS. This addresses your comments contained in a letter dated 21 January, 1987 to Mr. Albert Lono Lyman, Director, Planning Department.

The following are responses to your comments contained in that letter:

Comments:

Any new access permitted for the development must first be approved by the Department of Land and Natural Resources and Department of Transportation.

Response:

As a new access point will be required from the Queen Kaahumanu Highway, as well as access across State-owned lands, these required approvals have been noted in Sections 1.9 *Necessary Approvals and Permits*, and Table 4, *Development Permits and Approvals* in the Final EIS.

Comments:

Plan approval will be required by DOT prior to any construction activity done within the State Highway Rights-of-way.

Response:

Your comment has been noted, and any plans for improvements within the State Highway Rights-of-way will be submitted to your department for review and approval.

Comments:

The channelization plan for "T" intersection improvements at Queen Kaahumanu Highway will be subject to review and approval by the State Highways Division, DOT. The intersection improvement costs will be borne by the Developer.

Response:

Your comments have been noted.

Mr. Edward Hirata, Director
February 17, 1987
Page 2

Comments:

It is the responsibility of the Developer to provide for proper drainage of storm runoff from the Mauka side of the their proposed development.


Response:

Our engineering consultants will be developing comprehensive plans for a storm drainage system which will address storm runoff from the Mauka side of the project.

We appreciate your comments on the Awake's Resort Draft EIS. Your letter and this response will be appended to the Final EIS to ensure a document that adequately addresses pertinent development and environmental issues.

Sincerely,

HELBER, HASTERT & KIMURA, PLANNERS


Kevin M. Young, ASLA
Project Planner

cc: Hawaii County Planning Department

STATE OF HAWAII
GOVERNOR
TORILO WIL TACIAN
Chairman
FREDRICK P. MITCHELL
Vice Chairman

STATE OF HAWAII
DEPARTMENT OF PLANNING
AND ECONOMIC DEVELOPMENT
LAND USE COMMISSION
Room 104, Old Federal Bldg., 335 Macdonald Street
Honolulu, Hawaii 96813 Telephone 548-4411



COMMISSION MEMBERS
ALONZO S. P. CHOI
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THOMAS E. BUCK
ROBERT S. TAYLOR
WILLIAM S. L. TAYLOR
ESTHER UEDA
Executive Officer

December 22, 1986

87:PLNG/59

TO: MR. ALBERT L. LYMAN, DIRECTOR
COUNTY OF HAWAII PLANNING DEPARTMENT
25 AUPUNI STREET
HILO, HAWAII 96720

FROM: RUSSELL N. FUKUMOTO
EXECUTIVE DIRECTOR

RE: DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE
PROPOSED AWAKE'E RESORT, NORTH KONA, HAWAII

DATE: JAN 8 1987

RECEIVED

HEBER, HASTERT, VAN HORN
& KIMURA PLANNERS

Dear Mr. Lyman:

Subject: Draft Environmental Impact Statement for the
Proposed Awake'e Resort, North Kona, Hawaii

Thank you for providing us the opportunity to comment on
the above subject EIS. We have no comments to offer at this
time.

Sincerely,
Russell N. Fukumoto
RUSSELL N. FUKUMOTO
Executive Officer

EU:to



STATE OF HAWAII
DEPARTMENT OF SOCIAL SERVICES AND HOUSING
HAWAII HOUSING AUTHORITY
P. O. BOX 17867
HONOLULU, HAWAII 96817

January 6, 1987

TO: MR. ALBERT L. LYMAN, DIRECTOR
COUNTY OF HAWAII PLANNING DEPARTMENT
25 AUPUNI STREET
HILO, HAWAII 96720

FROM: RUSSELL N. FUKUMOTO
EXECUTIVE DIRECTOR

RE: DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE
PROPOSED AWAKE'E RESORT, NORTH KONA, HAWAII

DATE: JAN 8 1987

RECEIVED

HEBER, HASTERT, VAN HORN
& KIMURA PLANNERS

Dear Mr. Lyman:

Subject: Draft Environmental Impact Statement
(DEIS) for the Proposed Awake'e Resort,
North Kona, Hawaii

Thank you for the opportunity to review and comment on the
DEIS for the subject project.

The Authority believes that plans for the development of
employee housing units should be established early on. These
plans should include the location of housing within or in close
proximity to the project area, types of structures to be
developed, and sales price and rental ranges. We therefore
hope that you will work closely with State and county housing
agency officials to ensure that employee housing needs are met.

Should you have any questions, please contact Colette
Sakoda of my staff at 848-3226.

Sincerely,
Original Signed By
RUSSELL N. FUKUMOTO
Executive Director

cc: Mr. Kevin M. Young, Project Planner
Heber, Hastert, Van Horn & Kimura, Planners



University of Hawaii at Manoa

JAN 8 1987

Environmental Center
Crawford 317 • 2550 Campus Road
Honolulu, Hawaii 96822
Telephone (808) 948-7381

(P)2123.6

DEC 12 1986

RECEIVED
DEC 16 1986

HEIDER, MASTINI, VAN HORN
& KUMURA PLANNERS

Mr. Albert L. Lyman, Director
Planning Department
County of Hawaii
25 Aupuni Street
Hilo, Hawaii 96720

Dear Mr. Lyman:

Subject: Awake'e Resort
Draft Environmental Impact Statement

We have reviewed the subject document and have no comments to offer.

Very truly yours,

J. Tomimaga

TEUANE TOMINAGA
State Public Works Engineer

EM:jnc
cc: Mr. Kevin M. Young

RECEIVED
JAN 8 1987

HEIDER, MASTINI, VAN HORN
& KUMURA PLANNERS

January 7, 1987.
RE:0454

Mr. Albert L. Lyman, Director
County of Hawaii Planning Department
25 Aupuni Street
Hilo, Hawaii 96720

Dear Mr. Lyman:

Draft Environmental Impact Statement
Awake'e Resort
North Kona, Hawaii

The above cited document addresses the potential environmental impacts related to Kahala Capital Corporation's proposed development of a multi-use complex that includes a self-contained "intermediate resort" area with a hotel, multi-family residential units, resort commercial, and an 18-hole golf course and clubhouse. This review was prepared with the assistance of Richard Brock, Hawaii Institute of Marine Biology; Paul Ekern, Soils and Agronomy; Michael Graves, Anthropology; Jon Matsuoka, Social Work; Frank Peterson, Geology and Geophysics; and Wallington Yee, Environmental Center. Our reviewers have addressed the following general topics:

Climate

The Awake'e area is characterized by a generally dry, semi-tropical, semi-arid climate with an annual precipitation of only 10 to 15 inches per year. This dry climate emphasizes the need for adequate water supplies for this development. Furthermore, the number of other resort developments being proposed for the Kona area increase the water demand on the existing resources. We note that the ultimate source of water for the resort remains an unresolved issue, but to better estimate the water needs of the project for landscaping and irrigation of the golf course, the Final EIS should include pan evaporation data for the project area, which probably has a class A designation. Two references that could be consulted for the information are Pan Evaporation: State of Hawaii 1984-1983, R-74, Paul Ekern and Jen-Ju Chang, Water Resources Research Center in cooperation with Hawaii Sugar Planters Association and Department of Land and Natural Resources; and pan evaporation readings from the Koloa station.

AN EQUAL OPPORTUNITY EMPLOYER

Mr. Albert L. Lyman

-2-

January 7, 1987

On page VI-6, table 20, it is stated that the water demand for recreational use will be 12,500/gpd. We assume that the golf course needs are not considered under this "recreational use" heading. A figure of 663,360 gpd is given as the Irrigation water demand. Does this reflect the volumes needed for the golf course and landscaping? Does this figure include any use of recycled secondary treated effluent water?

Anchialine Ponds

We recognize the need to consolidate and reduce the bulk of the EIS documents and in general concur with the frequent practice for reducing the sub-consultants reports to 1 for 2 pages. However, the tables or figures resulting from such reductions are frequently illegible and hence useless for evaluative purposes. Such is the case in Appendix D, page D-14. It is impossible to read Table 4, so no evaluation of it can be undertaken. We suggest that the tables be reproduced at full size in the Final EIS so that the information will be available for decision makers.

On page D-26, the Draft EIS cites the Chang and Young (1977) study which shows that diluted sewage effluent (nutrient loading) placed on the Kaneohe Marine Corps golf course was taken up by plants and soil and never impacted the groundwater. It does not seem appropriate to extrapolate these findings to the case of Awake'e. As noted on page D-27, Oceanic Institute Consultants found large increases in groundwater nutrient levels following the construction of the golf course at Waikoloa. Since Awake'e has young porous lavas geologically similar to Waikoloa, where nutrients are apparently not stripped out, it seems more reasonable to assume that groundwater nutrient levels at Awake'e will be more similar to Waikoloa than Kaneohe.

The rationale for dismissing any impact due to increasing nutrient loading in the Awake'e anchialine ponds is based on the Oceanic Institute report (page D-27) which states that despite the large increases in anchialine pond nutrient concentrations, no visible changes in Waikoloa pond biota occurred. The problem, however, may not be so simple. The Waikoloa ponds lack any exotic fish (U.S. Army Corps of Engineers, 1985). The most abundant macro-organism being the herbivorous shrimp, *Halocaridina rubra*. Brock hypothesized, (1985) page D-23, that any reduction or elimination of herbivorous shrimp, would change the anchialine algal communities, thus permanently altering the community structure of the pond system. Shrimp reduction or elimination could come about by the presence of exotic fish. With the proposed nutrient subsidy in the Awake'e ponds, will the algal communities change because of the presence of exotic fish? This issue should be considered in the Final EIS.

We noted that the shrimp, *Metabetaeus lohena*, is one of Fish and Wildlife's Category 2 status species (p.D-28). MacIsaac and Brock (1974) found this species in a number of Awake'e ponds in 1972. Since the present survey did not sample at night and the author notes (page D-23) that many

Mr. Albert L. Lyman

-3-

January 7, 1987

species may emerge at night when exotic fish predation is low, a night time survey for *M. lohena* would seem appropriate considering it's potential endangered status.

Geology

The discussions of hydrology, geology and engineering interests seem to represent reasonably thorough and complete assessments of the topics with the minor exceptions noted above.

Archaeology

As currently written, the archaeological report does not meet the Minimum Requirements for Reconnaissance Survey Reports as established by the Society for Hawaiian Archaeology in that it does not provide site descriptions or analyses permitting independent verification of the preliminary conclusions reached in the Draft EIS. As a consequence, an adequate review and assessment of the significance of the archaeological remains within the project area cannot be made. In this regard, the preliminary archaeological report in the EIS does not meet the requirements of Chapter 343. A final archaeological report should be required and subject to review prior to acceptance of the Final EIS.

Socio-economic Environment

The social impact coverage is very sparse with superficial reporting. There is little substantive data or recommendations for mitigating the social impacts and needs that will be experienced with this development. For example, as presently proposed, no specific employee housing is proposed. Since affordable housing is in short supply in the Kona area, the problem of reasonable employee housing should be more adequately addressed in the Final EIS.

As part of the proposed mitigation measures, p. V-6, the statements are made that community outreach strategies to stimulate awareness and interest in the visitor industry, in-service upgrade training programs, and possible employer incentives for an organized program of job recruitment and screening, internship programs, and/or scholarships should be available. There is no indication of who will be supporting these strategies and accepting financial responsibility for their development. Will it be the state, county, or developer? Also, while personal income may go up, it should be acknowledged that as income rises, generally speaking taxes rise also. A probable outcome is a higher tax bracket and increase in property value with the existence of a new resort hotel in the area.

Both the positive and negative effects of the project need to be more fully articulated. For instance, in a social impact assessment, there is a need to document people's attitudes regarding the project. Generally speaking, issues of culture, crime, and housing, for example, need to be

Mr. Albert L. Lyman

-4-

January 7, 1987

elaborated upon. With the issues raised here the overall impression of the socio-economic assessment is that the statement is quite deficient and should be expanded in the Final EIS to assure that the social issues are adequately addressed.

We appreciate the opportunity to comment on this document.

Yours truly,

Jacquelin N. Miller

Jacquelin N. Miller
Acting Associate Director

cc: OEQC

✓ Stephen Lau
✓ Kevin Young
Richard Brock
Paul Ekern
Michael Graves
Jon Matsuoka
Frank Peterson
Wallington Yee

17 February 1987

Jacquelin N. Miller
Acting Associate Director
Environmental Center
University of Hawaii at Manoa
Crawford 317
2550 Campus Road
Honolulu, Hawaii 96822

Dear Ms. Miller:

Environmental Impact Statement (EIS)
Awake'e Resort, North Kona, Hawaii, T.M.K.: 7-2-04:03

Thank you for reviewing the Awake'e Resort Draft EIS. This letter addresses your comments contained in a letter to Mr. Albert Lono Lyman, Planning Director, dated 7 January 1987.

Comment:

To better estimate the water needs of the project for landscaping and irrigation of the golf course, the Final EIS should include pan evaporation data for the project area.

Response:

The preliminary estimates of water needs for irrigation and landscaping for Awake'e are based on a generalized demand figure of 4,000 gallons per day which translates to about 2 inches of water per week. This amount is slightly less than a standard of 5,000 gallons per day which is used to calculate demand under normal conditions. The use of a slightly lower factor is based on the assumption that the landscape treatment at Awake'e will utilize less tropical plantings and more drought tolerant and endemic species.

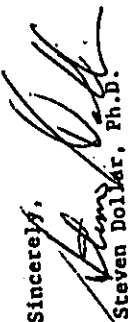
These figures are general in nature and reflect a variety of site conditions. As specific plans are prepared for the resort, more detailed data will be developed which should yield more precise estimates of water demand. These estimates will include an analysis of pan evaporation rates and their overall effect on water demand. However, preliminary research indicates that the adjusted annual pan evaporation based on evaporation contours delineated on maps published in Pan Evaporation: State of Hawaii 1894-1983, R-75 by Paul Ekern and Jen-Hu Chang of Water Resources Research Center, University of Hawaii at Manoa, is approximately 80 inches per year.

One comment made by the State of Hawaii Department of Planning and Economic Development (paragraph 5, page 2) concerns the use of biocides and their effect to biota. As stated on page D-28, present usage of these materials on existing golf courses at resorts near Awake'e is essentially nonexistent. A report by C. L. Murdoch and R. E. Green of the University of Hawaii, investigating the environmental fate of fertilizers and pesticides on Hawaiian golf courses (1986), state that the biocides which present the greatest environmental hazard are only applied in limited quantity to high maintenance area turfgrass areas, such as tees and greens. Such applications are used only in the event of specific outbreaks, which do not commonly occur, and not on a routine basis. These outbreaks are generally not widespread throughout a golf course, and it is unlikely that large acreages would be treated with biocides. Thus, the potential for these materials penetrating the soil mantle and reaching underlying porous bedrock is very small. Because no materials would be applied directly to waters, and storm runoff is very rare on the west coast of Hawaii, the potential for any biocidal material reaching the marine or aquatic environments in concentrations sufficient to affect natural populations is extremely remote.

The County of Hawaii suggests that a regional coastal water quality monitoring plan should be developed in conjunction with the Natural Energy Laboratory of Hawaii. The marine and pond environmental report included in the DEIS was designed to serve as a baseline data base in the event that a monitoring program is deemed necessary. Such programs are very important in cases where shoreline modification is planned (such as beach, lagoon or marina construction), or where the development is located in close proximity to a facility such as NELH where maintenance of water quality at a scale much more sensitive than required to affect changes in biota is important. Presently, plans for Awake'e do not include any shoreline modification, and all construction will be at least several hundred feet from the shoreline. Awake'e is also not located in close proximity to NELH (4 miles). As discussed in the DEIS, and reiterated above, the potential for substantive changes in marine water chemistry owing to construction and operation of Awake'e appear to be extremely small. Similar resorts presently operating on the west coast of Hawaii have not been found to cause any negative impacts to marine water quality, and there is no basis at this time to suggest that cumulative effects will occur in the future. While to the open circulation pattern of the coastline. While monitoring programs certainly cause no harm, and are useful in the event of unforeseen circumstances that may cause environmental changes, such a plan at Awake'e does not appear to be a necessity at this time.

I hope these responses are adequate to address the reviewers' comments. If you have any questions, or need any other information, do not hesitate to call.

Sincerely,



Steven Dolmar, Ph.D.

nutrient concentration varies seasonally as a result of precipitation, and spatially depending on local geography and hydrology. In addition, pond nutrient concentration is a function of the degree of seawater-groundwater mixing. This mix varies hourly, daily, and seasonally as a function of tidal cycle.

Another glaring omission in the data set used to conclude that nutrient increases resulted from sewage irrigant rather than groundwater variability was the lack of dissolved silica data. This material serves as a good tracer to distinguish nutrient input from groundwater or sewage, because the former contain very high concentrations of silica while the latter contains very low concentrations. If silica concentrations had tracked the increases in nitrogen and phosphorus, there would be evidence that the variation was the result of groundwater variability; if silica had remained constant while nitrogen and phosphorus increased there would have been some evidence for a sewage-related effect. Obviously, any study that attempts to validly identify the sources of variability of pond nutrient concentration must make such comparisons. Basing any definitive cause and effect statements on two samplings which ignored all of these factors cannot be used as a basis for stating that golf course irrigation has any effect on groundwater characteristics.

In this same vein, Dr. Ziemann has indicated that since the Waikoloa EIS, he and a group of co-investigators have continued analysis of anchialine ponds on the west Hawaii coastline. The results of these studies were not available at the time of the Awake'e DEIS preparation, and are as yet unpublished. The investigation identifies the range of natural variability inherent in the nutrient characteristics of anchialine ponds in the vicinity of Waikoloa and Awake'e. Groundwater chemistry exhibited high spatial and temporal variability, owing to season, distance from the ocean, time of day, and tidal height when samples were collected. Variability of chemical parameters of the ponds in proximity to the Waikoloa golf course were within the range of natural variability. These results indicate no firm evidence to support the assertion that sewage material used as irrigant has any effect on groundwater, and hence anchialine ponds. Such results are consistent with the results of studies cited in the Awake'e DEIS by Chang and Young (1977) that the large majority (95-99%) of the nitrogen and phosphorus applied to golf courses is taken up through adsorption, incorporation into plant material, denitrification, and an assortment of other processes in the soil mantle. Thus, only 1-5% of the nutrients would even reach the underlying lava rock and be incorporated into groundwater flow. Such an addition to groundwater would be virtually undetectable. The results of the new Waikoloa pond study are also consistent with the conclusion in the Awake'e DEIS that the proposed development will have virtually no adverse

effects on the anchialine pond environment. The discussion of nutrient enrichment to anchialine ponds also addresses the comments in paragraph 4 on page 2. This comment questions whether changes in shrimp populations might cause irreversible changes in pond plant community structure. The major environmental finding regarding the anchialine ponds at Awake'e is the domination by exotic fish species which apparently have eliminated the shrimp population over a period of time sufficient for pond plant community structure to change. At the same time, nutrient levels are very high; thus the conclusion that ponds and pond plants are not nutrient limited. Yet, none of the ponds at Awake'e exhibited any differences in algal characteristics compared to ponds not contaminated with exotic fish (Maciolek and Brock, 1975). All ponds, even those with thick sediment accumulations, had clear water columns, with no hint of turbidity from phytoplankton blooms. Benthic algae and grasses were present in sediment ponds, but not any more abundant than in ponds without exotic fish at other locations. It appears that while herbivorous shrimp may influence to some small extent pond plant abundance, the influence is not sufficient to noticeably alter pond community structure.

To repeat the major conclusion of the Awake'e DEIS regarding possible nutrient subsidy from development, a characteristic of anchialine ponds is that they are not nutrient limited. Hence, even though it is unlikely that development would cause any changes in nutrient concentration beyond the large range of natural variability for the reasons stated above, incremental increases would not have any effect on pond community structure because nutrient materials are constantly in excess supply. Rather, it is the high rate of pond water turnover, and in the case of Awake'e, predation by exotic fish that control pond populations.

The comment in paragraph 5, page 2 concerns lack of night observation to identify the nocturnal shrimp *Metabetaeus lohena*. The intent and scope of the baseline report included in the DEIS is to gain an basic understanding of the major physical, chemical, and biological parameters that influence community structure in the subject environments. The purpose of gaining this understanding is to be able to assess the changes that might come about as a result of modification of environmental parameters by development construction. A species list is one means to this end. In the case of the Awake'e anchialine ponds, pond community structure has been greatly modified by the introduction of predatory fish at the expense of the shrimp population. As such, the ponds are far from their natural state. The presence or absence of one nocturnal species does not change this scenario, and will not change the intent of any measures to return the ponds to their natural state. If, and when, a pond monitoring program is designed, night monitoring to assess the populations of endangered shrimp will undoubtedly be included.

Ms. Jacqueline N. Miller
February 17, 1987
Page 4

Comment:

While personal income may go up, it should be acknowledged that as income rises, generally speaking taxes also rise. A probable outcome is a higher tax bracket and increase in property value with the existence of a new resort hotel in the area.

Response:

Our economic consultant, Peat, Marwick, Mitchell & Co. concurs that personal income taxes could be expected to increase with rising personal income. However, although tax brackets may increase with higher incomes, they are still only a percentage of total income, and thus, net or disposable income will increase accordingly. Property values and taxes may also be expected to increase as a result of the proposed development, in areas benefited by those developments. However, since there are no small landowners in the vicinity of the proposed project, the impact on those who could least afford such increases are expected to be minimal.

Comment:

With respect to social impacts, both the positive and negative effects of the project need to be more fully articulated.

Response:

An expanded discussion of the potential social impacts of the project is included in the Final EIS. It includes a summary of attitudes of the people of Hawaii County towards tourism and resort development, as well as such issues as growth and employment. These discussions are based upon data obtained from the 1984 Hawaii State Plan Survey and the 1983 Study of Big Island Residents on Planning and Housing Concerns, as well as information obtained from other studies relating to proposed resort developments on the Big Island.

We appreciate your comments on the Awake's Resort Draft EIS. Your letter and this response will be appended to the Final EIS to ensure a document that adequately addresses pertinent development and environmental issues.

Sincerely,

HELBER, HASTERT & KIMURA, PLANNERS


Kevin M. Young
Project Planner

cc: Hawaii County Planning Department



STEVEN DOLLAR
Marine Research Consultant

1720-A Paula Dr.
Honolulu, HI 96816
February 4, 1987

Mr. Kevin Young
Helber, Hastert, Van Horn & Kimura
733 Bishop St., Suite 2590
Honolulu, HI 96813

Dear Kevin:

Thank you for sending the comments on the Draft Environmental Impact Statement (DEIS) for the proposed Awake's Resort, North Kona Hawaii. Below are my responses to the comments concerning the marine environment and anchialine ponds.

The most substantive comments were from the University of Hawaii Environmental Center. Responses to these comments also apply to several comments from other reviewers. Paragraph 3 on page 2 of the Environmental Center letter questions the validity of comparing results of controlled studies that determined the fate of sewage effluent used as irrigant and fertilizer on an Oahu golf course with the proposed golf course at Awake's. The basis of this question stems from the results of studies of anchialine ponds at Waikoloa (Cited as Oceanic Institute 1977, 1984), which are located in the proximity of a golf course. It is unequivocally stated in the Waikoloa Final EIS that golf course irrigation with treated sewage caused increases in pond nutrient levels. Even though I repeated this statement in the Awake's DEIS, I found it rather difficult to accept.

Examination of the data that leads to this conclusion clearly indicates that there is no firm basis for the statement. Dr. David Ziemann, of OI Consultants (i.e. Oceanic Institute), has explained to me that the statement in the Waikoloa EIS was based on comparison of two samplings of a series of 50 ponds (once in 1977 and once in 1984) which were made with no regard to matching environmental variables. No attempt was made to identify if the increases attributed to development-related activities in the second sampling were the result of natural variability of the pond nutrient content. It is well known that groundwater

44-130-5 MJ Place / Kaneohe, Hawaii 96744 / BOB 247-2440

Ms. Jacqueline N. Miller
February 17, 1987
Page 2

Comment:

On page VI-6, table 20, it is stated that the water demand for recreational use will be 12,500/gpd. We assume that the golf course needs are not considered under this "recreational use" heading. A figure of 663,360 gpd is given as the irrigation water demand. Does this reflect the volumes needed for the golf course and landscaping? Does this include any use of recycled secondary treated effluent water?

Response:

The 12,500 gpd represents the potable water demand associated with the golf course use. The Generalized Resort Site Development Simulation printout shown on page C-35, shows that the overall irrigation demand is 663,360 gpd, of which 395,866 gpd reflects the water demand for golf course irrigation, and the remainder represents landscaping and other non-potable irrigation demand. These figures do not include the use of secondary treated effluent. As stated in section 6.2.2, water infrastructure is designed to meet water needs exclusive of sewage reclamation. However, the availability of secondary treated effluent for irrigation would reserve the main water supply for domestic consumption, and hopefully reduce overall demand.

Comment:

A final archaeological report should be required and subject to review prior to acceptance of the Final EIS.

Response:

The findings and recommendations of our archaeological consultant as contained in the Preliminary Archaeological Reconnaissance Survey have been reviewed and approved by State's Historic Sites Section, and their chief archaeologist. However, in order that a complete inventory of the historic sites found at Awake's be presented, and available to the public, we have delayed issuance of the Final EIS until the Final Archaeological Report has been completed. This final report will be included in the Final EIS as Appendix G.

In addition, in order that all concerned parties have an opportunity to adequately review the Final Archaeological Report and comment on that document, we are enclosing a copy of that report for your review. We would appreciate your submitting any comments regarding that document to us. While these comments will not be included in the Final EIS due to time constraints, we will review them and take whatever actions are appropriate.

Ms. Jacqueline N. Miller
February 17, 1987
Page 3

Comment:

Certain tables within Appendix D have been reduced to the point that they are difficult to read.

Response:

These tables have been reproduced at their full size in the Final EIS.

Comment:

Your comments regarding the anchialine ponds were passed on to Mr. Steve Dollar our marine consultant. His responses to those comments were contained in a letter dated 4 February 1987 which was sent to us. A copy of that letter is included for your review.

Comment:

Since affordable housing is in short supply in the Kona area, the problem of reasonable employee housing should be more adequately addressed in the Final EIS.

Response:

Specific recommendations for an employee housing program are not developed in our report because we believe the housing needs that could be generated by resort development at Awake's would best be addressed on a project-specific basis. At such time, the labor requirements of a particular development and the labor and housing market situations in the region could be more accurately assessed. At this time, it would appear to be more effective to agree that such assessments and appropriate actions will be taken in relation to specific projects as they arise.

Comment:

As part of the proposed mitigation measures, p. V-6, the statements are made that community outreach strategies to stimulate awareness and interest in the visitor industry, in-service upgrade training program, and possible employer incentives for an organized program of job recruitment and screening, internship programs, and/or scholarships should be available. There is no indication of who will be supporting these strategies and accepting financial responsibility for their development.

Response:

It is unlikely that support for such programs would come from the state or county. It is likely that such programs would be sponsored by the developer and future hotel and commercial operators. The primary responsibility however, will fall to the project's developer to instigate programs and incentives which provide maximum benefit to the residents of West Hawaii.



University of Hawaii at Manoa

Water Resources Research Center
Holmes Hall 253 • 2540 Dole Street
Honolulu, Hawaii 96822

8 January 1987

RECEIVED
JAN 7 1987
HELBER, HASTERT, VAN HORN
& KIMURA PLANNERS

Mr. Albert L. Lyman, Director
County of Hawaii Planning Department
25 Aupuni Street
Hilo, Hawaii 96720

Dear Mr. Lyman:

SUBJECT: Draft Environmental Impact Statement Awakee Resort,
North Kona, Hawaii

We have reviewed the subject DEIS and offer the following comment.
The document is very vague about where they are going to get potable
water for this project. Since the viability of the development is totally
dependent on a satisfactory water supply, it appears prudent that that
would be a priority item needing resolution.

Thank you for the opportunity to comment. This material was
reviewed by WRRRC personnel.

Sincerely,

Edwin T. Murabayashi
Edwin T. Murabayashi
EIS Coordinator

ETM:jm

cc: K.M. Young, HHVH & K

AN EQUAL OPPORTUNITY EMPLOYER

19 January 1987

Mr. Edwin T. Murabayashi
EIS Coordinator
University of Hawaii at Manoa
Water Resources Research Center
Holmes Hall 253
2540 Dole Street
Honolulu, Hawaii 96822

Dear Mr. Murabayashi:

Awakee Resort, North Kona, Hawaii, T.M.K.: 7-2-04:03
Draft Environmental Impact Statement

Thank you for reviewing the Awakee's Resort Draft EIS. This addresses your
comments contained in a letter to Mr. Albert L. Lyman, Planning Director
dated 6 January 1987.

We fully agree with you that the viability of the project is dependent upon
obtaining a satisfactory water source.

As you are probably aware, the EIS is being prepared in support of a General
Plan amendment request. The G.P. amendment is the first of many approvals
which must be obtained before the project may proceed. At this preliminary
planning stage we felt that the most prudent course of action was to have our
engineering consultants examine the various alternatives for providing water,
and take that analysis to a point where they are confident that a solution is
available. This analysis is contained in Appendix C of the EIS. It was our
feeling that any additional engineering work, and subsequent large scale
expenditures, in terms of time and money, at this preliminary stage, would
be imprudent.

It is our intention to develop more definitive plans for the supply and
distribution of water as planning and design of the project becomes more
detailed. We will also, as stated in the Draft EIS, be discussing possible
alternatives for joint development of sources with the owners of neighboring
projects.

We appreciate your comments on the Awakee's Resort Draft EIS. Your letter
and this response will be appended to the Final EIS to ensure a document
that adequately addresses pertinent development and environmental issues.

Sincerely,

HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS

Kevin M. Young
Kevin M. Young, ASLA
Project Planner

cc: Hawaii County Planning Department

DATE: 12/15/86
Eugene N. Irwin
Managing Director



RECEIVED
DEC 15 1986

Patricia Engelhard
Director
Hilbert O. Kimura
Deputy Director

DEPARTMENT OF PARKS & RECREATION
COUNTY OF HAWAII

HEBER, HASTERT, VAN HORN
& KIMURA PLANNERS

December 15, 1986

Albert Lyman, Director
Planning Department
County of Hawaii
Hilo, HI 96720

Subject: Awake'e Resort, North Kona
Environmental Impact Statement

Dear Mr. Lyman:

A question that was raised during the review of the EIS Preparation Notice was whether provisions were being made to accommodate small boat launching at Awake'e Bay. No reference to this question was found and we would appreciate your response on this matter.

We have no other comments to offer other than to inform you that, in addition to Pahoehoe and White Sands Beach Parks (Chapter VI-16, Section 6.11), the County also maintains Kahaluu Beach Park.

Thank you for the opportunity to review the project document.

Sincerely,

Patricia Engelhard
Director

PE:GHI:al

cc: Heber, Hastert, Van Horn & Kimura, Planners

DEPARTMENT OF PUBLIC WORKS
COUNTY OF HAWAII
HILO, HAWAII

RECEIVED
JAN 5 1987

DATE December 23, 1986

TO : Planning Department

FROM : Chief Engineer

SUBJECT: AWAKE'E RESORT DRAFT EIS
TRK: 7-2-04:3
North Kona, Hawaii

We have reviewed the subject document and our comments are as follows:

1. Long-term improvements need to be planned for County highways in the Kailua area.
2. Wastewater sludge processing and disposal will be the responsibility of the developer.
3. The proposed roadways do not conform to the standard road section contained in the Standard Details of the County of Hawaii hence they shall remain private and not be dedicated to the County.
4. Where pedestrian traffic is expected, provide sidewalks.
5. Developer shall be informed that if drywells are included in the subject project improvements, Chapter 21, Underground Injection Control (UIC), Administrative Rules, Department of Health, prohibit any person from operating, constructing or modifying an injection well (drywell) unless authorized by a permit issued by the Director of Health, State of Hawaii.
6. DPW defers to Department of Transportation for Queen Kaahumanu intersection improvements.
7. Drainage concerns will be addressed at County rezoning level.

HUGH Y. OHNO
Chief Engineer
DPW/RY:aa

cc: Kevin Young
Engineering Division

Mr. Hugh Y. Ono
February 17, 1987
Page 2

Response:

The three (3) roadway and street classifications used in Section V, Roadway System in the Preliminary Engineering Report for the Proposed Awake'e Resort Development, Appendix C, correspond to the County classifications as follows:

Classification in Report	County Classification
Major	Secondary Arterials
Secondary	Collector Streets
Minor	Minor Streets

Secondary arterials without sidewalks by County standards require a minimum right-of-way of 80 foot consisting of a 24 foot wide travelway (12-ft. lanes), 10 foot wide shoulders and 18 foot wide swale areas on both sides. Collector streets without sidewalks require a minimum right-of-way of 60 foot consisting of a 24 foot wide travelway (12-ft. lanes), 8 foot wide shoulders and 10 foot wide swale areas on both sides. Minor streets without sidewalks require a minimum right-of-way of 50 foot consisting of a 20 foot travelway (10-ft. lanes) and 15 foot wide areas on both sides for shoulders and swales. For minor streets where pedestrian traffic is expected and sidewalks required, the typical roadway section requires a minimum right-of-way of 50 foot consisting of a 32 foot wide travelway (16-ft. lanes) and 9 foot wide areas on both sides for sidewalks, curbs and gutters.

While the proposed typical roadway sections exceed or equal the County standards in right-of-way width or travelway, other elements deviate from it. Currently, the County of Hawaii Department of Public Works has indicated that roadways must conform to County standards if they were to be dedicated to the County. Furthermore, minor streets and roadways where pedestrian traffic exist require installation of curbs and gutters. The proposed Awake'e development probably will adopt criteria more desirable or slightly higher than the minimum standards at certain areas. Further discussions with the County will be conducted at the appropriate time.

Comment 1:

Where pedestrian traffic is expected, provide sidewalks.

Response:

The Final EIS has been revised to state that where appropriate, sidewalks will be provided.

17 February 1987

Mr. Hugh Y. Ono
Chief Engineer
Department of Public Works
County of Hawaii
25 Aupani Street
Hilo, Hawaii 96720

Dear Mr. Ono:

Awake'e Resort, North Kona, Hawaii, T.M.K.: 7-2-04:03
Environmental Impact Statement (EIS)

Thank you for reviewing the Awake'e Resort Draft EIS. This addresses your comments contained in a memorandum to the Hawaii County Planning Department dated 23 December 1986.

We have passed your comments on to Wilson Okamoto & Associates, our civil engineering consultants. Their responses are as follows:

Comment 2:

Wastewater sludge processing and disposal will be the responsibility of the developer.

Response:

The Department of Health, State of Hawaii, sets forth guidelines prescribing acceptable disposal methods for wastewater sludge. A wastewater sludge disposal plan including the necessary treatment and transportation of the sludge will be submitted to the State Department of Health for approval. The plan will demonstrate that the disposal method will not result in the contamination of any underground drinking water sources, or surface waters, or create any public health hazard or nuisances. Wastewater sludge from the development may be processed, dried and disposed of at a sanitary landfill or it may be transported to a municipal collection facility for processing and disposal.

Comment 3:

The proposed roadways do not conform to the standard road section contained in the Standard Details of the County of Hawaii hence they shall remain private and not be dedicated to the County.

Mr. Hugh Y. Ono
February 17, 1987
Page 3

Comment:

A permit issued by the Director of Health, State of Hawaii, is required for the operation, construction or modification of any injection wells.

Response:

Should any subsurface disposal of fluids be required for the improvements on the project, conditions and requirements stipulated in the State of Hawaii, Underground Injection Control (UIC) Program intended to protect the quality of the State's underground sources of drinking water from pollution will be adhered to.

We appreciate your comments on the Awake'e Resort Draft EIS. Your memorandum and this response will be appended to the Final EIS to ensure a document that adequately addresses pertinent development and environmental issues.

Sincerely,

HELBER, HASTERT & KIMURA, PLANNERS

Kevin M. Young
Kevin M. Young, ASLA
Project Planner

cc: Hawaii County Planning Department



DEPARTMENT OF WATER SUPPLY • COUNTY OF HAWAII

33 AUPUNI STREET • HILO, HAWAII 96720

December 11, 1986

RECEIVED
DEC 15 1986

TO: Mr. Albert Long Lyman, Director
Planning Department

FROM: H. William Sewake, Manager

SUBJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT
AWAKE'E RESORT
TAX MAP KEY 7-2-04:3

Unless shown and transmission improvements are made, water is not available from the existing North Mena Water System which ends at the Keahole Airport.

RECEIVED
DEC 15 1986

HELBER, HASTERT, VAN HORN
& KIMURA PLANNERS

cc: Mr. Kevin M. Young, Project Planner

... Water brings progress...



PLANNING DEPARTMENT

25 ALPHEA STREET • HILLO, HAWAII 96720
(808) 531-4346

COUNTY OF
HAWAII

RECEIVED
JAN 9 1987
HELMER, HASTERT, VAN HORN
& KIMURA PLANNERS

DANIEL C. CRISPIN
Mayor
ALBERT LONG LYMAN
Deputy Mayor
HILMA A. PILLAY
Deputy Director

January 7, 1987

Mr. Kevin Young, Project Planner
Helmer, Hastert, Van Horn & Kimura
Grosvenor Center, P.O. Tower
733 Bishop Street, Suite 2590
Honolulu, HI 96813

Dear Mr. Young:

Draft Environmental Impact Statement
Awake'e Resort
Awake'e, North Kona, Island of Hawaii

We have reviewed the subject draft EIS for the proposed Awake'e Resort project and submit the following comments:

1. Water: The draft EIS states that the water will be privately developed at the 1,400-1,600 feet elevation but does not specify the approximate site location. Should this occur on state-owned lands, other DLNR approvals may be necessary, besides a water drilling permit. As a public resource, what are the implications of a private developer utilizing this?
2. Historic Sites: Appendix G of the draft EIS mentions a final archaeological reconnaissance report. This final report should be included in the final EIS.
3. Anchialine ponds and coastal waters: The draft EIS indicates that there is substantial movement of subsurface waters through the anchialine ponds and to coastal waters. The draft EIS should discuss and consider as a mitigation measure, an anchialine pond management plan in consultation with the Army Corps of Engineers and the Fish and Wildlife Service. A regional coastal water quality monitoring plan should be developed in conjunction with the NELH and discussed in the final EIS.

Mr. Kevin Young
January 7, 1987
Page 2

4. Page 1-9, 1-9 Necessary Permits and Approvals and Page 11-11, Table 4:
CDUA permit is required for improvements within the shoreline setback only if this portion is kept in the Conservation District. Otherwise a shoreline setback approval would be required from the County of Hawaii Planning Department.
5. Page IV-5, 2nd paragraph: "The parcel was the site of a Congregational church that was quit claimed in 1908."
The final EIS should state to who and by whom this parcel was quit claimed to.
6. Page IV-5, 4.5 Access: Approval for access easement must also be obtained from DLNR.
7. Page IV-10, Short-term Impacts: The final EIS should discuss and provide mitigation measures on erosion potential of Pu'u Kuili from land alterations especially since it is cinder.
8. Page IV-20, Mitigation measures: In the first sentence, change the word "may" to "should". Delete the word "might" in the second sentence.
9. Page IV-30, first paragraph/first sentence: The word "required" should be changed to "projected".
Should you have any questions or wish to discuss any of these comments in detail, please do not hesitate to contact us.

Sincerely,

A. L. Long
ALBERT LONG LYMAN
Planning Director

AK:acb

17 February 1987

Mr. Albert Lono Lyman, Director
County of Hawaii
Planning Department
25 Aupuni Street
Hilo, HI 96720

Dear Mr. Lyman:

Environmental Impact Statement (EIS)
Awake'e Resort, North Kona, Hawaii, T.A.L.K.-7-2-04-03

Thank you for reviewing the Awake'e Draft EIS. This letter addresses the comments contained in your letter dated 7 January 1987.

Comment:

What are the implications of a private developer utilizing water, which is a public owned resource?

Response:

At the present time, it is the preference of the applicant to participate in a joint water development program with adjoining property owners in this region. To this end, discussions have been held with both the Bishop Estate (owners of the Makalawena property) and Barnwell Industries (developers of the Kaupulehu property) to explore the possible development of a privately funded water system which would serve Awake'e and other resorts in the immediate vicinity. Only if an agreement cannot be reached with any of the surrounding property owners, will the applicant seek to develop an independent water source on State-owned mauka lands.

Upon approval of the proposed changes in land use for this site, a formal water agreement will be sought with the nearby landowner(s). If such an agreement is not reached, a geohydrological study will be conducted to investigate groundwater occurrences, movement and quality on State lands. At that time, the location and other elements for the source well(s) development will be determined. If it is determined that water which is pumped from offsite portions of the system to the State, the applicant will dedicate the use. Appropriate clearances, approvals, and permits will be obtained from concerned authorities having jurisdiction over the development and utilization of public resources.

Mr. Albert Lono Lyman, Director
February 17, 1987
Page 2

Comment:

The final EIS should include a final archaeological reconnaissance report.

Response:

A Final Archaeological Reconnaissance Report will be included in the Final EIS, as Appendix G.

Comment:

The draft EIS should discuss and consider as a mitigation measure, an anchialine pond management plan in conjunction with the Army Corps of Engineers and the Fish and Wildlife Service. A regional coastal water quality monitoring plan should be developed in conjunction with the NELH and discussed in the Final EIS.

Response:

As mentioned in the U.S. Fish and Wildlife Service's (FWS) letter to your department dated 7 January 1987, we met with John Ford and Peter Stein of the FWS to discuss their concerns as they related to the anchialine ponds at Awake'e. At that meeting, the representatives of FWS explained their plans to create a National Wildlife Refuge at the neighboring Makalawena ponds. They suggested to us the possibility that the ponds at Awake'e be included in such a refuge, and be managed in concert with the Makalawena ponds.

We expressed our interest in cooperating with them, and in carrying on further discussions leading to such an arrangement in the future.

Included in our discussions, was our suggestion that appropriate archaeological sites might be included in any interpretive development for the ponds. FWS expressed favorable reactions to this suggestion.

With respect to a regional coastal water quality monitoring plan, the marine and pond environmental report included in the EIS was designed to serve as a baseline data base in the event that a monitoring program is deemed necessary. Such programs are very important in cases where shoreline modification is planned (such as beach, lagoon or marina construction), or where the development is located in close proximity to a facility such as NELH where maintenance of water quality at a scale much more sensitive than required to affect changes in bion is important. Presently, plans for Awake'e do not include any shoreline modification, and all construction will be at least several hundred feet from the shoreline. Awake'e is also not located in close proximity to NELH (4 miles). As discussed in the marine report, and reiterated above, the potential for substantive changes in marine

Mr. Albert Lono Lyman, Director
February 17, 1987
Page 3

water chemistry owing to construction and operation of Awake'e appear to be extremely small. Similar resorts presently operating on the west coast of Hawaii have not been found to cause any negative impacts to marine water quality, and there is no basis at this time to suggest that cumulative effects will occur in the future, owing to the open circulation pattern of the coastline. While monitoring programs certainly cause no harm, and are useful in the event of unforeseen circumstances that may cause environmental changes, such a plan at Awake'e does not appear to be a necessity at this time. However, if such a program is deemed by the County to be necessary and is required for Awake'e, it would seem appropriate that such a plan be developed at the Shoreline Management Permit stage of the project approval process.

Comments:

CDUA permit is required for improvements within the shoreline setback only if this portion is kept in the Conservation District. Otherwise a shoreline setback approval would be required from the County of Hawaii Planning Department.

Response:

As will be noted in a revised Land Use Allocation Guide Map in the Final EIS, it is proposed that the area along the shoreline be designated as Open, except for a small portion of the site which may be included in a proposed National Wildlife Refuge planned by the U. S. Fish and Wildlife Service. An adequate shoreline setback area will be provided, and at present, no construction improvements are planned to take place within that shoreline setback area.

Comment:

State to who and by whom the adjacent parcel and site of the former Congregational church was quit claimed to.

Response:

This paragraph has been revised to more accurately clarify the history of the church.

Comment:

Approval for access easement must also be obtained from DLNR.

Response:

Your comment has been noted and reflected in the revised text.

Mr. Albert Lono Lyman, Director
February 17, 1987
Page 4

Comment:

The final EIS should discuss and provide mitigation measures on erosion potential of Pu'u Kuli.

Response:

It is unlikely that any major grading or other large-scale landform alterations will occur on the Pu'u Kuli cinder cone, as development has been precluded from taking place on the Pu'u. Therefore, it is not likely that erosion of the cinder cone should be a serious problem.

Thank you for your comments on the Awake'e Draft EIS. We will append your letter and this response to the Final EIS to ensure a document that adequately covers pertinent development and environmental issues.

HELBERT, HASTERT & KIMURA, PLANNERS


Kevin M. Young
Project Planner

3 January 1967

Dear Mr. Lyman,

Please accept my input regarding the proposed Kahala Capital Corp. Awake's Resort development at Keahole Hawaii.

As a resident of Kona for over 14 years and former resident of Oahu, and an employed taxpayer, and a concerned parent, I am logically concerned about the seemingly indiscriminate development which has taken place in Kona over the past several years.

Developing the Awake's Resort "moderate to upper-income" project is both poorly conceived and poorly timed. At a time when Kona is growing to the point of bursting her beautiful seams another large development is not in our best interest.

As a homeowner of the Kona Highlands Subdivision (an area we chose because of the beautiful, unobstructed view of the coastline and sunsets) any development of this magnitude on this pristine coastline would only be the beginning of a malignant blight to all the residents in this area as well as for the entire population of Kona and the Big Island.

Furthermore, any development in this close proximity to the Keahole Airport would all but eliminate the possibility of expanding our airport to handle direct mainland or foreign carriers from flying in here. There would be greater and longer lasting economic benefits were we to enlarge Keahole Airport than there would be by creating a resort development. As you are aware, well paying construction jobs are only temporary and then are replaced by low paying subservient hotel jobs.

We do not need any more of our open and conservation zoned areas to be rezoned and developed. We need to preserve and respect and appreciate the beautiful Island which our Lord has blessed us with and to keep and protect this beauty and blessing and not debate, destroy and develop it.

It is with well founded apathy that I even dare voice my concerns. It seems that the public is asked to respond to proposed developments only because law requires the Planning Commission to do so. Once the requirement is fulfilled and the comments are voiced, they are weighed against how much money special interests are willing to pass on to get their pet projects approved. This has been evidenced far too many times in the past. The zoning ordinances are generally overturned to meet the whims of the developers without genuine concern for the majority of the local residents.

So often has this happened in the past that the local taxpaying population has all but given up writing or attending public meetings because they feel they are being slapped in the face with the all-righty dollar when our concerns are consistently ignored.

Once we have another Honolulu, Lahaina/Kaanapali, Kailua/Kaneohe we cannot go back, so let's keep Kona a beautiful place we can cherish, and not have our children only be able to look back through the family photo album of what once was.

Please, Mr. Lyman, don't let the desires of the select few dictate against the hopes and prayers of the majority. Please set a precedent and decide against this Awake's Resort Development.

Thank you for your time,

sincerely

Roy Crytser

Roy Crytser

Roy Crytser
P.O. Box 5341
Kailua-Kona, HI 96745-5341

Roy Crytser
P.O. Box 5341
Kailua-Kona, HI 96745-5341



ALBERT L. LARSEN
DIRECTOR OF PLANNING
25 AUGUSTA ST.
HILLO, HI 96720

17 February 1987

Mr. Roy Cryser
P.O. Box 5341
Kailua-Kona, Hawaii 96745-5341

Dear Mr. Cryser:

Awake'e Resort, North Kona, Hawaii, T.M.K.: 7-2-04:03
Environmental Impact Statement (EIS)

Thank you for taking the time to review the Awake'e Resort Draft EIS. This letter addresses your comments contained in a letter to Mr. Albert L. Lyman, Director of Planning, dated 3 January 1987.

We understand your concern for the future of the Kona region and the issue of how much growth should take place. As you know, the Hawaii County Planning Department, along with the County Council is charged with the job of determining how much growth should take place in each area of the County. The major implementation instrument with which they seek to accomplish this task is the Hawaii County General Plan which is the policy document for the long-range comprehensive development of the island of Hawaii. [It] provides the direction for balanced growth of the County.

In Section 3.4 of the Environmental Impact Statement we prepared an analysis of how our planned development conformed to the General Plan. That analysis shows that the proposed development at Awake'e is in conformance with the goals, objectives and policies of that General Plan.

With respect to views from your home in the Kona Highlands Subdivision, the proposed Awake'e development is located approximately 4 miles northwest of your residence. As such, it is unlikely that the proposed development will have any significant impact on your views of the coastline and sunsets. In fact, our analysis shows that because of the moderate slope of the project site, it is unlikely that the development will have a significant impact on ocean views from directly mauka of the site on Queen Kaahumanu Highway.

You should also be aware that since the project site is located some four miles north of Keahole Airport, development of the project would have no effect on any future expansion of the airport. Current State Department of Transportation studies indicate that Awake'e is well removed from the areas impacted by airport noise, or areas projected to be impacted by the airport at expanded 1990 levels of utilization. The 1990 predictions assume continued use of the existing shorter runway. However, because of the substantial distance between Keahole Airport and Awake'e, it is not likely that any future expansion of runways would effect Awake'e.

Mr. Roy Cryser
February 17, 1987
Page 2

You state that there would be greater and longer lasting economic benefits to the region from enlarging Keahole Airport versus creating additional resort development. It should be pointed out that the primary industry within the Kona region has been and is expected to continue to be tourism. Without continued future growth in the tourism and resort industries, it is unlikely that there will be any need or justification for expanding the airport. Plans for expansion of Keahole Airport are primarily based on predicted future increases in visitor arrivals. Without growth in the tourism and resort industries, there will likely not be any significant increases in future visitor arrivals.

In addition, without future growth in the region's tourism and resort industries, the creation of additional economic growth and new jobs within the region will be confined to other segments of the economy which are currently very limited.

In conclusion, we would point out that in order to proceed with the development of Awake'e, its developers are conforming to the development approval processes required by the State and County. Those processes have been established to allow private citizens, such as yourself, as well as appropriate public agencies to provide input into the planning of such development. The purpose of such input is to helpfully ensure that all relevant concerns and issues are addressed in the planning process. We are hopeful that this is the case, and that as a result we will be able to develop the best possible resort at Awake'e.

We appreciate your comments on the Awake'e Resort Draft EIS. Your letter and this response will be appended to the Final EIS to ensure a document that adequately addresses pertinent development and environmental issues.

Sincerely,

HELBERT, HASTERT & KIMURA, PLANNERS

Kevin M. Young
Kevin M. Young, ASLA
Project Planner

cc: Hawaii County Planning Department

APPENDICES



APPENDIX A
MARKET ASSESSMENT



**Market Assessment for
Resort Development**

**at the
Awake'e Resort**

North Kona, Hawaii

Prepared for

KAHALA CAPITAL CORPORATION

October 1986

AWAKE'E RESORT

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1 - EXECUTIVE SUMMARY

Helber, Mastert, Van Horn & Kimura Planners (HHVHAK) engaged Peat, Marwick, Mitchell & Co. (Peat Marwick) to prepare a market assessment for the proposed Awake'e Resort (Resort) development in North Kona on the island of Hawaii. This chapter presents the background, objectives and approach of this engagement and describes the proposed Resort in terms of its site location, characteristics and proposed land uses. This chapter also summarizes the market support for hotel, condominium and retail development at the Resort and development recommendations.

BACKGROUND

Kahala Capital Corporation proposes to develop a 349-acre master-planned resort community in North Kona, Hawaii. The property is known as Awake'e. This ocean-front resort development is planned to include a hotel, multifamily condominium units, an 18-hole golf course and two commercial sites.

Kahala Capital Corporation retained HHVHAK to prepare a development plan and required land use and zoning applications for the Resort. In this regard, HHVHAK asked Peat Marwick to prepare a market and development assessment for the Resort.

STUDY OBJECTIVE AND APPROACH

The primary objective of the study is to assess the market support for proposed hotel, condominium and retail development at the Resort. In addition, based on the projected market for these land uses, recommendations as to project quality, size, phasing, pricing and facility characteristics would be defined.

To accomplish these objectives, the study approach was as follows:

1. Met with HHVHAK representatives to review the scope of work and proposed master plan and tour the Resort site.
2. Reviewed trends in the hotel, condominium and commercial markets at selected comparable resort areas on the island of Hawaii and in the state.
3. Projected the market orientation of the proposed Resort and assessed the market support for the proposed land uses at the Resort until the year 2010.
4. Summarized our findings in this report.

AWAKE'E RESORT DESCRIPTION

Awake'e is located on the Kona Coast of the island of Hawaii and is planned to be developed as an intermediate-sized resort which would eventually contain a total of 1,500 visitor units. The Resort is described in terms of its site characteristics and proposed master plan.

Site Description

Awake'e Resort would be located on 349 acres of beachfront land on the island of Hawaii's leeward coast, 11 miles north of the town of Kailua-Kona. The area is in its unimproved natural state, undeveloped and uninhabited. Unlike much of the Kona coastline, Awake'e enjoys topographical variations due to the 342-foot Pu'u Kuli cinder cone in the northeast corner of the property. Due to the elevation of the cinder cone, panoramic ocean views are available from the majority of the site. The proposed development area is roughly rectangular in shape with its longest frontage located on the North Kona coastline. The ocean frontage consists of a rather rugged coastline which is generally unsuitable for swimming.

The Keahole Airport is a short four-mile drive from the property and provides nonstop air transportation from Honolulu, the other neighbor islands and the U. S. mainland. The property would thus be easily accessible by visitors to the Kona and Kohala Coast area. The primary access road, Queen Kaahumanu Highway, runs between Kailua and Kawaihae. Excellent roads provide easy ground access from Hilo and other parts of the island of Hawaii.

Awake'e's proximity to Kailua Town's many attractions and facilities should favorably position the Resort with respect to guest activities. In addition, driving times to other Hawaii points of interest such as Hilo, Volcano National Park, Hawi, the Mauna Highlands, Captain Cook and the coffee plantations are comparable to those from other Kohala Coast resort developments.

Resort Master Plan

The development concept for Awake'e is for a compact, intermediate-sized resort community, including hotel and condominium units, an 18-hole golf course and the necessary retail and service support facilities. The primary elements of the master plan include:

- Hotel development - One hotel with about 600 rooms would be sited next to the Kaholawa Bay area. The site would be afforded excellent views of the coastline and Pu'u Kuli.
- Condominium development - About 900 condominium apartments would be positioned throughout the property. One grouping would be located on the slope of Pu'u Kuli, fronting the coast, another along the entrance road to the Kaholawa Bay hotel and the balance positioned around the golf fairways with varying views of the coast and Pu'u Kuli.
- Commercial development - Two retail/commercial areas could offer shopping, dining and services for Resort and regional guests and residents. One would be located near Awake'e Bay and could include parking spaces for local residents utilizing the bay for recreational purposes. The second would be sited on the slopes of Pu'u Kuli and contain a restaurant with panoramic views of the coast.
- Golf course and clubhouse - A par-72, 18-hole championship golf course would be the major recreational amenity of the development. It would also provide parklike frontages and view corridors for the condominium units and outstanding vistas for the golfers.

VISITOR INDUSTRY REVIEW

The visitor industry was the largest source of income to the state in 1985. This section summarizes visitor industry trends, visitor characteristics and projected visitor arrivals.

Historical Visitor Arrivals

Visitor arrivals to the state totaled nearly 4.9 million persons in 1985. Of the state's total visitors, nearly 3.7 million, or 75%, were westbound visitors and about 1.2 million, or 25%, were eastbound visitors. The growth in visitors to the state has historically been strong with an average annual increase of 10.4% between 1960 and 1970, 8.5% between 1970 and 1980 and 4.4% between 1980 to 1985. This declining trend in growth is attributable to the increasing visitor base and the maturing development of Hawaii as a visitor destination.

Since 1970 the neighbor islands have collectively experienced a relatively faster rate of growth in westbound visitor arrivals than has Oahu. The neighbor islands have experienced an average annual growth rate of 6.5% from 1970 through 1985 compared to 5.6% for Oahu. The island of Maui has experienced the highest growth rate over this period in the state at 10.7% annually while the island of Hawaii had the lowest growth rate at 3.9%.

In the future, visitor arrivals to Hawaii and Kauai counties are expected to follow a pattern more similar to Maui's and to increase significantly in future years due to:

- Increased air service to and more effective marketing of the neighbor islands, with three major inter-island carriers and direct flights to Kauai, Maui and Hawaii from major mainland destinations.
- A greater number of repeat visitors to the state who seek new visitor destinations.
- Greater development of visitor accommodations on the neighbor islands with an emphasis on creating international destination resorts.

Visitor Characteristics

Travel patterns of westbound visitors to the state are summarized as follows:

- Westbound visitors to Hawaii tend to be vacationers.
- Approximately 75% of westbound arrivals travel independently rather than in groups.
- Condominium usage has increased to represent nearly 20% of visitor accommodations in 1984, as compared to less than 1% in 1975.
- Average party size has slowly increased over the last ten years, moving from 1.74 persons in 1975 to 1.85 persons in 1985.
- Average length of stay in the state has remained relatively stable over the last ten years at approximately ten days. Length of stay varies considerably by island, however, and has increased on the neighbor islands in recent years.

Visitor Market Segments

Visitors may be segmented by their travel status. The four major segments of Hawaii's visitor market are reviewed below:

1. Free and independent travelers - Free independent travelers (FIT) are those that travel and plan their itineraries individually rather than with a group. FITs typically have higher-than-average incomes, patronize higher priced visitor accommodations and are often repeat visitors. FITs, including visitors using individual packages, have been increasing as a percent of total state visitors over the last decade from 58% in 1978 to 76% in 1985.
2. Group inclusive tours - The group inclusive tour traveler market includes visitors who travel together in organized tours with preset travel arrangements. Group travelers have declined as a percent of all westbound visitors over the last decade from 27% in 1978 to 14% in 1985.
3. Convention attendees - The convention market consists of those attending meetings or conventions. This market has fluctuated in a range between 3.6% to 8.6% of total westbound visitors in recent years. Convention attendees have not represented a major visitor market for Hawaii due to the lack of a large convention facility in the state.
4. Incentive travelers - Incentive travelers are a small but sought after market segment consisting of individuals and groups who have won or earned all-expense paid Hawaii vacations. These travelers tend to be put up in the better accommodations by their corporate sponsors and have some prepaid meals. This market is growing in importance and represented 4.9% of visitors in 1985.

Proposed Visitor Arrivals

The State of Hawaii Department of Planning and Economic Development (DPED) projects a continued increase in visitor arrivals, resulting in more than eight million visitors to the state by the year 2005. Because of the island of Hawaii's expected emergence as one of the state's major destination resort areas, visitors to the island are expected to represent about 30% of westbound visitors and 9% of eastbound visitors to the state within the next 20 years.

Thus, in total, island of Hawaii tourism is expected to increase at 4.6% annually to a total of nearly two million visitors per year by 2005.

HOTEL MARKET ASSESSMENT

This section summarizes hotel industry trends on the island of Hawaii, projected room requirements and the market support for hotel development at the Resort.

Hotel Inventory

As of February 1986, the island of Hawaii had a total of 7,280 visitor units, including hotel rooms and resort condominium units in rental pools. Hotel rooms accounted for 5,230 units, or 72% of the island's total visitor units. Condominium units in transient visitor use accounted for the remaining 2,050 units, or 28%.

- The resort and hotel sites lack a quality sandy swimming beach. Good swimming beaches are offered by other existing luxury resorts as well as some planned resorts.
- Competition in the luxury hotel market on the island as well as the state is expected to be intense over the next decade due to the expected completion of the Hyatt Regency Maikoloa as well as the large number of planned and proposed developments throughout the state which are oriented to this traveler market.

Based on these factors, hotel development at the Resort is recommended to offer a first-class level of facilities and services targeted to the moderate- to upper-income clientele rather than the luxury, upscale traveler. In this way the Resort could position itself to:

- Benefit from the visitor reputation and quality image of the South Kohala area.
- Not compete with the luxury developments in the Kohala area.
- Serve the mid- to upper-income traveler markets by offering a higher quality alternative to the nonintegrated and random development of Kailua-Kona.

Based on the anticipated appeal of the Awake'e Resort hotel sites to the various markets and the experience of comparable Hawaii hotels, the distribution of these visitors at Awake'e is anticipated to be as follows:

Expected Hotel Target Markets

	Percent of total guests
FIT	25%
Package	20
Meetings and incentive groups	15
Other groups	40
	100%

The market support for hotel development at the Awake'e Resort is assessed in the following sections in terms of number of supportable rooms, development concept and phasing, projected occupancy rates and average room rates.

- Supportable rooms - The successful development of hotel accommodations at Awake'e is related to the overall demand for hotel rooms on the island of Hawaii over the next 20 years. Visitor unit occupancy levels are projected to improve significantly over the next six or seven years from about 63% in 1986 to almost 80% in 1993. Thus, the overall balance of visitor room demand and supply is expected to be healthy in the near future.

The estimated number of rooms that can be supported at the Awake'e Resort in particular is dependent on the market position of the Resort in relationship to the overall room demand.

A majority, or 62%, of the island's visitor accommodations are located in the Kona area. Including the Kohala district's 19%, together the Kona and Kohala district represents 81% of the island of Hawaii's accommodations inventory. Hilo, the island's first visitor destination area following statehood, now accounts for only about 18% of the visitor room inventory.

About 2,960 hotel and condominium units are planned on the island of Hawaii over the next five to six years. Based on the developers scheduled completion dates, the visitor unit inventory is expected to increase by about 5.8% annually from 1986 to 1992.

The largest of the planned visitor projects is the 1,244-room Hyatt Regency Maikoloa. This three-hotel facility is planned to open in late 1988 or 1989 and will feature extensive landscaping and waterways, an intraproject transportation system and extensive amenities and public facilities. The opening of this \$360 million dollar development is expected to have a definitely positive impact on tourism throughout the island by fostering increased visitor arrivals, marketing promotion of the island, attraction of a more upscale visitor mix, improved visitor awareness and image and longer average lengths of stay on the island.

Occupancy Levels

Occupancy levels on the island of Hawaii remain significantly lower than the state average, indicating that visitor units on the island may be temporarily overbuilt in relation to room demand. However, occupancies have improved significantly from 45% in 1981 to 63% during the first seven months of 1986.

Future visitor unit occupancies are projected based on anticipated hotel room demand and the expected visitor unit inventory. Visitor unit occupancy levels are estimated to increase from about 58% in 1985 to almost 70% by 1987, to the mid-70s by 1990 and to the low 80s by 1995. Thus, over the next 10 years, occupancy levels are expected to improve significantly by over 20 percentage points and to achieve 80% occupancies similar to that currently being experienced by the state as a whole.

Awake'e Resort Hotel Market Assessment

The potential market for hotel development at the Awake'e Resort is influenced by the following factors:

- The extensive ocean frontage offered by the hotel sites and the planned 18-hole championship golf course is expected to attract visitors who seek at least a first-class level of service.
- The proximity of the Resort to affordably priced shopping, dining and other recreational amenities of Kailua Town as well as the higher priced amenities of the South Kohala resorts would provide additional attractions to the first-class market.
- The reputation and widespread market recognition of the South Kohala luxury resorts would also attract travelers with lower budgets to the area.

The design of the Hotel should emphasize ocean views and create a tropical setting which is associated with Hawaii resorts. The Hotel could consist of a mid-rise main building of 400 to 500 rooms and a low-rise suite-type facility of 100 to 150 rooms. The low-rise structures could be oriented around pools or lagoons in a similar manner to the bungalows at Kahala Hilton Hotel or the Kauai Beach Villas condominiums next to the Kauai Hilton Hotel. This could enable the Hotel to serve two distinct guest market segments in a single facility and allow greater privacy and seclusion for the FIT and family visitor market while accommodating groups in the main facility.

- Projected occupancy rates - Based on the anticipated market position of the Resort, projected islandwide occupancy levels and the experience of comparable Hawaii hotels, the proposed Hotel is estimated to be able to achieve a stabilized occupancy level of 80% by the fourth year of operations. During the first three years of operation, occupancy levels are expected to progress from 60% in the first year of operations to the stabilized 80% occupancy rate as the Hotel develops its market position in the FIT, repeat visitor, group and meetings and conventions markets, as shown in the following table:

Projected Occupancy Rates for the
Proposed Awake'e Resort Hotel

1993 to 1997

	Projected occupancy level	
	Island of Hawaii	Proposed Awake'e hotel
1993	79%	60%
1994	81	70
1995	82	75
1996	83	80
1997	83	80

- Projected average room rates - The Hotel is estimated to achieve an average daily room rate of about \$90 in 1986 dollars. This projected room rate considers the rates achieved at the selected hotels, their site characteristics, hotel and resort amenities and guest market segments in comparison to the proposed hotel at Awake'e. This rate is lower than the rates achieved by the Waiohale, Maui Marriott and Princeville Sheraton Hotels due to their relatively more widespread resort reputation, beach frontage high-quality golf course facilities and resort amenities. However, this achieved rate is slightly higher than the \$83.81 average room rate achieved by Kona hotels in the first seven months of 1986.

CONDOMINIUM MARKET ANALYSIS

This section summarizes recent condominium development trends and the market outlook for the Island of Hawaii. Based on this analysis, the market support and orientation of condominium development at the Resort are summarized.

The Awake'e Resort is relatively small in comparison to the Keauhou Resort which receives almost 30% of the current visitor room demand. The Resort is initially planned to be similar in size to the emerging resort areas of Mauna Kea, Mauna Lani and Waikoloa Beach on the island of Hawaii. These resorts have been able to achieve about 6% to 9% of the total Hawaii county market.

The Awake'e Resort is estimated to be able to achieve 5% to 7% of the total visitor room requirements based on the competitive attractiveness of the Resort and the anticipated lower room rates it is expected to achieve relative to the South Kohala luxury resorts. Assuming the hotel rooms are completed between 1993 and 1997, when industrywide occupancy levels are expected to be about 80%, about 400 to 600 rooms could be supported at the Resort by 1993 and about 500 to 700 rooms by 1997, as shown in the table below:

Supportable Hotel Rooms at Awake'e Resort

	Hawaii hotel room requirements(1)		Awake'e Resort market share(2)	
	80% occupancy	75% occupancy	70% occupancy	5% to 7%
1993	7,500	8,000	8,600	400 560
1994	8,100	8,600	9,200	430 600
1995	8,500	9,100	9,700	460 640
1996	9,000	9,600	10,300	480 670
1997	9,300	10,000	10,700	500 700

(1) Based on figures shown in Exhibit IV-L.

(2) Based on midrange 75% average occupancy assumption.

- Development concept and phasing - Due to the need to develop a critical mass of hotel activity and to enable the hotel to accommodate larger groups, 550 to 650 hotel rooms are proposed to be developed in one phase by about 1993. At this time, islandwide occupancy levels are expected to be relatively high and the Kona and Kohala area is expected to have developed greater visitor recognition due to planned visitor facilities on the island.

The concept for the proposed hotel would be to create an activity-oriented resort hotel which would be a complete "resort" in itself. The Hotel could serve as an "amenity" to the entire Awake'e Resort and provide:

- A focal point for all Resort activities
- An internationally known hotel operator that could market and promote both the Hotel and Resort as a whole
- Restaurants and meeting facilities for the use of resort condominium guests
- A pool of potential repeat visitors who could be potential condominium purchasers at Awake'e

• Buyer motivations - Buyers at first-class resort developments are more likely than those at luxury resort developments to be primarily motivated by investment with the majority of the units typically kept in a visitor rental pool. Only a small portion of the condominiums are purchased as primary residences. At the selected comparable projects, full-time residents are estimated to occupy between 4% and 13% of the units.

Resort condominium owners also tend to be repeat visitors to the region's hotel(s) or condominium(s) who have decided to make a greater commitment to the area as a vacation destination.

Sales Outlook for the Island of Hawaii

New condominium unit sales on Hawaii island since 1978 have averaged about 270 units per year based on a three-year moving average, as shown previously. This market is expected to expand in future years due to the expected:

- Strengthening of the island economy
- Increases in visitor arrivals to the island
- Increase in condominium product development and diversity
- Lower and more stable interest rates
- Increased market awareness of the island of individual resorts

The long-term outlook for new condominium unit sales on the island, however, may also be affected in the short term by public uncertainty over the effects of expected changes in Federal tax law provisions and the loss of some tax incentives to investment. Thus new unit sales to 1990 may remain at about the same levels as observed in recent years. Thereafter, the sales absorption of new units on the island is projected to increase, as shown in the following table:

Projected New Condominium Sales
for the Island of Hawaii

1991 to 2010

	Units sold	
	Average Annual	Total
1991 to 1995	350	1,750
1996 to 2000	450	2,250
2001 to 2005	550	2,750
2006 to 2010	675	3,375
Total		10,125

Awake's Resort Condominium
Market Assessment

The potential market orientation of condominium development at Awake's is affected by the following factors:

Development Trends

Resort condominiums are differentiated from nonresort condominiums based on their relatively higher quality, location in resort areas with recreational amenities and their orientation to second homeowners or vacation users. The island of Hawaii presently includes about 52 condominium projects located in resort areas. These projects represent over 4,200 units, the majority of which are located in the Kona area. About 740 units are planned over an indefinite time period including units at the Mauna Lanai Point, Waikoloa Shores and Keauhou Resort areas.

In addition, there is significant existing zoned capacity for condominium development at Waikoloa, Mauna Lanai and Keauhou Resorts and there are numerous proposed resorts currently seeking county and/or state government approvals for further condominium development on the island.

Market Performance of Comparable
Condominium Projects

Characteristics of selected condominium projects located in resort areas on the islands of Hawaii and Maui are reviewed in order to provide a context for the condominium development program proposed for Awake's.

- Sales absorption - Annual new condominium sales have fluctuated dramatically since 1978 from the current low of about 100 units to over 492 units in 1979 for an average of about 250 units per year over the period. Using a three-year moving average to smooth the fluctuations, between 195 and 398 units were sold annually for an average of about 270 units per year over the period.
- Sales price - Average prices of new condominium units sold in the North Kona district since 1982 range from about \$150,000 up to \$250,000. These averages represent projects located in the master-planned Keauhou Resort as well as stand-alone projects located in the Kailua area that do not offer private access to golf.
- New unit sales prices in the South Kohala district have been significantly higher than in North Kona due to the high quality of recent developments in the district and their locations in prestigious, master-planned resorts that offer golf, sandy white beaches and other amenities. The average prices of new units sold in South Kohala have ranged from about \$300,000 for one-bedroom units to over \$900,000 for three- and four-bedroom units.
- Buyer profile - Purchasers of resort condominiums on the island of Hawaii typically (1) are from the west coast of the mainland, primarily from California, Washington, Oregon and Alaska; (2) have average annual household incomes of \$100,000 or more; (3) are experienced in real estate acquisition and ownership and may own one or more other vacation homes; (4) are married couples, aged 35 to 55, without dependents; and (5) are most often corporate executives, self-employed heads of business, real estate developers or professionals but may also include visitor industry company owners or managers.

- The first-class quality of the proposed hotel development at the Resort.
- The long ocean frontage but lack of sandy beaches at the site.
- The favorable location of the proposed condominium sites with respect to ocean and golf course views and frontage.
- Proposed competitive developments elsewhere on the island.

Based on the above-mentioned considerations, condominium development at Awake'e could have a first-class market orientation with units targeted primarily at buyers who seek vacation or future retirement homes. Based on unit usage observed at other resort condominium projects, however, it could be expected that many of the units would also be kept in visitor rental pools.

- Supportable rooms - Supportable rooms at Awake'e are estimated based on an 8% to 10% share of expected future new condominium unit sales on the island. This market share is considered achievable at Awake'e due to the distribution of recent condominium sales at comparable Hawaii county resorts, superior view orientations available from most of the proposed Resort condominium sites and the recommended unit mix and pricing.

Thus, it is estimated that sales absorption at Awake'e could amount to about 140 to 175 units between 1991 and 1995 and up to 270 to 340 units between 2006 and 2010. This would represent average sales of 40 to 50 units per year over the 20-year period, or sellout of about one project phase per year. The projected sales absorption results in total market support for development of about 800 to 1,000 units between 1991 to 2010, as shown in the table below:

Projected Annual New Condominium Unit Sales
at Awake'e Resort

Years	Projected total island condominium sales	Awake'e projections			Cumulative sold units	
		Period sales by market share	8%	10%	Low	High
1991 to 1995	1,750	140	175	140	140	175
1996 to 2000	2,250	180	225	180	320	400
2001 to 2005	2,750	220	275	220	540	675
2006 to 2010	3,375	270	340	270	810	1,015
Total, rounded	10,125	810	1,015			
Average annual sales, rounded - 1991 to 2010		510	40	50		

- Unit sizes and prices - The oceanfront and prime ocean view sites designated on the master plan, could be expected to achieve unit prices ranging from about \$200,000 to \$450,000 and averaging \$350,000. Other condominium sites could achieve unit prices ranging from about \$150,000 to \$250,000 and averaging about \$200,000 per unit. Proposed net average unit sizes, prices and prices per square foot are summarized in the following table:

Proposed Condominium Unit Sizes and Prices
at Awake'e Resort

	Average unit size(1)	Unit prices		Price square foot
		Range	Average	
Oceanfront/ocean view sites	1,300	\$ 200,000 - 450,000	350,000	270
Other sites	1,100	150,000 - 250,000	200,000	180

(1) Net square feet, excluding lanai and garage spaces.

COMMERCIAL MARKET ANALYSIS

This section summarizes the recent trends at selected resort shopping centers in Hawaii. With this background, the market support for commercial space at the Resort is assessed and development guidelines are recommended in terms of development phasing and tenant mix.

Resort Shopping Center Review

Five resort shopping centers were reviewed in terms of their physical characteristics, occupancy rates, retail sales levels and retail market segments. These shopping centers included:

- Whaler's Village (Kaanapali Resort, Maui)
- Mailea Shopping Village (Mailea Resort, Maui)
- Coconut Plantation Marketplace (Coconut Plantation, Kauai)
- Princeville Center (Princeville Resort, Kauai)
- Keauhou Shopping Village (Keauhou Resort, Hawaii)

Architectural themes of the selected resort shopping centers relate to the architectural themes of the resorts. Coconut Plantation Marketplace has an outdoor bazaar theme with numerous kiosks. This bazaar theme reflects the design theme of the Coconut Plantation resort. Whaler's Village has a Whaler's Museum and whaling exhibits throughout the center to recall the whaling history of the Lahaia and Kaanapali area. Whaler's Village also has ocean frontage which adds to the ambience of its waterfront restaurants. Princeville Center has a turn-of-the-century architectural theme, which also relates to the resort's architectural theme. Mailea Shopping Village has a luxury resort style befitting the image sought at the Mailea resort area.

The amount of retail space that a resort shopping center can support is related to the size of the resort population which it supports, the number of competitive shopping areas within the trade area and the degree to which the centers cater to residents of surrounding residential communities. The total leasable retail space at the five shopping centers ranged from 26,000 square feet at the Mailea Shopping Village to 90,000 square feet at Whaler's Village.

The site areas which the resort shopping centers occupied ranged from 6.9 acres at Princeville Center to 10.5 acres at Wailea Shopping Village. Resort shopping centers thus have a typical retail floor area to site area coverage ratio of 20% to 25%.

Typically, the tenants at resort shopping centers are oriented towards the visitor market that are accommodated at the hotels, condominiums and single-family homes at the resort. Princeville Center and Keauhou Shopping Village also cater to the resort residential market and the residents of surrounding communities due to the proximity of these markets and the lack of competitive shopping facilities within their trade areas.

Retail tenants at the selected resort shopping centers tend to be concentrated in a few retailing categories. The apparel, gift, craft or jewelry store, and restaurant categories generally represent 85% to 95% of the total retail space. Princeville Center, in contrast, has resident-oriented establishments such as a supermarket, hardware store and a bank, comprising more than two-thirds of the total retail space. Keauhou Shopping Village is anchored by a large supermarket which represents over one-half of the total retail space.

Office tenants represent a portion of the tenant mix at each of the selected resort shopping centers except Coconut Plantation Marketplace. Office tenants represent 6% of total leasable space at Whaler's Village, 17% at Wailea Shopping Village, 23% at Princeville Center and 10% at Keauhou Shopping Village. The relatively large portion of office space at Princeville Center reflects its residential market orientation.

Market Performance of Resort Shopping Centers

The resort shopping centers surveyed were highly successful as evidenced by high retail sales levels and high occupancy levels. The success of these centers can be directly attributed to the degree to which they serve the needs of their primary market, the visitor industry. The centers' ability to serve the needs of visitors is reflected in their tenant mixes which emphasize restaurants, apparel and gift stores. The resort shopping centers were an integral part of the resorts and served to enhance the visitor's experience by providing expanded and interesting dining and shopping opportunities.

- Occupancy levels - Occupancy levels at the selected shopping centers are very high with the weighted average occupancy level increasing from 96% in 1983 to 99% in 1985. The Keauhou Shopping Village is currently 86% occupied after the completion of the major portion of the center over one year ago in summer 1985.

- Retail sales levels - Retail sales levels are stated in dollars per square foot of gross leasable area per year. Sales levels at the selected resort shopping centers are significantly higher than levels experienced at neighborhood or regional shopping centers. The weighted average of retail sales for the selected resort shopping centers increased from \$320 per square foot in 1983 to \$445 per square foot in 1985.

Awake's Market Assessment

The market support for commercial space at the Resort is expected to come from three population segments:

- Awake's Resort guests
- Awake's Resort residents
- Off-Resort visitors and residents

The visitor and resident population expected to reside in the Resort's hotels and condominiums are estimated based on projected units developed, occupancy rates and unit usage patterns. The population of the Awake's Resort is projected to increase from almost 1,000 persons in 1995 to almost 2,000 persons by 2010.

The supportable commercial space at the Resort is estimated based on the projected retail expenditures from these three market segments as well as a desired level of sales per square foot. Based on a desired annual sales level of \$300 per square foot, Awake's Resort could support approximately 22,300 square feet of retail space in 1995 and 40,700 square feet of retail space by 2010. However, the net retail demand at the Awake's commercial center, taking into account about 9,000 square feet of retail space that could be expected to be provided by the Resort's hotel, is estimated to be about 13,300 square feet in 1995 and 31,700 square feet by 2010, as shown in the table below:

Projected Supportable Commercial Space at Awake's Resort

	1995 to 2010			
	1995	2000	2005	2010
Projected annual expenditures (in millions: 1986 dollars)	\$ 6.7	8.5	10.2	12.2
Desired sales per square foot	\$ 300	300	300	300
Estimated retail space demand(1)	22,333	28,333	34,000	40,667
Less hotel commercial space(2)	9,000	9,000	9,000	9,000
Net retail space demand	13,333	19,333	25,000	31,667
Plus office/service space(3)	2,354	3,411	4,412	5,588
Total supportable commercial space:	15,690	22,740	29,410	37,250
Cumulative, rounded	15,690	7,050	6,670	7,840
Net additional				

- (1) Gross leasable square feet.
- (2) Estimated at 15 square feet of retail space per additional hotel room for 600 rooms to be built in the 1991 to 1995 period.
- (3) Estimated at 15% of total shopping center area.

In addition, based on the experience of the selected resort shopping centers surveyed, the supportable office/service space is estimated to be 15% of the total shopping center area. This brings the total supportable commercial space to 16,000 square feet in 1995 and 37,000 by 2010.

Development Phasing

The current master plan for the Awake'e Resort establishes two sites for commercial use. These include a 3.5-acre oceanfront site near the Awake'e Bay Hotel site and a 1.5-acre elevated site located on the side of the Pu'u Kuli'i cinder cone.

Two phases of commercial development are recommended as follows:

- Phase I - The initial phase for commercial development could include about 22,000 square feet and be developed by about the year 2000, or about seven years after the Resort's Hotel is completed. In prior years, the retail and restaurant facilities of the Hotel could accommodate the retail needs of Resort guests. The initial complex could be located on the oceanfront site so as to create a unique Resort amenity and a concentrated cluster of activity near to the Hotel and condominium developments.
- Phase II - The second phase of commercial development would include an additional 15,000 square feet of space and be developed by about 2010. This would result in a total of 37,000 square feet of retail area. Part of this phase could be developed on the second site on the side of Pu'u Kuli'i and contain a fine dining restaurant which would take advantage of the outstanding views of the Kona and Kohala coastline afforded by the site. This site could be developed to cater to a more upscale market and could potentially emerge as one of the leading restaurant areas in the Kona and Kohala area.

Assuming a site coverage ratio of .2 for the 37,000 proposed square feet of commercial space, about 4.2 to 5.0 acres of commercially zoned land would be required at the Resort.

DEVELOPMENT SUMMARY

The proposed development phasing for the Awake'e Resort is based on the market support for the various land uses as described in the previous sections, and is summarized in the table below:

Proposed Cumulative Development Phasing for the Awake'e Resort				
	1995	2000	2005	2010
Hotel units	600	600	600	600
Condominium units	140 - 175	320 - 400	540 - 675	810 - 1,015
Commercial square feet	-	22,000	22,000	37,000

III - AWAKE'E RESORT DESCRIPTION

AWAKE'E RESORT
Awake'e Resort Location

[illegible]

Unlike much of the Kona coastline, Awa'e'e enjoys topographical variations due to the 342-foot Pu'u Kūlii cinder cone in the northeast corner of the property. Due to the elevation of the cinder cone, panoramic ocean views are available from the majority of the site. Lava long ago engulfed the land and it is now sparsely covered with grass and kawe trees. The proposed development area is roughly rectangular in shape and fronts a rather rugged coastline which is generally unsuitable for swimming. A few jeep trails run through the property and the shore is sometimes used for fishing, swimming and beachcombing by island residents.

The area is well suited for resort development. Air quality is excellent. Marine waters are clear and unpolluted. Noise is limited to the sound of surf and airport acoustic disturbances are minimal as the site is out of the Keahole Airport flight path. The last major lava flow to the property took place about 1800. The area is not designated as a high water flooding zone, but structures must be designed for Zone 3 seismic activity.

Access

The property would thus be easily accessible by visitors to the Kona and Kohala coast area. The primary access road, Queen Kaahumanu Highway, runs between Kailua and Kapaehaie. The Kapehale Airport is a short four-mile drive from the property and provides nonstop air transportation from Honolulu, the other neighbor islands and the U. S. mainland. Excellent roads provide easy ground access from Hilo and other parts of the island of Hawaii.

Attractions

Awake's proximity to Kailua Tom's many attractions and facilities should favorably position the Resort with respect to guest activities. In addition, driving times to other Hawaii points of interest such as Hilo, Volcano National Park, Hail, the Maimea Highlands, Captain Cook and the coffee plantations are comparable to those from other Kohala Coast resort developments.

Distance to Island Attractions
from Awake's

	Distance (miles)
South to:	
Keahole Airport	4
Honokohau Sailing Boat Harbor	5
Kailua-Kona town	11
Kailua Kona	11
North to:	
Mauna Kea Resort	21
Maimea	30
Hilo	80

RESORT MASTER PLAN

The development concept for Awake's is for a compact, intermediate-sized resort community including hotel and condominium units, an 18-hole golf course and the necessary retail and service support facilities, as shown in Exhibit 11-B.

A total of 1,500 visitor units are planned at the Resort, as shown in Exhibit 11-B. Thus the Resort is planned to be much smaller in scale than the existing Keahou, Mauna Kea, Mauna Lanii and Waikoloa Beach Resorts, each of which is proposed to ultimately contain 6,000 or more units.

The Hotel would have about 600 rooms and be sited close to the coastline, as shown in the Resort master plan in Exhibit 11-C. The Hotel is planned for the Kahaloa Bay area, with excellent views of Pu'u Kuli and the coastline.

About 900 condominium apartments would be positioned throughout the property. One grouping would be located on the slope of Pu'u Kuli, fronting the coast, another along the entrance road to the Kahaloa Bay hotel and the balance positioned around the golf fairways with varying views of the coast and Pu'u Kuli.

A par-72, 18-hole championship golf course would be the major recreational amenity of the development. It would also provide park-like frontages and view corridors for the condominium units and outstanding vistas for the golfers. The golf clubhouse would be sited in mid-property just off the main access boulevard and would contain a reservations and starting desk, offices, pro shop, locker rooms, lounge area and restaurant/coffee shop.

Two retail/commercial areas could offer shopping, dining and services for Resort and regional guests and residents. One would be located near Awake's Bay and could include parking spaces for local residents utilizing the Bay for recreational purposes. The second would be sited on the slopes of Pu'u Kuli and contain a restaurant with panoramic views of the coast.

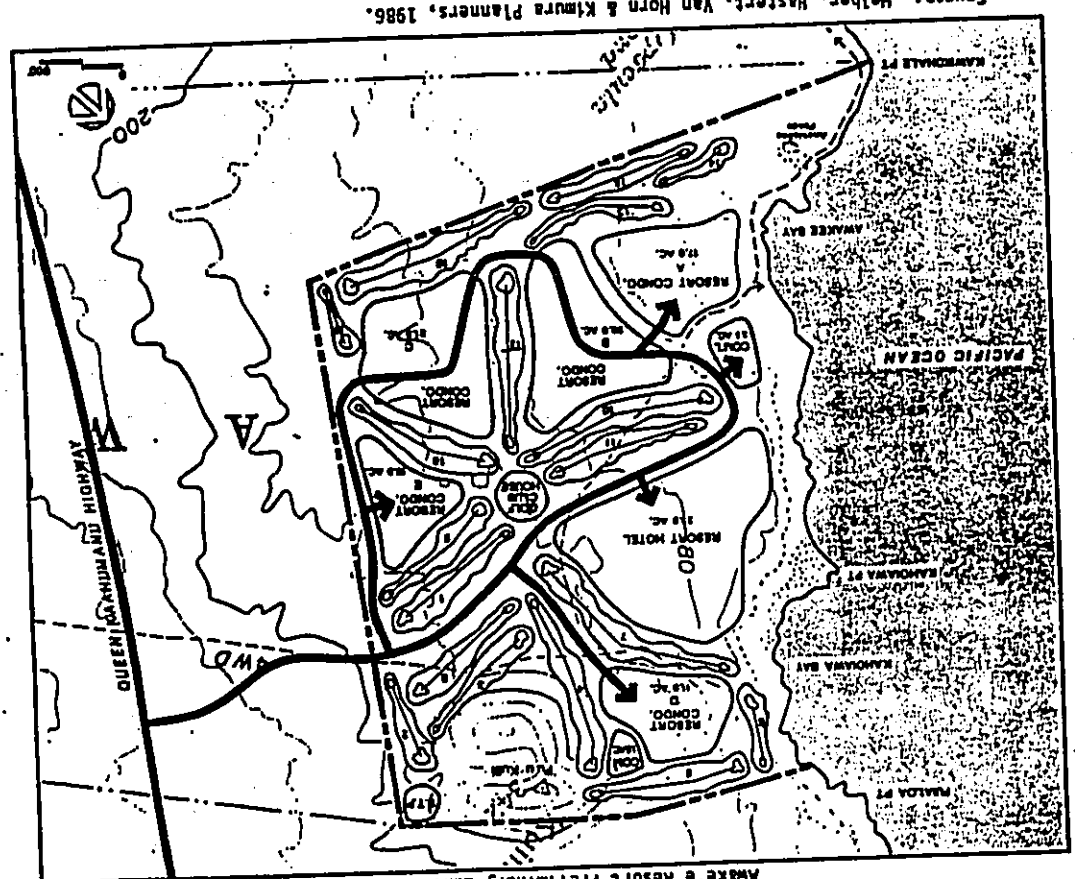
AWAKE'S RESORTProposed Land Uses at Awake's Resort

	Acres	Units	Units per acre
Visitor units:			
Hotel	33	600	18.0
Condominium (five sites)	79	900	11.0
	112	1,500	13.4
Resort amenities:			
Golf course/clubhouse	166	-	-
Commercial (two sites)	5	-	-
Public beach park/open space/circulation	66	-	-
	237	-	-
Total	349	1,500	13.4

Source: Helber, Mastert, Van Horn & Kimura Planners.

AWAKE'E RESORT

Awake, Resort Preliminary Land Use Plan

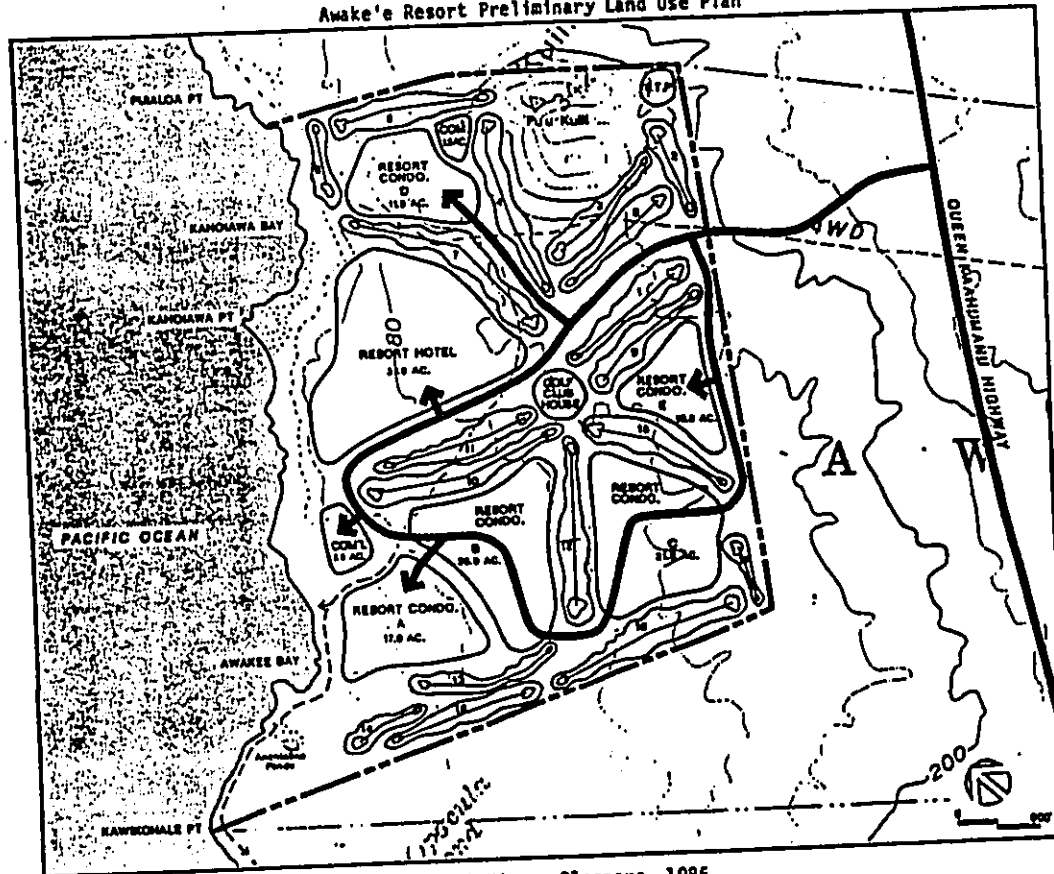


Source: Helber, Haster, Van Horn & Kimura Planners, 1986.

A-14

AWAKE'E RESORT

Awake'e Resort Preliminary Land Use Plan



Source: Helber, Hastert, Van Horn & Kimura Planners, 1986.

Exhibit II-C

III - HAWAII VISITOR MARKET REVIEW

This chapter reviews recent trends in the visitor market and visitor arrivals to the state and the island of Hawaii. In addition, major neighbor island resorts are reviewed to provide a perspective for the potential market position for resort development at the Awake'e Resort.

VISITOR ARRIVAL TRENDS

Visitors were the largest source of income for the state of Hawaii in 1985. The Hawaii Visitors Bureau (HVB) tabulates and reports the estimated overnight visitors to the state, separating visitors in terms of travel direction for statistical purposes. Westbound visitors are defined as those arriving from North America and traveling to Hawaii and other destinations in the Pacific and Asian areas. Eastbound visitors are defined as those visitors traveling from Asia (primarily Japan) and the Pacific to Hawaii or beyond. This section reviews trends in the visitor industry in the state and on the neighbor islands of Hawaii.

Statewide Visitor Arrivals

Visitor arrivals to the state totaled nearly 4.9 million persons in 1985, which represents a 0.3% increase over 1984. In 1985 visitor arrivals to the state were severely curtailed by the one-month long United Airlines strike that began in June.

Of the state's total visitors, nearly 3.7 million were westbound visitors and about 1.2 million were eastbound visitors. The growth in visitors to the state has historically been strong with an average annual increase of 19.4% between 1960 and 1970, 8.5% between 1970 and 1980 and 4.4% from 1980 to 1985, as shown in Exhibit III-A. This declining trend in growth is attributable to the increasing visitor base and the maturing development of Hawaii as a visitor destination.

Over the past ten years westbound visitors have made up about 79% of state visitor arrivals. Westbound arrivals have increased at an average annual growth rate of 18.1% from 1960 through 1970, 8.7% from 1970 through 1980 and 5% from 1980 through 1984. Although a significantly smaller segment of the visitor market, eastbound arrivals have grown at a faster rate than westbound arrivals with average annual increases of 24.9% from 1960 through 1970, 7.8% from 1970 through 1980 and 6.1% from 1980 through 1985.

During the first seven months of 1986, visitor arrivals to Hawaii have increased about 14.3% over the prior period and are estimated to amount to 5.5 million arrivals by year's end. The visitor industry in Hawaii is currently benefiting from a number of favorable factors. These include:

- Short-term factors:
 - Weak U. S. dollar
 - Increased air capacity and expanded service both at points of origin and destination

Exhibit III-A

Year	Westbound		Eastbound		Total		Average annual percentage growth
	Number	Annual percentage growth	Number	Annual percentage growth	Number	Annual percentage growth	
1960	250,795	- %	45,722	- %	296,517	- %	- %
1965(1)	567,218	17.7	119,710	22.3	686,928	18.6	18.6
1970	1,326,135	18.5	420,835	28.6	1,746,970	20.5	20.5
1975	2,207,417	12.1	621,688	15.4	2,829,105	13.0	13.0
1976	2,551,601	15.6	668,550	7.5	3,220,151	13.8	13.8
1977	2,763,312	8.3	670,355	0.3	3,433,667	6.6	6.6
1978	3,030,999	9.7	639,310	4.6	3,670,309	6.9	6.9
1979	3,139,455	3.6	621,076	28.4	3,760,531	7.9	7.9
1980	3,046,132	(3.0)	888,372	4.4	3,934,504	(0.7)	(0.7)
1981	2,974,791	(2.3)	959,832	8.0	3,934,623	-	-
1982	3,278,519	10.2	964,400	0.5	4,242,919	7.8	7.8
1983	3,395,880	3.6	972,000	0.8	4,367,880	2.9	2.9
1984	3,721,380	9.6	1,134,200	16.7	4,855,580	11.9	11.9
1985	3,708,610	(0.3)	1,175,500	3.6	4,884,110	0.3	0.3
1986 (January to July)	2,548,210	15.8 (3)	748,500	9.2(3)	3,296,710	14.3 (3)	14.3 (3)
1960 to 1985		18.1		24.9		19.4	19.4
1970 to 1980		8.7		7.8		8.5	8.5
1980 to 1985		4.0		5.7		4.4	4.4

(1) Visitor statistics collection system was revised in 1964.
 (2) Not significant.
 (3) Represents change from same period in previous year.

Source: Hawaii Visitors Bureau, annual and monthly reports.

AWAKE'E RESORT
 Overnight Visitors to the State of Hawaii
 1960 to 1986

III - HAWAII VISITOR MARKET REVIEW

III-1

This chapter reviews recent trends in the visitor market and visitor arrivals to the state and the island of Hawaii. In addition, major neighbor island resorts are reviewed to provide a perspective for the potential market position for resort development at the Awake'e Resort.

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Visitors were the largest source of income for the state of Hawaii in 1985. The Hawaii Visitors Bureau (HVB) tabulates and reports the estimated overnight visitors to the state, separating visitors in terms of travel direction for statistical purposes. Westbound visitors are defined as those arriving from North America and traveling to Hawaii and other destinations in the Pacific and Asian areas. Eastbound visitors are defined as those visitors traveling from Asia (primarily Japan) and the Pacific to Hawaii or beyond. This section reviews trends in the visitor industry in the state and on the neighbor islands of Hawaii.

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 - Weak U. S. dollar
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AWAKE'E RESORT

Overnight Visitors to the State of Hawaii
1960 to 1986

Year	Westbound		Eastbound		Total	Average annual percentage growth
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1985	3,708,610	(0.3)	1,175,500	3.6	4,884,110	.3
1986 (January to July)	2,548,210	15.8 (3)	748,500	9.2 (3)	3,296,710	14.3 (3)
Compound annual percentage increase:						
1960 to 1970		18.1		24.9		19.4
1970 to 1980		8.7		7.8		8.5
1980 to 1985		4.0		5.7		4.4

- (1) Visitor statistics collection system was revised in 1964.
 (2) Not significant.
 (3) Represents change from same period in previous year.

Source: Hawaii Visitors Bureau, annual and monthly reports.

Exhibit III-A

- Lower air fares
- European travel uncertainties
- Long-term factors:
 - More effective and aggressive tourism marketing
 - Introduction of new U. S. travel markets to Hawaii
 - Development of resort destination areas
 - Development of new and competitive hotel facilities

Neighbor Island Visitor Arrivals

Since 1970 the neighbor islands have collectively experienced a relatively faster rate of growth in westbound visitor arrivals than has Oahu. According to the HVB, the neighbor islands have experienced an average annual growth rate of 6.5% from 1970 through 1985 compared to 5.6% for Oahu. The neighbor island performance, however, has been due to the very high growth in Maui county, which averaged 9.8% per annum over the period. The island of Hawaii experienced the lowest growth rate over the period, averaging 3.9%, as shown in Exhibit III-8. Visitor arrivals to Hawaii and Maui counties are expected to follow a pattern more similar to Maui's and to increase significantly in future years due to:

- Increased air service to and more effective marketing of the neighbor islands, with three major inter-island carriers and direct flights to Kauai, Maui and Hawaii from major mainland destinations.
- A greater number of repeat visitors to the state who seek new visitor destinations.
- Greater development of visitor accommodations on the neighbor islands with an emphasis on creating international destination resorts.
- Slower development on Oahu due to a restrictive environment created by the high density of Waikiki and lack of developable land.
- A decline in new visitor facilities and the aging of the visitor plant, on Oahu.

Exhibit III-C presents the percentages of the state's westbound visitors who indicate an intention to visit the neighbor islands based on surveys conducted by the HVB. Due to multiple responses indicating intentions to visit more than one island, total percentages for the state add to more than 100%.

Prior to the full development of resort infrastructure on the neighbor islands, most visitors stayed in Waikiki. In 1970, approximately 94% of the visitors to Hawaii stayed on Oahu. Although it is still the most visited island in the state, Oahu has shown a decline in its market share. In 1985 the island captured only 76% of westbound visitors, while the neighbor islands, notably Maui, have gained in market shares.

Nearly half of all westbound visitors indicated an intention to visit the island of Maui in 1985, as compared with 34% in 1970. Maui includes the three major resorts of Kaanapali, Wailea and Kapalua. A fourth major resort has recently been completed at Makena which recently opened the 310-room Maui Prince Hotel in June 1986.

AWAKE'E RESORT Westbound Visitors to the Neighbor Islands 1970 to 1986

Year	Neighbor island counties			
	Oahu	Hawaii	Maui(l)	Kauai Total
1970	1,246,970	445,401	447,985	410,075 1,303,461
1971	1,311,426	522,166	554,799	472,563 1,549,628
1972	1,572,380	637,562	710,050	565,386 1,912,998
1973	1,785,485	694,170	766,791	590,475 2,051,436
1974	1,877,845	742,839	852,204	601,703 2,196,746
1975	1,889,790	769,779	931,863	632,821 2,334,463
1976	2,169,850	816,514	1,110,726	699,275 2,626,515
1977	2,295,310	839,008	1,257,142	740,501 2,836,651
1978	2,494,890	908,983	1,403,054	837,712 3,149,749
1979	2,542,720	860,940	1,419,773	825,366 3,106,079
1980	2,398,740	761,103	1,378,189	781,409 2,920,701
1981	2,398,480	672,683	1,389,892	757,811 2,820,386
1982	2,589,190	678,170	1,550,080	733,295 2,961,545
1983	2,591,635	714,030	1,645,720	692,130 3,051,880
1984	2,901,320	760,940	1,854,690	814,590 3,430,220
1985	2,828,640	697,380	1,831,110	832,580 3,361,070
1986 (January to July)	N/A	470,540	1,204,240	470,540 N/A

Compound annual percentage increase:
1970 to 1985 5.6%
1980 to 1985 3.3%

N/A Not available.
(1) Includes the island of Molokai.

Source: Includes westbound visitors to and beyond Hawaii, as reported by the Hawaii Visitors Bureau, tabular release dated July 1984 and Annual Research Report, annual and records.

AWAKE'E RESORT
Percentage of Westbound Visitors
Visiting the Major Hawaiian Islands

1970 to 1986

Year	Oahu	Hawaii	Hawaii(1)	Kauai
1970	94.0%	35.6%	33.8%	30.9%
1975	85.6	34.9	42.2	28.7
1976	85.0	32.0	43.5	27.4
1977	83.1	30.4	45.5	26.8
1978	82.3	30.0	46.3	27.6
1979	81.0	27.4	45.2	26.3
1980	78.7	25.0	45.2	25.7
1981	80.6	22.6	45.2	24.6
1982	79.0	20.7	49.1	23.2
1983	76.3	21.0	50.1	21.1
1984	78.0	20.5	49.7	21.7
1985	76.3	18.8	49.4	22.4
1986 (January to July)	N/A	18.6	47.4	23.3

N/A Not available.

(1) Includes the island of Molokai.

Sources: Hawaii Visitors Bureau, Annual Research Report, annual and monthly. Figures reported represent percentage of the state's visitors who intended to visit each island; most tourists visit more than one island during their stay in Hawaii.

Kauai is estimated to have received 23% of the state's westbound visitors in 1985, down from about 31% in 1970. Kauai includes the resorts of Princeville, Coconut Plantation, Kiahuna, Poipu Kai, the Poipu area and the recently completed Hanalei resort.

The island of Hawaii attracted the lowest percentage of westbound visitors with about 19% indicating an intention to visit the island in 1985, compared to 36% in 1970. This decline in the percentage of the state's visitors since 1970, however, is due to changes in interisland air traffic patterns, where previously the town of Hilo was a major stopover point.

Comparable information on the interisland travel patterns of eastbound visitors is not available. However, survey data collected by the HVB suggests that they remain primarily on Oahu.

VISITOR CHARACTERISTICS

Travel patterns and demographic characteristics of westbound visitors to the state are presented in Exhibit III-D and are discussed below:

1. Purpose of trip - Westbound visitors to Hawaii tend to be primarily vacationers. About 80% of westbound travel to the state in 1985 was for pleasure and another 11% combined business with pleasure. The percentage of pleasure trips to Hawaii has generally increased since 1970.
2. Travel status - The travel status of visitors to Hawaii has remained fairly consistent since 1970, with approximately 75% of westbound arrivals traveling independently. Group travelers, including those visitors on tours and conventions, have declined in share since 1980. In 1985 group travelers comprised 18.4% of westbound arrivals. Market segments by travel status are further discussed in the following section.
3. Visitor accommodations - Types of accommodations have shifted significantly over the last ten years. Although hotels continue to serve the majority of visitors, the usage of condominiums has increased to nearly 21% of visitor accommodations in 1985, as compared with less than 1% in 1975. The increase in usage of condominiums is attributed to:
 - Improved management and marketing of condominium pools, along with companies specializing in this field.
 - Increases in repeat visitors and large visitor party sizes, including families that prefer accommodations with cooking facilities and multiple rooms per unit.
 - Development of condominium units which are designed to be operated in rental pools.
 - Greater condominium unit availability and ownership.
4. Average length of stay - Average length of stay in the state has remained relatively stable over the last ten years at approximately ten days.

AWAKE'E RESORT

Characteristics of
Westbound Visitors to Hawaii, Continued

	1970	1975	1980	1981	1982	1983	1984	1985
Age:								
Under 20	11.6%	9.2%	10.5%	11.1%	10.6%	11.5%	10.9%	10.3%
20 - 29	22.9	16.2	17.6	18.7	20.3	18.2	18.1	18.6
30 - 49	34.0	36.0	38.0	37.4	38.3	38.5	39.4	36.9
50 - 59	18.9	22.8	19.4	18.1	16.5	16.2	15.9	18.9
60 and older	12.5	15.8	14.5	14.7	14.3	15.6	15.7	15.3
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Median age (years)	40.7	44.5	41.3	40.2	39.1	39.8	40.1	39.7
Occupation:								
Professional and technical	27.9%	33.5%	35.8%	35.0%	36.1%	36.7%	36.3%	36.6%
Business, managerial and official	21.6	26.9	26.2	26.0	25.4	25.0	25.2	25.5
Clerical, office and sales	12.2	11.2	9.7	10.2	10.5	9.1	9.6	9.8
Military and dependents	13.7	.9	1.0	1.2	1.2	1.4	1.3	1.0
Other employed	7.2	8.0	7.6	7.6	7.5	6.8	7.0	7.0
Retired	7.6	12.5	11.5	11.8	11.5	13.1	13.6	13.4
Students and unemployed	9.8	7.0	8.2	8.2	7.8	7.9	7.0	6.7
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Trips to Hawaii:								
First	67.2	60.3	51.6	52.9	54.1	49.6	52.7	53.7
Second	14.7	17.1	18.8	18.3	18.1	18.9	18.6	18.8
Third	5.6	7.2	9.1	8.7	8.7	9.3	8.6	8.7
Fourth	12.5	15.4	20.5	20.1	19.1	22.2	20.1	18.8
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Repeat visitors	32.8%	39.7%	48.4%	47.1%	45.9%	50.4%	47.3%	46.3%

N/A Not available.

(1) Represents percentage of westbound visitors to and beyond Hawaii.

Source: Hawaii Visitors Bureau, Annual Research Report, annual.

AWAKE'E RESORT

Characteristics of
Westbound Visitors to Hawaii

1970 to 1984

	1970	1975	1980	1981	1982	1983	1984	1985
Purpose of trip:								
Pleasure	74.6%	76.4%	75.4%	77.7%	80.4%	77.8%	79.7%	80.2%
Business	3.8	2.6	2.9	2.6	2.2	2.7	2.3	2.0
Business and pleasure	9.9	10.7	13.3	12.2	11.3	12.0	11.5	10.6
Military and government	.6	.3	.4	.4	.4	.6	.5	.5
Relatives	6.3	3.7	4.1	3.0	2.9	3.7	2.9	2.7
Convention	4.5	6.2	3.5	3.7	2.4	2.7	2.7	3.6
Other	3.3	1.1	.4	.4	.4	.5	.4	.4
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Travel status(1):								
Group	21.9	45.1	23.9	22.7	19.7	18.5	18.8	18.4
Individual	77.5	54.6	72.0	73.3	75.5	76.7	75.0	78.5
Individual basis	-	-	3.7	3.5	4.4	4.2	5.7	1.5
Incensive	-	-	-	-	-	-	-	-
Government - military	.6	.3	.4	.5	.4	.6	.5	1.6
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Accommodations:								
Hotel or apartment hotel	84.2	91.7	71.2	70.1	71.6	68.4	69.1	67.7
Rented home or apartment	.8	.5	16.4	18.6	17.8	19.5	19.6	20.9
Condominium	-	-	-	-	-	-	-	-
Friends or relatives	12.6	6.8	10.6	9.4	8.8	9.7	8.0	7.7
Others	2.4	1.0	1.8	1.9	1.8	2.4	3.3	3.7
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Average stay in state (days)	10.3	10.5	10.6	10.6	10.5	10.3	10.3	10.2
Persons per party	1.55	1.74	1.79	1.82	1.82	1.83	1.84	N/A
Length of stay in state:								
1 - 6 days	14.3%	9.0%	8.3%	9.2%	8.8%	9.9%	8.3%	7.7%
7 - 12 days	55.7	61.1	61.2	60.4	62.0	63.5	65.5	67.8
13 - 18 days	23.8	24.9	23.9	23.0	22.2	20.5	20.6	19.5
19+ days	6.2	5.0	6.6	7.4	7.0	6.1	5.6	5.0
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

By island, the average length of stay is longest on Oahu at 7.2 days and shortest on the island of Hawaii at 4.2 days, as shown in Exhibit III-E. However, the greatest nominal growth in the average length of stay has occurred on Maui where the average length of stay increased by 3.4 days over the period from 1970 to 1985 and currently averages 6.4 days.

5. Average persons per party - Average persons per party has slowly increased over the last ten years, moving from an average of 1.74 persons in 1975 to 1.84 persons in 1984. This increase may be attributable to more families visiting the islands and easier access to the state from mainland destinations.
6. Age - Visitors aged 30 to 49 were by far the largest age group to visit Hawaii, representing nearly 37% of all westbound arrivals in 1985. Next largest is the 20 to 29 age group which accounted for approximately 19%.
7. Occupation - Persons employed in professional and technical occupations were the largest employment segment to visit the state in 1985, at approximately 37%. They were followed by visitors employed in business, managerial and official occupations, 25.5%. Since 1970 Hawaii has experienced a slight shift to the higher salaried professional/technical and business/managerial occupations.
8. Number of visits to Hawaii - Slightly more than 50% of Hawaii's visitors are first-time visitors to the state. However, the number of repeat visitors to the state has increased from only 33% in 1970 to 46% in 1985. Repeat visitors typically stay in condominiums or in hotels with the reputations, ambience, service and amenities that induce them to visit year after year.
9. Visitor origin - Westbound visitors to the state typically reside in the continental United States. The largest segment is residents of the West Coast states and Alaska, representing 35% of all westbound visitors. Foreign visitors were primarily Japanese and Canadian citizens. During recent years, foreign visitor arrivals have declined due to the relatively stronger U. S. dollar.
10. Neighbor island visitor characteristics - As compared to Oahu westbound visitors, visitors to the neighbor island can be characterized as slightly more experienced and "upscale" travelers. As shown in Exhibit III-F, neighbor island visitors are characterized as follows:
 - Higher percentage of pleasure visitors
 - Higher average length of stay in state
 - Slightly older
 - Higher percentage of higher level occupations
 - Greater percentage of repeat visitors

VISITOR MARKET SEGMENTS

Visitors may be distinguished by their travel status. The five major segments of Hawaii's visitor market are summarized in Exhibit III-G:

AWAKE'E RESORT

Average Length of Stay of Westbound Overnight and Longer Visitors by Island

1970 to 1985

(Days)

Year	Oahu	Hawaii	Maui	Kauai
1970	6.03	2.94	2.97	2.68
1975	5.97	3.08	3.42	2.85
1976	5.99	3.04	3.50	2.85
1977	5.88	3.13	3.62	2.97
1978	5.83	3.25	3.77	3.08
1979	5.85	3.39	4.01	3.27
1980	5.78	3.46	4.08	3.40
1981	5.91	3.56	4.13	3.48
1982	5.77	3.62	4.26	3.51
1983	6.96	4.52	5.61	4.22
1984	7.49	3.64	6.47	4.91
1985	7.24	4.21	6.36	5.03
Increase from 1970 to 1985	1.21	1.27	3.39	2.35

Source: Hawaii Visitors Bureau, Research Department, July 1986.

Exhibit III-F

AWAKE'E RESORT

Selected Characteristics of Westbound Visitors to the Major Hawaiian Islands

1984

	State of Hawaii	Oahu	Mau	Kauai	Hawaii	Molokai
Percentage of pleasure visitors	79.7%	80.4%	82.0%	84.1%	80.1%	83.6%
Travel status:						
FIT	75.0	73.1	73.5	71.6	70.4	62.0
Group	18.8	21.5	19.8	24.2	24.6	34.1
Incentive	5.7	4.7	6.6	4.0	4.8	3.6
Other	.5	.7	.1	.2	.2	.3
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Average length of stay (days):						
In state	10.3	10.3	10.7	11.3	11.4	12.4
On island	-	7.9	6.6	5.0	3.8	3.0
Median age (years)	40.1	40.4	40.5	43.7	45.8	50.1
Percentage higher level occupations(1)	61.5%	58.8%	65.1%	62.1%	60.5%	54.3%
Percent repeat visitors	47.3	41.9	43.1	43.3	48.3	42.4

(1) Professional, technical, business, managerial and official occupations.

Source: Hawaii Visitors Bureau, A Study of Westbound Visitors to the State of Hawaii and Islands of Oahu, Maui, Kauai, Hawaii and Molokai, 1984.

Exhibit III-G

Year	FIT	Incentive group	Convention	Government, military, other(1)	Westbound visitors to Hawaii(2)	Total
1978	1,563,746	738,897	68,750	230,273	97,165	2,698,831
1979	1,826,895	632,817	101,639	178,753	65,709	2,805,813
1980	1,934,393	410,646	100,367	230,891	42,566	2,718,863
1981	1,914,140	412,370	90,972	181,662	11,998	2,611,142
1982	2,163,210	396,797	126,615	167,558	42,075	2,896,255
1983	2,272,080	344,386	127,340	211,764	132,450	3,088,020
1984	2,482,360	367,388	189,800	255,152	91,180	3,385,880
1985	2,560,190	482,530	166,520	122,600	54,690	3,386,530
	7.3%	(5.9)%	13.5%	(8.6)%	(7.9)%	3.3%

(decrease) - 1978 to 1985

(1) Includes nonrespondents.

(2) Includes all westbound visitors to Hawaii (exclusive of visitors traveling beyond Hawaii).

Source: Hawaii Visitors Bureau, Annual Research Report, annual.

1. Free and independent travelers (FITs)
2. Group inclusive tour travelers (GITs)
3. Convention attendees
4. Incentive travelers
5. Government and military visitors

This section reviews the characteristics of the first four of the five major segments, representing more than 99% of all visitors.

1. Free and independent travelers - Free independent travelers (FIT) are those that travel and plan their itineraries individually rather than with a group. This category includes individual travelers who may purchase "packaged" travel arrangements such as where air fare, hotel and car rental are sold together at a favorable price. FITs typically have higher-than-average incomes, patronize higher priced visitor accommodations and are often repeat visitors. FITs, including visitors using individual packages, have been increasing as a percent of total state visitors over the last decade from 58% in 1978 to 76% in 1985.
2. Group inclusive tours - The group inclusive tour traveler market includes visitors who travel together in organized tours with preset travel arrangements. Group travelers have declined as a percent of all westbound visitors over the last decade from 27% in 1978 to 14% in 1985.
3. Convention attendees - The convention market consists of those attending meetings or conventions. This market has fluctuated in a range between 3.6% to 8.6% of total westbound visitors in recent years. This market is often considered part of the group traveler market and is quite irregular, as a large group can distort figures for a given year. Convention attendees have not represented a major visitor market for Hawaii due to the lack of a large convention facility in the state.
4. Incentive travelers - Incentive travelers are a small but sought after market segment consisting of individuals and groups who have won or earned all-expense paid Hawaii vacations. These travelers generally are accommodated in the higher priced hotels, have higher food and beverage expenditures and are more likely to return as repeat visitors. This market is growing in importance and represented 4.9% of visitors in 1985.

In summary, individual and package travelers account for the largest market segment, representing over 76% of westbound visitors. While visitors to the state as a whole have increased by 3.3% over the past seven years, relatively faster rates of growth were experienced by incentive groups at 13.5% and FITs at 7.3%. In contrast, convention travelers have been erratic, while group and other travelers have declined by 5.9% and 7.9%, respectively.

VISITOR ARRIVALS TO THE ISLAND OF HAWAII

Westbound arrivals to the island of Hawaii increased at an average 5.5% per annum between 1970 and 1980, but declined by 1.8% per annum between 1980 and 1985 due to the significant loss of visitors in 1985 resulting from the United Airlines strike, as shown in Exhibit III-H. As in the rest of the state, how-

AWAKE'E RESORT

Westbound Visitor Arrivals to the Island of Hawaii

1970 to 1986

Year	Percent of state westbound visitors	Visitor arrivals	Percentage increase (decrease)
1970	35.5%	445,401	- 2
1975	34.9	769,779	3.6
1976	32.0	816,514	6.1
1977	30.4	839,008	2.8
1978	30.0	908,983	8.2
1979	27.4	860,940	(5.3)
1980	25.0	761,103	(11.6)
1981	22.6	672,683	(11.6)
1982	20.7	678,170	0.8
1983	21.0	712,380	5.0
1984	20.4	760,940	6.8
1985	18.8	697,380	(8.4)
1986 (January to July)	18.5	470,540	13.3 (1)

Compound annual percentage increase:

1970 to 1980 5.5
1980 to 1985 (1.8)

(1) Compared to comparable period in 1985.

Source: Includes westbound overnight and longer visitors to and beyond Hawaii who indicate an intention to visit the island. Hawaii Visitors Bureau, Research Report, annual and monthly.

ever, arrivals in the first months of 1986 were showing a strong recovery over 1985. Hawaii County's slower visitor growth has been due to its relatively slower facility development, historically greater dependence on agriculture and less prominent market image among westbound travelers compared to the other neighbor islands.

PROJECTED VISITORS TO THE ISLAND OF HAWAII

Projections for visitors to the state of Hawaii through the year 2000 reflect continuing increases in both west- and eastbound visitors and are based on projections prepared by the Hawaii State Department of Planning and Economic Development (DPED). According to the DPED, the State could expect to receive about 6.1 million visitors by 1990 and nearly 8.2 million by 2005.

- Westbound travelers - An increasing proportion of westbound visitors to the state is projected to visit the island of Hawaii. The anticipated increase would result from increased visitor facilities development, the aging of the visitor plant on Oahu and other factors as noted below. As shown in Exhibit III-1, the percentage of the state's westbound visitors traveling to the island of Hawaii is projected to reach 30% by 2005. Approaching the levels experienced in the mid-60s and early 70s. This would result in a compound annual increase in westbound visitors to the island of 4.4% from 1986 to 2005.

- Eastbound and total travelers - The proportion of eastbound visitors traveling to the island of Hawaii is also expected to increase, but more gradually than for westbound visitors. Due to this increasing market share and the anticipated increase in the total number of eastbound visitors to the state, the number of eastbound visitors to the island could increase at approximately 6.1% annually from 1986 to 2005.

These increases could be driven by the following factors:

- The more rapid development of visitor facilities and amenities
- The diversification of visitor market segments served
- Improved air service to the island
- Increased and more effective marketing of the island and individual properties
- Increasing disposable incomes in the areas in which visitors reside
- Aging of the visitor plant on Oahu
- Increasing numbers of repeat visitors to the state who seek new vacation experiences

Thus, in total, island of Hawaii tourism is expected to increase at 4.6% annually to a total of nearly two million visitors per year by 2005. Of this number, westbound visitor arrivals from the United States and Canada could continue to account for up to 90% of all visitors to the island of Hawaii.

MARKET REPORT

Historical and Projected Visitor Arrivals to the State and Island of Hawaii - 1970 to 2005

Westbound		Eastbound		Total	
Percent of State	Island of Hawaii	Percent of State	Island of Hawaii	Percent of State	Island of Hawaii
1970	1,326,135	33.6%	2,746,971	N/A	N/A
1975	2,207,417	34.9%	2,829,105	N/A	N/A
1980	3,046,132	28.0%	4,334,504	N/A	N/A
1985	3,395,680	21.0%	4,367,880	4.6%	4.6%
1990	3,721,380	20.5%	4,855,580	5.0%	5.0%
1995	4,461,000(4)	18.5%	5,545,200	5.0%	5.0%
2000	5,171,700(4)	27.0%	7,082,200	7.0%	7.0%
2005	5,709,900(4)	30.0%	8,182,300(6)	8.0%	8.0%
Projected compound annual percentage increase - 1986 to 2005					
1.8%		2.8%		4.6%	

Sources: Hawaii Visitors Bureau, Research Report, July 1986; Annual Research Report, 1985; 1986, Survey of Westbound Visitors to the Island of Hawaii, 1983; Department of Planning and Economic Development, State of Hawaii; Hawaii Population and Economic Projection and Simulation Model: Updated State and County Forecasts, 1984; and County of Hawaii, Hawaii County General Plan; (a) preliminary draft dated May 1986.

(1) Eastbound visitors not estimated prior to 1980.

(2) Estimated based on surveys of Japanese visitors to Hawaii County as reported by the Hawaii Visitors Bureau, Annual Research Report, 1980 and 1983.

(3) Projected based on the first seven months of 1986.

(4) Non-Japanese visitors as projected by the Department of Planning and Economic Development, State of Hawaii, less those estimated to be traveling eastbound.

(5) Compared to the mid-range "Series B" projections prepared by the County of Hawaii for the Hawaii County General Plan. The westbound arrivals projected here are slightly lower through 1990, but nearly identical thereafter.

(6) Japanese visitors as projected by the Department of Planning and Economic Development, State of Hawaii, plus 22% non-Japanese estimated to be traveling westbound.

STATE OF HAWAII RESORTS

A resort is a place developed to provide for the sojourn of visitors, offering multiple facilities for their accommodations, leisure and other needs. A successful resort is a visitor destination area with a reputation that attracts and motivates travel.

Characteristics of nine major Hawaii resorts are reviewed to provide a prospective as to the market position of Auke'e Resort. Exhibit III-J presents characteristics of the major destination resorts in Hawaii in terms of site area, site characteristics, existing development, visitor facility, room rates and prices, market appeal and visitor profile.

As shown in the exhibit, all but one of the resorts (Kauaihou) have a good swimming beach. Developments completed to date range between 95 units or lots at Punaluu Resort to 5,500 units at Kaanapali Beach Resort. Amenities generally include golf, tennis and extensive water sports.

The quality of developments and target visitor market varies significantly by resort:

- Upscale visitor markets:
 - Mauna Kea Beach, Hawaii
 - Mauna Lanai, Hawaii
 - Kapalua, Maui
- Moderate to upscale visitor market:
 - Kaanapali Beach, Maui
 - Halea, Maui
 - Maikoloa, Hawaii
 - Princeville, Kauai
- Less affluent visitor markets:
 - Turtle Bay, Oahu
 - Hakaha, Oahu
 - Kalua Koi, Molokai
 - Keauhou, Hawaii

Resorts which cater to the luxury traveler market typically host visitors who are older FIT guests, who return year after year, while those catering to the first-class or tourist market have a broader range of age groups including GIT and package groups.

Exhibit III-J

Resort Name		Location		Size (Acres)		Units		Facilities		Remarks	
Mauna Kea Beach, Hawaii		Maui		2,500		1,000		100 villas (condos)		199	
Mauna Lanai, Hawaii		Maui		2,500		1,000		100 villas (condos)		199	
Kapalua, Maui		Maui		2,500		1,000		100 villas (condos)		199	
Kaanapali Beach, Maui		Maui		2,500		1,000		100 villas (condos)		199	
Halea, Maui		Maui		2,500		1,000		100 villas (condos)		199	
Maikoloa, Hawaii		Hawaii		2,500		1,000		100 villas (condos)		199	
Princeville, Kauai		Kauai		2,500		1,000		100 villas (condos)		199	
Turtle Bay, Oahu		Oahu		2,500		1,000		100 villas (condos)		199	
Hakaha, Oahu		Oahu		2,500		1,000		100 villas (condos)		199	
Kalua Koi, Molokai		Molokai		2,500		1,000		100 villas (condos)		199	
Keauhou, Hawaii		Hawaii		2,500		1,000		100 villas (condos)		199	

(Continued)

NOT AN ARTICLE.

(1) Information was obtained from the following sources:
(a) The National Association of Manufacturers, 1200 K Street, N.W., Washington, D.C.
(b) The National Association of Manufacturers, 1200 K Street, N.W., Washington, D.C.
(c) The National Association of Manufacturers, 1200 K Street, N.W., Washington, D.C.
(d) The National Association of Manufacturers, 1200 K Street, N.W., Washington, D.C.
(e) The National Association of Manufacturers, 1200 K Street, N.W., Washington, D.C.
(f) The National Association of Manufacturers, 1200 K Street, N.W., Washington, D.C.
(g) The National Association of Manufacturers, 1200 K Street, N.W., Washington, D.C.
(h) The National Association of Manufacturers, 1200 K Street, N.W., Washington, D.C.
(i) The National Association of Manufacturers, 1200 K Street, N.W., Washington, D.C.
(j) The National Association of Manufacturers, 1200 K Street, N.W., Washington, D.C.
(k) The National Association of Manufacturers, 1200 K Street, N.W., Washington, D.C.
(l) The National Association of Manufacturers, 1200 K Street, N.W., Washington, D.C.
(m) The National Association of Manufacturers, 1200 K Street, N.W., Washington, D.C.
(n) The National Association of Manufacturers, 1200 K Street, N.W., Washington, D.C.
(o) The National Association of Manufacturers, 1200 K Street, N.W., Washington, D.C.
(p) The National Association of Manufacturers, 1200 K Street, N.W., Washington, D.C.
(q) The National Association of Manufacturers, 1200 K Street, N.W., Washington, D.C.
(r) The National Association of Manufacturers, 1200 K Street, N.W., Washington, D.C.
(s) The National Association of Manufacturers, 1200 K Street, N.W., Washington, D.C.
(t) The National Association of Manufacturers, 1200 K Street, N.W., Washington, D.C.
(u) The National Association of Manufacturers, 1200 K Street, N.W., Washington, D.C.
(v) The National Association of Manufacturers, 1200 K Street, N.W., Washington, D.C.
(w) The National Association of Manufacturers, 1200 K Street, N.W., Washington, D.C.
(x) The National Association of Manufacturers, 1200 K Street, N.W., Washington, D.C.
(y) The National Association of Manufacturers, 1200 K Street, N.W., Washington, D.C.
(z) The National Association of Manufacturers, 1200 K Street, N.W., Washington, D.C.

IV - HOTEL MARKET ANALYSIS

This chapter presents the market analysis for hotel development at Awake'e Resort. The following sections describe existing and proposed visitor accommodations on the island of Hawaii, average occupancy rates, projected hotel room demand and the market potential for hotel development at the Awake'e Resort.

VISITOR ACCOMMODATIONS INVENTORY

Visitor accommodations in the state are reviewed in terms of the current statewide inventory and the current and planned inventory and composition on the island of Hawaii.

State Inventory

The HVB reports the number of visitor accommodations including hotels and condominium units which are available for transient use. As reported by the HVB, there are currently about 520 visitor facilities in the state with a total of about 66,300 units. This represents a 140% total or 4.6% per annum increase over the 1970 inventory of 27,500 units, as shown in Exhibit IV-A.

About 59% of the visitor units are currently located on Oahu, primarily in Waikiki. This represents a decrease in Oahu's share of the state's visitor units from 69% in 1970.

Since 1970 the visitor rooms inventory has experienced a compound annual rate increase of about 5.6%. The county of Maui, which includes the islands of Molokai and Lanai, experienced the fastest rate of growth and increased by about 10.8% compounded annually, or about twice the rate experienced by the state as a whole. In comparison, facility development on Oahu and Hawaii and Kauai counties was slower than the Maui and statewide averages, as also shown in the exhibit.

Over the past decade, the hotel industry has undergone a significant upgrading of accommodations inventory on the neighbor islands relative to Waikiki. Reasons for this include:

- Relatively rapid rate of new hotel development on the neighbor islands and the moratorium of new hotel development in Waikiki.
- Development of hotel and condominium projects within master-planned resort areas which offer a full complement of visitor services and amenities in contrast to the stand-alone facilities of Waikiki.

Island of Hawaii Inventory

The island of Hawaii had a total of 7,280 visitor units, including hotel rooms and resort condominium units in rental pools as of February 1986, as shown in Exhibit IV-B. Hotel rooms accounted for 5,230 units, or 72% of the island's total visitor units. Condominium units in transient visitor use accounted for the remaining 2,050 units, or 28%.

Exhibit IV-A

AWAKE'E RESORT
Visitor Rooms in Hawaii
1970 to 1986

Year	Oahu	Hawaii county	Kauai county	Maui county(1)	State total
1970	19,050	3,182	2,567	2,720	27,519
1975	25,428	5,386	3,145	6,018	39,977
1976	25,773	5,936	3,724	7,378	42,811
1977	27,827	6,051	3,868	8,397	46,143
1978	29,193	6,064	4,097	8,680	48,034
1979	31,411	6,056	4,064	9,654	51,185
1980	34,393	6,260	4,435	10,483	55,571
1981	33,566	6,859	4,832	11,245	56,502
1982	34,766	7,106	5,207	12,278	59,357
1983	34,378	7,368	4,475	12,680	58,901
1984	37,910	7,209	5,501	13,336	63,956
1985	38,600	7,511	5,656	14,152	65,919
1986(2)	39,010	7,280	5,922	14,096	66,308
Percent of state:					
1970	69.2%	11.6%	9.3%	9.9%	100.0%
1986	58.8%	11.0%	8.9%	21.3%	100.0%
Compound annual percentage increase - 1970 to 1986	4.6	5.3	5.4	10.8	5.7

- (1) Includes Molokai and Lanai.
(2) Visitor rooms as of February.

Source: Figures represent number of visitor units as of June of the year indicated, as reported by the Hawaii Visitors Bureau, Annual Research Report, 1984 and updates.

Exhibit IV-B

AWAKE'E RESORT
Distribution of Existing Visitor Accommodations
on the Island of Hawaii

February 1986

	Hotel rooms		Condominium units		Total	
	Number	Percent	Number	Percent	Number	Percent
Hilo/Honokaa	1,189	22.7%	134	6.5%	1,323	18.1%
Ka'u	13	2	35	1.7	48	.7
Kohala	1,257	24.1	126	6.2	1,383	19.0
Kona	2,732	52.3	1,757	85.6	4,489	61.7
Volcano	37	.7	-	-	37	.5
Total units	5,228	100.0%	2,052	100.0%	7,280	100.0%
Percent of total units		71.8%		28.2%		100.0%

Source: Hawaii Visitors Bureau, Visitor Plant Inventory, February 1986.

The rate of growth of visitor accommodations on the island has closely followed that experienced in the state. Hawaii island visitor unit inventory has increased by about 5.3% annually over the last 16-year period from 1970 to 1986, a rate only slightly lower than the 5.6% experienced by the state over the same period, as shown previously in Exhibit IV-A. The rate of visitor unit growth has fluctuated widely over the past 16-year period. The visitor inventory grew fastest between 1970 and 1975, increasing at 11.1% per year. Subsequently, the rate of growth slowed to 3.1% and 2.5% from 1975 through 1980 and 1980 through 1986, respectively, as shown below:

Growth Rate of Island of Hawaii Visitor Units		
1970 to 1986		
Year	Visitor units	Growth(1)
1970	3,182	-%
1975	5,386	11.1
1980	6,260	3.1
1986	7,280	2.5
Compound annual growth rate - 1970 to 1986		5.3

(1) Average compound annual rate since previous year shown.

During the last three years, the number of hotel units on the island of Hawaii has fluctuated as a result of the closure or conversion of several hotels into commercial or residential condominium units in the Hilo area due to low occupancy levels.

Quality master-planned visitor facility development has occurred in several resort areas on the Kona and Kohala coast of the island, including:

- Mauna Kea Resort
- Mauna Lani Resort
- Maikoloa Beach and Village Resorts
- Kona Village Resort
- Keauhou Resort

In addition, there is a large concentration of units in the Kailua Town area. A majority, or 62%, of the island's visitor accommodations are located in the Kona Town area. Including the Kohala district's 19%, together the Kona and Kohala district represents 81% of the island of Hawaii's accommodations inventory. Hilo, the island's first visitor destination area following statehood, now accounts for only about 18% of the visitor room inventory.

Planned Development on the Island

About 2,960 hotel and condominium units are currently under development on the island of Hawaii, or are planned for development over the next five to six years, with the majority of approvals already in place. These expected

projects and their estimated completion dates are presented in Exhibit IV-C. Based on the developers' scheduled completion dates, the visitor unit inventory is expected to increase by about 5.8% annually from 1986 to 1992.

The largest of the planned visitor projects is the 1,244-room Hyatt Regency Waikoloa. This three-hotel facility is planned to open in late 1988 or 1989 and will feature extensive landscaping and waterways, an intraproject transportation system and extensive amenities and public facilities. The opening of this \$360 million dollar development is expected to have a definitely positive impact on tourism throughout the island by fostering increased visitor arrivals, marketing promotion of the island, attraction of a more upscale visitor mix, improved visitor awareness and image and longer average lengths of stay on the island.

In addition, there are numerous development proposals currently before County and State agencies for hotel and condominium projects located in the Kona, Kohala and Ka'u areas. There is also significant zoned additional capacity at existing resorts in the region.

FACILITIES OF SELECTED LUXURY AND FIRST-CLASS HOTELS

Selected luxury and first-class hotels in Hawaii are reviewed to provide a background for the management and facility types to be developed at the proposed hotel at Awa'ele. This section reviews the management and facilities of selected hotels.

Luxury Versus First-Class Hotels

Hotel properties may be described in terms of the class of service and facilities they offer. Master-planned destination resorts generally provide either luxury or first-class hotels. Luxury hotels are differentiated from first-class hotels based on the following factors:

- High quality of accommodations and amenities.
- High level of service, personal attention and guest activities.
- Ability to achieve higher than average room rates. Average room rates of over \$150 per day are typically achieved by luxury facilities.
- Ability to attract a greater proportion of FIT travelers due to the reputation of the hotel, quality of facilities and level of service.

The typical luxury hotel visitor is relatively less sensitive to price in the search for unique, exciting and world renowned resort hotels compared to the clientele of first-class hotels. Thus, luxury hotels in the state compete against other luxury hotels on all islands rather than only with hotels on the same island, as first-class hotels tend to.

In Hawaii, the luxury hotel market consists of only five hotels which, together represent 1,681 rooms or less than 3% of the total visitor rooms (including hotels and condominiums) in the state. These hotels are noted in the following table:

Sources: Compiled by Peat, Marwick, Mitchell & Co. based on interviews with resort developers and information published by the Hawaii Visitors Bureau, Visitor Plant Inventory, February 1986.

Project name	Location	Expected date of unit completion
Hyatt Regency Waikoloa	Waikoloa Beach Resort	1987
Unmanned luxury hotel	South Kohala Resort	1988
Unmanned first-class/luxury hotel	Kaunala Resort	1989
Unmanned luxury resort	Kaunala	1990
Condominiums:		
Shores at Waikoloa	Waikoloa Beach Resort	1991
Bluffs at Hapuna	Hapuna Beach Resort	1992
Villas at Hapuna	Hapuna Beach Resort	1993
Hale Kahanu	Kaunala Resort	1994
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AWAKE RESORT
Planned Visitor Unit Developments
on the Island of Hawaii

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- High level of service, personal attention and guest activities.
- Ability to achieve higher than average room rates. Average room rates of over \$150 per day are typically achieved by luxury facilities.
- Ability to attract a greater proportion of FIT travelers due to the reputation of the hotel, quality of facilities and level of service.

The typical luxury hotel visitor is relatively less sensitive to price in the search for unique, exciting and world renown resort hotels compared to the clientele of first-class hotels. Thus, luxury hotels in the state compete against other luxury hotels on all islands rather than only with hotels on the same island, as first-class hotels tend to.

In Hawaii, the luxury hotel market consists of only five hotels which, together represent 1,681 rooms or less than 3% of the total visitor rooms (including hotels and condominiums) in the state. These hotels are noted in the following table:

AWAKE'E RESORT Planned Visitor Unit Developments on the Island of Hawaii

Project name	Location	Expected date of unit completion					
		1987	1988	1989	1990	1991	1992
Hotels:							
Hyatt Regency Waikoloa	Waikoloa Beach Resort	-	-	1,244	-	350	-
Unnamed luxury hotel	South Kohala Resort	-	-	-	-	400	-
Unnamed first-class/luxury hotel	Mauna Lanı Resort	-	-	-	-	-	600
Unnamed luxury resort	Kaupulehu	-	-	-	-	-	-
Condominiums:							
Shores at Waikoloa	Waikoloa Beach Resort	60	60	-	-	150	-
Bluffs at Hapuna	Hapuna Beach Resort	-	72	-	-	-	-
Villas at Keauhou	Keauhou Resort	28	-	-	-	-	-
Hale Kehau	Keauhou Resort	-	-	-	-	-	-
		<u>88</u>	<u>132</u>	<u>1,244</u>	<u>-</u>	<u>900</u>	<u>600</u>
							<u>2,964</u>

Sources: Compiled by Peat, Marwick, Mitchell & Co. based on interviews with resort developers and information published by the Hawaii Visitors Bureau, Visitor Plant Inventory, February 1986.

Luxury Hotels in Hawaii

1985

Hotel	Rooms	Island	Year of completion
Kahala Hilton	370	Oahu	1964
Mauna Kea Beach	310	Hawaii	1965
Kapalua Bay	194	Mau	1978
Mauna Lani Bay	351	Hawaii	1983
Halekulani	456	Oahu	1983
	<u>1,681</u>		

Hotel Management

The management of Hawaii's visitor accommodations has changed dramatically over the past two decades. In the past the visitor accommodations industry was predominantly composed of individually operated hotels. Recently, new hotel properties have been developed or managed by international hotel chains with stronger marketing networks and more efficient management practices. As shown in Exhibit IV-D, of 26 selected comparable hotels, 20 are managed by national or international hotel chains, 5 by Hawaii hotel companies (Surf Resorts, Interisland Resorts and Amfac Hotels) and 1 is privately operated (Kapalua Land Company).

As also shown in the exhibit, the selected hotels range in size from 200 rooms at the Sheraton Mahalea Hotel to 2,612 rooms at the Hilton Hawaiian Village. Luxury hotels tend to be smaller in size to provide a sense of exclusivity and personal service to hotel guests. The luxury hotels range in size from 194 to 456 rooms.

Guest Facilities

Guest facilities of the selected comparable hotels are noted in Exhibit IV-E. Waikiki hotels typically lack the recreational amenities such as tennis and golf that are found at resort hotels. Instead, Waikiki hotels generally feature extensive shopping areas and convention and meeting facilities.

Food and beverage facilities at the selected hotels provide a range of dining settings and prices to appeal to their guests. The number of facilities should provide an ample number of choices to serve guests during the course of their stay.

HOTEL MARKET PERFORMANCE

The market performance of Hawaii hotels provides an indication of the market support for additional hotels on the island and at Amale's Resort. The following sections review the market performance of Hawaii hotels in terms of occupancy levels, average room rates and guest mix.

MAKALE'S RESORT

Management Companies of Selected Luxury and First-Class Hotels

Location	Management company	Number of rooms	Quality
Oahu:			
Off-Waikiki:			
Kahala Hilton	Hilton International Co.	370	Luxury
Turtle Bay Hilton	Hilton Hotels Corporation	487	First-class
Sheraton Mahalea	Sheraton Corporation	200	First-class
Waikiki:			
Halekulani	Halekulani Corporation	456	Luxury
Hyatt Regency Waikiki	Hyatt Hotels Corporation	1,234	First-class
Hilton Hawaiian Village	Hilton Hotels Corporation	2,612	First-class
Hawaiian Regent	Emerald Hotels Corporation	1,346	First-class
Sheraton Waikiki	Sheraton Hotels	1,844	First-class
ITIHAI	Westin Hotels	800	First-class
Mau:			
Mauna Kea Beach	Westin Hotels	310	Luxury
Mauna Lani Bay	Emerald Hotels Corporation	351	Luxury
Sheraton Royal Maalea	Sheraton Hotels	543	First-class
Kona Hilton	Hilton Hotels Corporation	452	First-class
Kona Surf Resort	Surf Resorts	535	First-class
Kauai:			
Kaui Surf Resort	Interisland Resorts	655	First-class
Malehale Resort	Amfac Resorts	460	First-class
Sheraton Kauai	Sheraton Corporation	344	First-class
Mau:			
Kaanapali-Kapalua:			
Hyatt Regency - Mau	Hyatt Hotels Corporation	815	First-class
Kaanapali Beach	Amfac Resorts	431	First-class
Mau Marriott	Marriott Hotels	720	First-class
Mau Surf	Interisland Resorts	556	First-class
Royal Lahaina	Amfac Hotels	614	First-class
Sheraton Mau	Sheraton Corporation	503	First-class
Kapalua Bay Hotel	Kapalua Land Co.	194	Luxury
Malea:			
Mau Intercontinental Maalea	Intercontinental Hotel Corporation	600	First-class
Stouffer's Maalea Beach	Stouffer Hotels	350	First-class

Sources: Hawaii Visitors Bureau, Number Accommodation Guide, 1985 and Pest, Harwick, Mitchell & Co.

MAUIE RESORT

Guest Facilities of Selected Hotels

	Number of guest rooms	Number of food and beverage facilities		Meeting rooms	Largest convention/meeting capacity (banquet table)	Quality of beach
		Restaurants/ snack bars	Lounges/nightclubs			
Oahu:						
Off-Waikiki:						
Kahala Hilton	370	4	-	1	240	Good
Turtle Bay	487	2	2	11	800	Poor
Sheraton Makaha	200	3	-	-	240	None
Waikiki:						
Kalokulani	456	3	2	3	360	Good
Hyatt Regency Waikiki	1,234	5	7	-	835	Good
Hilton Hawaiian Village	2,612	10	13	26	2,200	Excellent
Hammann Regent	1,346	5	5	13	605	Good
Sheraton Waikiki	1,844	5	5	20	2,400	Good
Iliala	800	1	3	13	1,500	None
Hawaii:						
Mauna Kea Beach	310	5	1	-	400	Excellent
Mauna Lani Bay	351	4	4	1	420	Good
Sheraton Royal Waikoloa	842	3	3	-	630	Good
Kona Hilton	452	4	N/A	3	400	Poor
Kona Surf Resort	535	3	1	N/A	1,000	Poor
Kauai:						
Kauai Surf	555	4	5	10	800	Good
Mahealani Resort	460	4	3	-	600	Excellent
Sheraton Kauai	344	2	1	-	250	Excellent
Mau:						
Kaanapali/Kapalua:						
Hyatt Regency Maui	815	4	6	1	1,200	Good
Kaanapali Beach	431	3	2	-	-	Good
Maui Marriott	720	3	3	1	1,300	Good
Maui Surf	556	4	-	1	800	Excellent
Royal Lahaina	514	3	1	3	300	Good
Sheraton Maui	503	2	2	-	125	Good
Kapalua Bay Hotel	184	4	1	2	250	Excellent
Wailea:						
Maui Intercontinental Wailea	600	2	2	1	500	Good
Stouffer's Wailea Beach	350	3	2	1	300	Good

EXHIBIT IV-E

MAUIE RESORT

Guest Facilities of Selected Hotels, Continued

	Swimming pools/SPAs	Tennis courts	Golf course	Other amenities/attractions	Market orientation/notes
Oahu:					
Off-Waikiki:					
Kahala Hilton	1	-	Private	Shuffleboard, water sports, peripiscines	Well-known luxury hotel in upscale residential area.
Turtle Bay Hilton	2	10	18 holes	Water sports, horseback riding, dune cycles	Only full-scale resort hotel and amenities on Oahu.
Sheraton Makaha	1	4	36 holes	Horseback riding, bicycling	Group and local conference hotel.
Waikiki:					
Kalokulani	1	-	-	-	Luxury renovation of a historic hotel.
Hyatt Regency Waikiki	1	-	-	Extensive shops	High-end, first-class hotel with art collections and Hyatt reputation.
Hilton Hawaiian Village	3	-	-	Extensive shops, water sports, lagoon	Large convention facilities for groups and conventions.
Hammann Regent	2	2	-	Extensive shops	Group hotel.
Sheraton Waikiki	2	-	-	Extensive shops	Large convention facilities for groups and conventions.
Iliala	2	7	-	-	Well-established reputation.
Hawaii:					
Mauna Kea Beach	1	9	18 holes	Water sports	Developed by Rockefeller, attracts affluent clientele.
Mauna Lani Bay	1	10	18 holes	Water sports, natural fishponds	Luxury hotel with high degree of service for FITs and incentive travelers.
Sheraton Royal Waikoloa	1	6	18 holes	Jacuzzi, water sports	FIT and group hotel in emerging resort.
Kona Hilton	2	N/A	-	Water sports	Group hotel.
Kona Surf Resort	2	N/A	-	-	Group and convention hotel.
Kauai:					
Kauai Surf	1	10	18 holes	Water sports	Golf and convention hotel being renovated by VHS Realty.
Mahealani Resort	3	N/A	Nearby	Water sports, health spa	Elegant FIT hotel on fine beach.
Sheraton Kauai	1	-	Nearby	Shuffleboard, volleyball	FIT hotel on Poipu Beach.
Mau:					
Kaanapali-Kapalua:					
Hyatt Regency Maui	1	N/A	36 holes	Half-acre pool with bar, garden atrium and health club	Group, incentive and FIT travelers.
Kaanapali Beach	1	N/A	36 holes	Shuffleboard	FIT and group hotel.
Maui Marriott	2	5	36 holes	Water sports	High-quality standards, strong marketing.
Maui Surf	1	3	36 holes	Volleyball	FIT hotel near to Whalers Village shops.
Royal Lahaina	5	11	36 holes	Shuffleboard, putting green	Total resort complex.
Sheraton Maui	2	3	36 holes	-	Good location.
Kapalua Bay Hotel	5	10	36 holes	Attached shopping complex	FIT hotel within a prestigious resort.
Wailea:					
Maui Intercontinental Wailea	3	14	36 holes	Water sports	FIT and group travelers.
Stouffer's Wailea Beach	1	14	36 holes	Water sports	FIT and group travelers.

N/A Not available.

Sources: Pacific Area Travel Association, Pacific Travel News, June 15, 1984; discussions with managers of the respective facilities and observations by Peat, Marwick, Mitchell & Co.

EXHIBIT IV-E, Cont.

AWAKE'E RESORT
Occupancy Levels of
Hawaii Visitor Accommodations
1980 to 1986

Location	1980	1981	1982	1983	1984	1985	January to July 1986
Waikiki:							
On beach	73.9%	72.1%	72.7%	74.7%	81.6%	79.3%	82.6%
Off beach (w/restaurant)	73.2	73.8	80.6	79.1	85.7	83.7	88.2
Off beach (w/o restaurant)	66.5	76.1	80.1	74.4	80.4	80.4	87.7
Other Oahu	74.6	75.3	79.4	73.3	85.0	84.5	87.2
Island of Oahu	72.3%	74.1%	77.8%	75.8%	83.3%	81.5%	86.1%
Hilo	34.4	35.3	37.7	39.2	58.2	57.8	54.7
Kona	59.0	49.5	46.9	47.0	54.9	57.4	64.6
Island of Hawaii	51.0%	44.9%	44.0%	44.7%	55.6%	57.6%	62.6%
West Maui	74.8	73.7	78.0	77.8	84.1	82.5	88.0
Other Maui	67.4	58.1	61.4	67.0	70.3	69.6	78.6
Island of Maui	73.0%	70.3%	73.9%	75.2%	80.5%	78.5%	85.4%
East Kauai	75.1	68.5	63.4	59.3	63.0	62.1	75.8
South Kauai	52.5	46.2	44.2	50.2	63.0	70.1	84.2
Island of Kauai	69.6%	62.7%	57.5%	57.2%	63.0%	64.8%	78.5%
State total	69.3%	68.3%	70.4%	69.7%	76.0%	76.1%	82.2%

N/A Not available.

Source: Pannell Kerr Forster, Trends in the Hotel Industry, monthly. (Data presented excludes several major hotels which are not surveyed.)

Occupancy Levels

Occupancy levels indicate the demand for visitor accommodations relative to room supply. Hotel occupancy levels, including both hotel and condominium units, are surveyed monthly. It should be noted that the facilities survey excludes several major hotel chains (most notably Hilton and until recently, Sheraton). The exclusion of these sizable facilities may greatly distort actual industry occupancy levels. However, hotel occupancy levels are discussed here as they provide an indication as to the general occupancy trends experienced by state visitor facilities.

In general, occupancy levels since 1984 have improved significantly over the previous four years. In the first seven months of 1986 the average annual occupancy level for visitor accommodations in the state was 82%, as shown in Exhibit IV-F. This is significantly higher than the 68% to 70% average annual occupancies experienced from 1980 to 1983. The recent increase in occupancies is attributed to a decline in construction of new visitor units coupled with an 11% increase in visitor arrivals in 1984 and a 14% increase in the first seven months of 1986.

Oahu, and Waikiki in particular, have historically had the highest occupancy levels in the state. However, Maui is now approaching Oahu's high occupancy levels. Both islands experienced annual occupancy levels of about 85% to 86% during the first seven months of 1986.

Occupancy levels on the islands of Hawaii and Kauai are significantly lower than the state average. Visitor units on Hawaii experienced an average annual occupancy of about 63% while Kauai experienced an occupancy of about 79%.

In general, hotel facilities experience significantly higher occupancies than condominium facilities. This is especially true during the slower spring and fall months.

Average Room Rates

Hotel rooms in the state achieved an average room rate of \$77 as of July 1986, as shown in Exhibit IV-G. Average room rates vary significantly by island and region, reflecting the relatively newer visitor plant on the neighbor islands, the completion of several high-quality projects and higher occupancy levels achieved by different regions, most notably on west Maui. The average room rate achieved by Maui hotels as a whole in 1986 was about \$118 per day and in west Maui it was about \$131. In contrast, average room rates were lowest on Oahu at \$63 and even lower at Waikiki off-beach facilities without restaurants.

Average room rates have increased by about 9% annually since 1970. Relatively faster rates of increase were experienced on Maui, while Oahu and Kauai rates have increased slower than average, as also shown in the exhibit.

Achieved average daily room rates on the island of Hawaii have been slightly lower than for the state as a whole, ranging from 89% to 98% of the state average, as shown in the following table:

MAKAE RESORT
Average Room Rates
1980 to 1986

Location	1980	1981	1982	1983	1984	1985	1986	January to July 1986	Compound annual percentage increase 1980 - July 1986
Waikiki:									
On beach	\$ 59.01	61.05	61.15	62.69	69.15	84.13	94.18	8.7%	8.7%
Off beach (w/o restaurant)	34.78	33.90	35.69	39.56	44.31	46.90	48.55	5.5	5.5
Off beach (w/o restaurant)	27.67	28.40	28.70	30.21	31.10	35.41	40.55	7.1	7.1
Other Oahu	\$ 42.70	43.05	44.88	46.93	50.06	57.70	63.01	7.2	7.2
Island of Oahu	33.71	30.53	30.41	32.30	34.88	37.66	39.81	2.0	2.0
Hilo	49.96	52.81	53.49	55.42	65.22	71.39	83.81	9.7	9.7
Kona	\$ 46.40	47.16	47.25	48.84	58.13	64.06	75.88	9.2	9.2
Island of Hawaii	63.19	77.82	81.19	89.52	97.12	107.17	130.52	13.8	13.8
West Maui	53.30	53.49	51.50	52.82	61.28	75.61	81.92	7.3	7.3
Other Maui	\$ 61.34	73.27	75.02	81.60	88.89	98.51	118.47	12.5	12.5
Island of Maui	52.66	54.67	55.65	56.54	57.85	59.28	58.44	1.9	1.9
East Maui	66.36	61.90	67.53	72.41	82.88	93.55	97.74	7.2	7.2
South Maui	\$ 55.16	56.06	58.51	59.78	65.09	70.06	72.08	4.9	4.9
Island of Kauai	\$ 47.37	49.73	51.87	54.78	59.84	68.84	77.40	9.2	9.2
State total									

Source: Pannell Kerr Forster, "Trends in the Hotel Industry, monthly."

Exhibit IV-6

Comparison of Achieved Average Daily Room Rates

	1980 to 1986	Island of Hawaii	State of Hawaii	Hawaii island as a percent of state
1980		\$ 46.40	47.37	98.0%
1981		47.16	49.73	94.8
1982		47.25	51.87	91.1
1983		48.84	54.78	89.2
1984		58.13	59.84	97.1
1985		64.06	68.84	93.1
1986 (to July)		75.88	77.40	98.0

In the future Hawaii island room rates could be expected to increase in absolute terms and more closely match, or exceed, those of the state due to the completion of the Hyatt Regency Waikoloa and as newer and higher quality visitor facilities are developed.

The published room rates (or rack room rates) of individual Hawaii hotels exclude rate discounts and are related to the quality, location, reputation and guest mix of the hotel. Average published room rates of selected surveyed luxury and first-class hotels are presented in Exhibit IV-H. The published room rates of the luxury facilities are about 20% to 50% higher than at first-class hotels on the four major islands. Published rates ranged from \$120 to \$340 per day for standard deluxe rooms at luxury hotels and \$80 to \$285 at first-class hotels.

Guest Markets

The guest mix of Hawaii hotels varies significantly with the ability of a hotel to appeal to various travel markets based on its location, facilities, site characteristics, room rates, marketing practices and reputation. The guest mix of selected luxury and first-class hotels is summarized in Exhibit IV-I.

Luxury hotels are able to achieve about 70% to 80% FIT travelers, a significantly higher share than that achieved by first-class hotels. Oahu hotels typically attract a lower FIT market and greater first-time group visitors.

Neighbor island first-class and luxury hotels typically attract a higher percentage of FIT and incentive guests than Oahu hotels. This is attributed to their:

- Greater recreational, retail and other resort amenities.
- Ability to attract repeat visitors (typically FITs) who seek new vacation destinations and experiences.
- Broader appeal for incentive groups due to newer facilities and provision of adequate meeting and banquet space.

AWAKE'E RESORT

Travel Status and Average Length of Stay
at Selected Luxury and First-Class Hotels

	Guest mix by travel status			
	FLY	Group	Incentive	
Luxury hotels:				
Halekulani	69 %	8 %	23 %	
Kahala Hilton	80	15	5	(1)
Mauna Kea Beach	75	25	-	
Mauna Lani	75	..	5	20
Kapalua Bay	80	5	15 - 20	
First-class hotels:				
Oahu:				
Hilton Hawaiian Village	20	80	-	(1)
Sheraton Waikiki	20	80	-	(1)
Hyatt Regency - Waikiki	30	57	13	
Hawaiian Regent	40 - 45	25 - 30	25 - 35	
Westin Ilhale	40	60	-	(1)
Hawaii:				
Sheraton Royal Waikoloa	50	25	25	
Keauhou Beach	70	25	5	
Mau:				
Hyatt Regency - Maui	47	53	-	(1)
Kaanapali Beach	75	25	-	
Maui Marriott	65	15	20	
Maui Intercontinental	35	35	30	
Stouffer's Wailea Beach	65	21	14	
Kauai:				
Maiohale	60	2nd	3rd	
Sheraton Kauai	80	20	-	

(1) Included in group travel.

Sources: Interviews with hotel operators or other published sources.

AWAKE'E RESORT

Published Room Rates of Selected Hawaii
First-Class and Luxury Resort Hotels

1986

	Double occupancy room rates(1)			
	Standard	Deluxe	Suites	
Luxury hotels:				
Mauna Kea Beach(2)	\$ 270 - 340	320 - 340	On request	
Mauna Lani Bay	185	210 - 275	375	
Kahala Hilton	145 - 185	205 - 325	425 - 1,050	
Halekulani	155 - 175	200 - 215	245 - 450	
Kapalua Bay	120 - 300	-	350 - 950	
First-class hotels:				
Oahu				
Hyatt Regency Waikiki	90 - 115	135 - 190	280 - 1,000	
Royal Hawaiian	105 - 165	-	180 - 1,280	
Turtle Bay Hilton & Country Club	80 - 140	-	175 - 700	
Hyatt Regency Maui	155 - 240	255 - 285	250 - 1,400	
Maui Marriott	135 - 225	160 - 215	425 - 1,050	
Stouffer's Wailea Beach	100 - 120	140	185	
Maui Intercontinental	110 - 160	200	240 - 310	
Sheraton Royal Waikoloa	115 - 150	180	700	
Maiohale	120 - 175	-	350 - 650	
Princeville Sheraton				

(1) Rack room rates without discounts.

(2) American plan hotel room rate includes breakfast, lunch and dinner.

Source: Hawaii Visitors Bureau, Member Accommodations Guide, 1986.

PROJECTED HAWAII ISLAND OCCUPANCY LEVELS AND ROOM REQUIREMENTS

This section assesses the market support for additional hotel development based on the projected demand and supply for visitor rooms on the island.

Projected Demand for Hotel and Condominium Accommodations

The demand for visitor accommodations is based on the projected growth in overnight visitor arrivals to the island as presented in Chapter III. Over the next 15 years, the average daily demand for hotel and condominium units on the island is projected to almost triple from about 4,300 units in 1985 to nearly 12,500 units by 2005, as shown in Exhibit IV-3. This would represent a 7% average annual increase in demand over the 15 years, with growth concentrated in the earlier periods. The major assumptions underlying this assessment are discussed below:

1. West- and eastbound visitor arrivals are as shown previously in Exhibit III-1 and assume a significant increase in the share of state visitors who visit the island.
2. Hotel and condominium users are estimated to represent approximately 90% of westbound visitors who stay in commercial accommodations as opposed to staying with friends or relatives or through other accommodations.
3. Average nights of stay are projected to increase as a result of the continued development of major destination resorts on the island. The projected increase is consistent with the recent experience of Maui county, where the average stay increased from 3.0 days to 6.4 days between 1970 and 1985. Average nights of stay is assumed to increase to 5.5 nights for westbound and 1.9 nights for eastbound visitors to the island.
4. Average party size is based on the most recent observations for the island, as reported by the HVB. Average party size is not expected to change significantly over the projection period.
5. State residents seeking hotel accommodations on the island are projected to increase over their estimated 1985 levels at about 2% per year, or at a slightly higher rate than the rate of resident population growth projected by the DPED.

Projected Hawaii County Occupancy Levels

Projected occupancy levels for the island of Hawaii are estimated based on the demand for visitor accommodations and the anticipated supply of new and existing visitor units. Projected occupancy levels are presented in Exhibit IV-K and are discussed as follows:

MAUI COUNTY
Historical and Projected Daily Occupied Visitor Rooms
1984 to 2005

Historical		Projected		Historical		Projected	
1984	1985	1986	1987	1984	1985	1986	1987
789,940	697,380	789,000	1,026,000	1,213,000	1,800,300	1,800,300	1,800,300
684,800	627,600	710,100	923,490	1,541,700	1,620,300	1,620,300	1,620,300
3.8	4.3	4.0	4.5	5.2	5.2	5.2	5.2
2,454,990	2,669,975	2,815,610	4,155,300	8,016,800	8,911,700	8,911,700	8,911,700
1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
3,540	4,060	5,790	8,980	11,560	13,850	13,850	13,850
56,700	64,100	97,300	121,600	174,600	196,400	196,400	196,400
1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
85,100	96,200	115,700	223,700	314,300	373,300	373,300	373,300
1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
140	140	150	250	360	510	510	510
3.55	3.25	3.25	3.85	3.75	4.15	4.15	4.15
3,460	3,990	4,210	6,240	9,240	12,070	12,070	12,070
330	340	350	380	420	460	460	460
4,010	4,370	4,560	6,620	9,660	12,530	12,530	12,530
4,010	4,370	4,560	6,620	9,660	12,530	12,530	12,530

Westbound:
Visitor arrivals
Commercial accommodations demand(1)
Average stay, nights
Visitor nights
Average party size(2)
Daily occupied rooms

Eastbound:
Visitor arrivals
Average stay, nights
Visitor nights
Average party size(2)
Daily occupied rooms

Visitor nights(3)
Average party size(4)
Daily occupied rooms

Total
Hawaii residents(5)
Visitors to Hawaii
Total daily room demand

- (1) About 10% of all visitors projected to stay with friends, relatives, or in other noncommercial accommodations. Hawaii Visitors Bureau, A Study of Westbound Visitors to the Island of Hawaii, 1983.
- (2) Historical figure estimated based on Hawaii Visitors Bureau, A Study of Westbound Visitors to the Island of Hawaii, 1983.
- (3) All eastbound visitors assumed to stay in commercial hotel or condominium accommodations.
- (4) Historical figure based on Hawaii Visitors Bureau Annual Report, 1983. Japanese visitor profile.
- (5) Projected to increase over estimated 1985 levels at a compounded rate of 2% per year, numbers rounded.

Source: Peat, Marwick, Mitchell & Co.

Exhibit IV-K

AWAKE'E RESORT
Projected Occupancy Levels
for the Island of Hawaii
1985 to 2000

Year	Average daily room demand	Projected visitor unit inventory(1)		Projected occupancy level
		Beginning	Ending	
1985	4,330	7,511	7,511	58%
1986	4,560	7,511	7,280	63
1987	5,070	7,280	7,340	69
1988	5,580	7,340	7,472	75
1989	6,090	7,472	8,716	70
1990	6,620	8,716	8,716	76
1991	7,220	8,716	9,616	75
1992	7,840	9,616	10,216	77
1993	8,460	10,216	10,726	79
1994	9,080	10,726	11,266	81
1995	9,660	11,266	11,826	82
1996	10,260	11,826	12,416	83
1997	10,820	12,416	13,036	83
1998	11,380	13,036	13,686	83
1999	11,940	13,686	14,366	83
2000	12,530	14,366	15,086	83

(1) Includes both hotel and condominium units.

(2) Based on planned hotel and condominium unit completions as projected by developers to 1992, as shown in Exhibit IV-C. Thereafter, visitor unit completions are estimated to increase at about 5% annually.

1. Average daily room demand is estimated as shown in Exhibit IV-J and as discussed in the previous section.

2. Projected visitor unit inventory is based on actual expected hotel and condominium unit completions as projected by developers over the next six years to 1992. Thereafter, the Hawaii island visitor unit inventory is projected to increase by about 5% annually to account for as yet unplanned unit completions. This rate of increase is estimated to be higher than the 2.5% to 3.1% rate of growth experienced over the last two 5-year periods but similar to the 5.3% growth rate achieved over the entire 16-year period since 1970.

Based on this analysis, visitor unit occupancy levels are estimated to increase from about 58% in 1985 to almost 70% by 1987, to the mid-70s by 1990 and to the low 80s by 1995. Thus, over the next 10 years, occupancy levels are expected to improve significantly by over 20 percentage points and to achieve 80% occupancies similar to that currently being experienced by the state as a whole.

Projected Hotel Unit Requirements

The projected number of hotel units required on the island is based on the demand for commercial facilities, the share of overnight visitors using hotels and an assumed 70% to 80% average annual occupancy level for hotel establishments. Typically, 70% to 80% occupancy levels permit visitors' choices in selection of accommodations and allow hotels to efficiently maintain and operate their facilities profitably through busy and slower visitor months.

About 75% of the commercial room demand on the island is currently estimated to be served by hotels. In the future, hotels are expected to account for a smaller share of total demand as the island's industry matures and more repeat visitors seek the lower priced and more spacious condominium accommodations. Thus at the assumed 70% to 80% average occupancy levels, the island is expected to require a total of 8,500 to 9,700 hotel units by 1995 and 10,600 to 12,100 units by 2000, as shown in Exhibit IV-L.

Based on the number of existing hotels and those in the planning and development process, the supply of units on the island is expected to exceed demand through about 1993 or 1994. Thereafter, market support for about 2,800 to 4,300 hotel units in addition to those currently existing or planned could be expected by 2000, as shown in Exhibit IV-M.

AWAKE'E RESORT HOTEL
MARKET ASSESSMENT

This section assesses the market for hotel development at the Resort in terms of the anticipated market segments, required rooms and development plan recommendations.

Resort Market Position

The potential market for hotel development at the Awake'e Resort is influenced by the following factors:

Exhibit IV-M

ANAK'E RESORT
Projected Cumulative Hotel Room Requirements
1990 to 2000

Year	At 70% occupancy		At 80% occupancy	
	Existing and planned units(1)	Cumulative additions required (surplus)	Total units required	Cumulative additions required (surplus)
1990	6,472	6,900	6,000	(500)
1995	7,822	9,700	8,500	700
2000	7,822	12,100	10,600	2,800

(1) Includes 5,228 existing hotel units plus 2,594 planned hotel units, as presented in Exhibit IV-C.

Source: Peat, Marwick, Mitchell & Co.

Exhibit IV-L

ANAK'E RESORT
Projected Market Support for Hotel Rooms
on the Island of Hawaii
1985 to 2000

Year	Visitor accommodation demand	Hotel market share	Hotel room demand	Hawaii hotel room requirements	
				80% occupancy	70% occupancy
1985	4,330	75%	3,248	4,100	4,600
1986	4,560	75	3,420	4,300	4,900
1987	5,070	74	3,752	4,700	5,400
1988	5,580	74	4,129	5,200	5,900
1989	6,090	73	4,446	5,600	6,400
1990	6,600	73	4,818	6,000	6,900
1991	7,220	72	5,198	6,500	7,400
1992	7,840	72	5,645	7,100	8,100
1993	8,460	71	6,007	7,500	8,600
1994	9,080	71	6,447	8,100	9,200
1995	9,700	70	6,790	8,500	9,700
1996	10,260	70	7,182	9,000	10,300
1997	10,820	69	7,466	9,300	10,700
1998	11,380	69	7,852	9,800	11,200
1999	11,940	68	8,119	10,100	11,600
2000	12,500	68	8,500	10,600	12,100

Source: Peat, Marwick, Mitchell & Co.

- The extensive oceanfrontage offered by the hotel sites and the planned 18-hole championship golf course is expected to attract visitors who seek at least a first-class level of service.
- The proximity of the Resort to affordably priced shopping, dining and other recreational amenities of Kailua town as well as the higher priced amenities of the South Kohala resorts would provide additional attractions to the first-class market.
- The reputation and widespread market recognition of the South Kohala luxury resorts would also attract travelers with lower budgets to the area.
- The resort and hotel sites lack a quality sandy swimming beach. Good swimming beaches are offered by other existing luxury resorts as well as some planned resorts.
- Competition in the luxury hotel market on the island as well as the state is expected to be intense over the next decade due to the expected completion of the Hyatt Regency Maikoloa as well as the large number of planned and proposed developments throughout the state which are oriented to this traveler market.

Based on these factors, hotel development at the Resort is recommended to offer a first-class level of facilities and services targeted to the moderate- to upper-income clientele rather than the luxury, upscale traveler. In this way the Resort could position itself to:

- Benefit from the visitor reputation and quality image of the South Kohala area.
- Not compete with the luxury developments in the Kohala area.
- Serve the mid- to upper-income traveler markets by offering a higher quality alternative to the nonintegrated and random development of Kailua-Kona.

Anticipated Target Markets

The target markets for first-class hotel development at the Resort are described as follows:

- FITs:
 - Repeat visitors to Hawaii who seek an integrated recreational resort
 - Two wage earner households headed by professionals or entrepreneurs, 35 to 45 years of age
 - Active persons who place high importance on good value in first-class hotel facilities, quality restaurants, shopping, recreation and new travel experiences

- Package tours:
 - Shorter staying FIT guests who receive room rate discounts
 - Local Hawaii residents on golf, tennis, honeymoon and seasonal vacations of one to three days
- Group tours:
 - Wholesale one-time group tours
 - Regularly scheduled wholesale tour groups featuring deluxe escorted tours
 - Corporate and association groups
 - Golf groups seeking recreation-oriented vacations
- Meetings and incentive groups:
 - First-time and repeat visitors to Hawaii
 - Employees of major U. S. mainland insurance, banking or professional organizations
 - Smaller incentive groups who are corporate sponsored as a reward for meeting corporate goals
 - Corporate conventions, conference and meeting attendees

Based on the anticipated appeal of the Awake'e Resort hotel sites to the various markets and the experience of comparable Hawaii hotels, the distribution of these visitors at Awake'e is anticipated to be as follows:

Expected Hotel Target Markets

	Percent of total guests
FIT	25%
Package	20
Meetings and incentive groups	15
Other groups	40
	<u>100%</u>

Supportable Rooms at Awake'e Resort

The successful development of hotel accommodations at Awake'e is related to the overall demand for hotel rooms on the island of Hawaii over the next 20 years. Previous sections of this chapter evaluated the anticipated hotel room demand and supply on the island. Based on the analysis, the island could be expected to require about 2,800 to 4,300 hotel rooms by 2000 in addition to the inventory which is currently being planned for the island.

As also shown in Exhibit IV-K, visitor unit occupancy levels are projected to improve significantly over the next six or seven years from about 63% in 1986 to almost 80% in 1993. Thus, the overall balance of visitor room demand and supply is expected to be healthy in the near future.

The estimated number of rooms that can be supported at the Awa'e'e Resort in particular is dependent on the market position of the Resort in relationship to overall room demand on the island. Achieved market capture rates for resorts are usually directly related to the:

- Perceived attractiveness and quality and range of facilities provided
- Maturity of development and the reputation the resort has earned
- Number and strength of established competitive resorts
- Relative size of the islandwide visitor room demand

For major visitor destination resorts, market capture rates have varied from as little as 2% to as much as 47% of the total room demand on the neighbor islands, as shown in Exhibit IV-N.

On Oahu, visitor room demand is dominated by Waikiki hotels which have about 93% of the market. In comparison to Oahu resort areas, the market shares of resort areas are more evenly distributed.

The Awa'e'e Resort is relatively small in comparison to the Keauhou Resort which receives almost 30% of the current visitor room demand. The Resort is initially planned to be similar in size to the emerging resort areas of Mauna Kea, Mauna Lani and Waikoloa Beach on the island of Hawaii. These resorts have been able to achieve about 6% to 9% of the total Hawaii County market.

The Awa'e'e Resort is estimated to be able to achieve 5% to 7% of the total visitor room requirements based on the competitive attractiveness of the Resort and the anticipated lower room rates it is expected to achieve relative to the South Kohala luxury resorts. Assuming the hotels are completed between 1993 and 1997, when industrywide occupancy levels are expected to be about 80%, about 400 to 600 rooms could be supported at the Resort by 1993 and about 500 to 700 rooms by 1997, as shown in the table below:

Supportable Hotel Rooms at Awa'e'e Resort

	Hawaii hotel room requirements(1)		Awa'e'e Resort market share(2)	
	80% occupancy	75% occupancy	70% occupancy	7% share
1993	7,500	8,000	8,600	400 560
1994	8,100	8,600	9,200	430 600
1995	8,500	9,100	9,700	460 640
1996	9,000	9,600	10,300	480 670
1997	9,300	10,000	10,700	500 700

(1) Based on figures shown in Exhibit IV-L.

(2) Based on midrange 75% average occupancy assumption.

AWAKE'E RESORT Estimated Market Share of Visitor Room Nights at Selected Hawaii Resorts

1985

	Estimated visitor room nights(1)	Island market share
Oahu:		93%
Waikiki/Kahala(2)	29,790	3
Leward(2)	840	2
North Shore(2)	540	2
Other (airport/downtown)	630	100%
Hawaii:	31,800	29
Keauhou Resort	1,220	30
Kailua-Kona	1,290	22
Mauna Kea/Mauna Lani/Waikoloa(2)	930	19
Hilo/Ka'u/Volcano	800	100%
Mau:	4,240	42
Kaanapali	4,490	17
Hapili/Honokowai/Lahaina	1,820	3
Kapalua	320	9
Wailea	900	25
Kihiti/Maalaea	2,660	4
Kahului/Mailuku/Hana/Kula	400	100%
Kauai:	10,590	17
Princeville	640	36
Poipu/Kalahao/Kokee	1,390	47
Waimea/Kapaa/Lihue	1,800	100%
	3,830	

(1) Estimated based on the number of visitor units as reported by the Hawaii Visitors Bureau and the occupancy rate for the areas based on surveys conducted by Peat, Marwick, Mitchell & Co.

(2) Smaller resorts have been combined with larger regions to preserve confidentiality of occupancy rates of individual facilities.

Development Plan Recommendations

The facility concept for hotel development at the Awake'e Resort is based on anticipated facilities which are required to serve the anticipated target markets which the Awake'e Resort is expected to attract.

Recommendations for the development of the hotel facilities are outlined below:

1. Hotel size - As described in the previous section, about 400 to 500 hotel rooms could be supported at the Resort by about 1993 and 500 to 700 rooms by 1997. One mid-sized hotel of between 550 to 650 rooms is proposed at the Awake'e Resort as:

- First-class hotels are generally larger than luxury hotels as the success of the hotels will depend on a volume trade and efficient operations rather than their high degree of service and exclusivity.
- First-class neighbor island hotels in Hawaii are found to range in size from about 350 to 800 units.
- One mid-sized hotel would complement, rather than dominate, the overall master plan for development at the Resort which is expected to consist of a total of 1,500 hotel and condominium units.
- A mid-sized hotel would be able to support incentive, meeting and conference groups which are expected to be a major visitor market segment.

2. Development concept and phasing - Due to the need to develop a critical mass of hotel activity and to enable the hotel to accommodate larger groups, 550 to 650 hotel rooms are proposed to be developed in one phase by about 1993. At this time, islandwide occupancy levels are expected to be relatively high and the Kona and Kohala area is expected to have developed greater visitor recognition due to planned visitor facilities on the island.

The concept for the proposed hotel would be to create an activity-oriented resort hotel which would be a complete "resort" in itself. The Hotel could serve as an "amenity" to the entire Awake'e Resort and provide:

- A focal point for all Resort activities
- An internationally known hotel operator that could market and promote both the Hotel and Resort as a whole
- Restaurants and meeting facilities for the use of resort condominium guests
- A pool of potential repeat visitors who could be potential condominium purchasers at Awake'e

The design of the Hotel should emphasize ocean views and create a tropical setting which is associated with Hawaii resorts. The Hotel could consist of a mid-rise main building of 400 to 500 rooms and a low-rise suite-type facility of 100 to 150 rooms. The low-rise structures could be oriented around pools or lagoons in a similar manner to the bungalows at Kahala Hilton Hotel or the Kaula Beach Villas condominiums next to the Kaula Hilton Hotel. This could enable the Hotel to serve two distinct guest market segments in a single facility and allow greater privacy and seclusion for the FIT and family visitor market while accommodating groups in the main facility.

As the Hotel contains no beach frontage, strong emphasis should be placed on the development of interesting swimming areas both for recreational and aesthetic purposes.

3. Public areas - The Hotel's public areas should cater to both Hotel guests and, to a lesser extent, guests of the Awake'e Resort. The lobby should be moderate to large in size and employ a unique design theme to create a memorable impression of the Hotel. Public areas should emphasize the ocean and tropical setting of the Resort and utilize high-quality materials and artwork.

4. Guest rooms - All guest rooms should feature ocean or lagoon views or frontage. Guest rooms should contain a living area of 375 to 400 square feet and be nearly identical in configuration with the exception of suites as follows:

Proposed Guest Room Configuration		
	Room count	Living area (square feet)
Standard room	400 - 500	375 - 400
Suites:		
One-bedroom	85 - 130	500 - 700
Two-bedroom	15 - 20	900 - 1,400
	<u>500 - 650</u>	

5. Recreational facilities - To make the Hotel a complete resort in itself and to compete effectively with Kailua Town and with Keauhou Resort, the Hotel should offer a full complement of recreational activities or facilities such as golf, tennis, swimming pools, jogging and walking paths and health spa or gym facilities.

6. Other facility and amenity requirements - To attract the targeted market segments, the Hotel should also offer the following:

- Mid-sized meeting or conference facilities designed to accommodate up to 600 persons.
- Multiple restaurants and cocktail lounges or nightclubs to enable the Hotel to accommodate groups in slower visitor months.

- Lobby shops to provide high-quality resort goods and conveniences.
- Extensive landscaping to enhance the Hawaii resort setting.

Projected Occupancy Rates

Occupancy rates for individual hotel facilities are dependent on many factors. In estimating the projected occupancy levels for the proposed Hotel, the following factors were considered:

- Generally high occupancy levels projected for the island of Hawaii from 1993 and later years.
- The emerging awareness of the island of Hawaii as a visitor destination due to the reputation of the Kohala coast and the opening of the Hyatt Regency Maikoloa by 1989.
- The initially limited recognition of the Awake'e Resort as the proposed Hotel would be one of the first developed at the Resort.
- Start-up occupancy levels of recently completed hotels such as the Sheraton Royal Maikoloa, Princeville Sheraton, Mauna Lani Bay and Maui Marriott Hotels.
- An assumed international reputation, professional management practices and extensive marketing network of the operator of the proposed Hotel.

Based on these factors and the estimated market position of the Resort, the proposed Hotel is estimated to be able to achieve a stabilized occupancy level of 80% by the fourth year of operations, 1996. During the first three years of operation, occupancy levels are expected to progress from 60% in the first year of operations to the stabilized 80% occupancy rate as the Hotel develops its market position in the FIT, repeat visitor, group and meetings and conventions markets, as shown in the following table:

Projected Occupancy Rates for the
Proposed Awake'e Resort Hotel

1993 to 1997

	Projected occupancy level	
	Island of Hawaii	Proposed Awake'e hotel
1993	79%	60%
1994	81	70
1995	82	75
1996	83	80
1997	83	80

Projected Average Room Rates

The projected average achieved room rates for the proposed hotel has been based on the proposed published room rate structure for the Hotel and a survey of the average room rates achieved by selected comparable Hawaii hotels. The published room rates for the Hotel range from about \$90 to \$120 per day for a standard ocean view guest room and \$120 to \$150 for units located on the oceanfront. Suites are proposed to range from \$160 to \$500 per day, as shown in the following table:

Proposed Awake'e Hotel Room Rates

(1986 dollars)

Published room rates:	\$ 90 - 120
Ocean view	120 - 150
Oceanfront	160 - 500
Suites	

Average achieved room rate 90

The Hotel is estimated to achieve an average daily room rate of about \$90 in 1986 dollars. These projected room rates consider the rates achieved at the selected hotels, their site characteristics, hotel and resort amenities and guest market segments in comparison to the proposed hotel at Awake'e. This rate is lower than the rates achieved by the Waiohale, Maui Marriott and Princeville Sheraton Hotels due to their relatively more widespread resort reputation, beach frontage high-quality golf course facilities and resort amenities. However, this achieved rate is comparable to that achieved by the Sheraton Royal Maikoloa and slightly higher than the \$83.81 average room rate achieved by Kona hotels in the first seven months of 1986.

AWAKE'E RESORT
Private Multifamily Housing Authorizations
for the State and Island of Hawaii
1970 to 1985

Year	State of Hawaii		Island of Hawaii	
	Number of units	Average value(1)	Number of units	Average value(1)
1970	5,241	\$ 20,913	395	\$ 14,522
1971	5,788	17,234	858	14,850
1972	9,356	17,834	854	15,287
1973	12,374	21,064	479	17,948
1974	15,474	25,101	994	25,256
1975	7,269	34,083	507	27,012
1976	3,560	32,144	129	15,837
1977	3,193	36,100	133	25,789
1978	4,657	41,357	334	35,734
1979	4,989	50,536	734	47,500
1980	6,758	73,544	739	76,218
1981	3,321	76,797	285	94,533
1982	3,070	50,071	245	110,780
1983	1,479	66,815	96	141,969
1984	1,280	48,938	181	90,834
1985	2,633	54,772	190	133,379

(1) Value of permits granted for new construction, in current dollars.

Source: Bank of Hawaii, Construction in Hawaii, 1986.

V - CONDOMINIUM MARKET ANALYSIS

This chapter assesses the market support for condominium development at Awake'e. The sections below review condominium development trends, the current and planned inventory of units on the island of Hawaii, comparable project characteristics and market trends relating to absorption, prices, buyer profiles and the condominium market outlook for the island to the year 2010. The last section of the chapter presents the condominium market assessment for Awake'e.

CONDOMINIUM DEVELOPMENT TRENDS

Condominium development and ownership in the state was legalized with the passage of the Horizontal Property Regime Act (Act) by the Hawaii State Legislature in 1961. The Act defines a condominium as a structure or structures that offer ownership of single units in a multiunit development with fractional ownerships of the projects' common elements.

Private Multifamily Authorizations

Condominium development boomed statewide in the early to mid-1970s, but has slowed considerably in the early 1980s in response to slower growth in the national economy and temporarily overbuilt situations in certain areas such as on Kauai and Hawaii. Condominium development trends for the state and the island of Hawaii are reflected in private multifamily housing authorizations, as shown in Exhibit V-A. Statewide, there were record numbers of authorizations, totaling more than 12,000 and 15,000 new units in 1973 and 1974, respectively, but a significant slowdown in new construction permit authorizations in the years since.

Authorization trends on the island of Hawaii have been more irregular than those statewide. More than 700 units per year were approved on the island in 1971 to 1972, 1974, 1979 and 1980. In 1984 and 1985, new construction authorizations represented 180 and 190 units, respectively, as also shown in the exhibit. A very strong trend on the island has been the increasing average value of unit authorizations. This reflects the high quality of development occurring in resort areas of the island, most notably in South Kohala. Thus the average estimated value of new construction has increased from about \$14,500 in 1970 to over \$130,400 in 1985, as also shown in the exhibit.

Development in South Kohala and North Kona

On the island of Hawaii, the majority of condominium development has been concentrated in the North Kona and South Kohala districts. Condominium development in these areas is estimated to have totaled 74 projects or phases of projects as of 1986, as shown in Exhibit V-8. In recent years the development momentum has shifted from stand-alone projects in the Kailua area to master-planned development in South Kohala resorts, as also reflected in the exhibit. There have been no condominium project completions in the North Kona district since 1982.

ISLAND OF HAWAII INVENTORY

This section inventories existing and planned condominium projects on the island of Hawaii.

AWAKE'E RESORT

Exhibit V-8

Project Completions by Area in the
South Kohala and North Kona Districts(1)

To 1986

Year	South Kohala district	North Kona district Kailua	Keauhou	Total
Pre-1980	3	33	6	42
1980	3	5	5	13
1981	1	6	2	9
1982	-	4	1	5
1983	1	-	-	1
1984	2	-	-	2
1985	-	-	-	-
1986	2(2)	-	-	2
Total	12	48	14	74
Percent	16.2%	64.9%	18.9%	83.8%
				100.0%

(1) Phases of developments counted as separate projects.

(2) First phases of the Mauna Lani Point at Mauna Lani Resort and the Shores at Waikoloa expected to be substantially completed by end of the year.

Sources: Hastings, Martin, Conboy, Braig & Associates, Ltd., Condominium Market Study: Island of Hawaii, 1985; and Peat, Marwick, Mitchell & Co.

Existing Units

The island of Hawaii presently includes about 52 condominium projects located in resort areas. These projects represent over 4,200 units, the majority of which are located in the Kona area, as shown in Exhibit V-C. According to the HVB, an average of 49% of units at these resort condominium projects are kept in transient visitor rental pools, as also shown in the exhibit.

Planned Units

Projects currently under construction on the island include the 116-unit Mauna Lani Point at Mauna Lani Resort and the 120-unit Waikoloa Shores at Waikoloa Beach Resort, as shown in Exhibit V-D. Three projects are also planned for development in Keauhou Resort. These projects range in development stages from the 72-unit first increment of the Villas at Keauhou, which is now in presales, to a 39-acre site at Keauhou Resort where a Montana developer is reported to be acquiring a leasehold interest in the land in order to develop a 405-unit project over the next several years. These planned developments total about 740 units over an indefinite time period, as also shown in the exhibit.

In addition, there is significant existing zoned capacity for condominium development at Waikoloa, Mauna Lani and Keauhou Resorts and there are numerous proposed resorts currently seeking County and/or State approvals for further condominium development on the island.

COMPARABLE PROJECT REVIEW

This section discusses types of resort condominium sites and reviews the characteristics of selected comparable resort condominium developments on the islands of Hawaii and Maui.

Site Location

Visitors to Hawaii tend to associate ocean views, beaches and lush landscaping with the islands. Thus market conditions for individual projects are strongly affected by the site location with respect to these elements. Three types of condominium sites are differentiated in this study:

- Oceanfront - Ocean frontage is normally the most desirable location, as it may offer spectacular views and access to the ocean and beaches. As a result, projects with ocean frontage usually command the highest unit prices and sell most rapidly.
- Golf-front - Golf-front sites are attractive in that they may provide views over a well-maintained, landscaped area. Many golf-front projects such as at the Kapalua, Wailea and Keauhou Resorts also offer ocean views because of the topography of the site. Golf-front sites with ocean views are generally preferred to those with fairway views only.
- Interior - Interior resort locations are the least desirable and, as a result, usually support significantly lower unit prices than do projects with ocean frontage, ocean views or golf frontage. In order to compensate for this locational disadvantage, interior projects may offer manmade views such as water features or gardens.

AWAKE'E RESORT
Resort Condominium Inventory
for the Island of Hawaii
1986

	Unit count		Percent units in rental pool
	Visitor rental pool(1)	pool(2)	
Hilo	1	134	100%
Ka'u	1	35	46
Kohala	7	126	28
Kona	43	1,757	49
Total	52	2,052	49%

(1) Estimated based on Monitor, Hawaii, Inc., 1984, other published sources and interviews with developers.
(2) As of February 1986, Hawaii Visitors Bureau, Visitor Plant Inventory, 1986.

Planned Condominium Units on the Island of Hawaii	
AWAKE'E RESORT	
District and project	Location
South Kohala: Mauna Lani Point	Mauna Lani Resort
The Shores	Waikoloa Beach Resort
Subtotal	116
North Kona: The Villas at Keauhou Estates	Keauhou Resort
Maie Keahu Unnamed	Keauhou Resort
Subtotal	28
Total	144
Comments	Second phase expected to be completed by early 1986. First phase expected to be completed by late 1986.
Comments	Now in presales, construction commence- ment indefinite. Completion planned for mid-1987. In land acquisition stage.
Number of units	741

Sources: Interviews with resort representatives; Hawaii Visitors Bureau, Visitor Plant Inventory, February 1986; and Pacific Business News (various).

Comparable Project Definition

Characteristics of selected condominium projects located in resort areas on the islands of Hawaii and Maui are reviewed in order to provide a context for the condominium development program proposed for Awa'e'e. Projects were selected for review based on the following criteria:

- Location in a master-planned resort on Maui or Hawaii
- Proximity to golf course and hotel developments within the resort
- Location on the ocean or fronting a golf course
- Low-rise development (three or fewer stories)
- First marketed since 1975

Based on these criteria, 12 projects were selected for study and comparison to potential development at Awa'e'e. These projects are discussed in the following subsections.

Project Characteristics

The selected comparable projects range in size from 40 to 186 units with an average size of 122 units. This represents 1.3 to 13.6 units per gross acre, as shown in Exhibit V-E. Units are generally clustered, with 4 to 13 per two- to three-story building, as also shown in the exhibit. The Mauna Kea Villas, a very luxurious project developed on the island of Hawaii, are fee-standing single-story buildings that are paired to resemble single-family duplexes.

Among the selected projects, the Hawaii island projects are slightly smaller and of lower densities than are the Maui projects, as also shown in the exhibit.

Unit Mix

Most projects include a majority of one- and two-bedroom units, as shown in Exhibit V-F. The projects generally do not include three- and four-bedroom units and even luxury projects generally include no more than 10% of this type. Studio units are increasingly rare and are found mostly at older projects such as in Kaanapali Beach Resort or in areas outside of master-planned resorts which cater to a less upscale market segment. None of the projects selected for study included studio units.

Unit Size

Excluding lanais and garage spaces, average unit sizes range from about 1,000 net square feet for one-bedroom units to about 2,400 square feet for three- and four-bedroom units, as shown in Exhibit V-G. Except at the Waikoloa Shores, the selected comparable Hawaii island units have been somewhat larger than comparable units on Maui, as also shown in the exhibit.

Facilities and Amenities

Resort condominiums have become increasingly competitive in the provision of recreational and other project amenities. Amenities of recently completed projects are noted in Exhibit V-H and include recreation centers, swimming pools, jacuzzis, saunas, tennis courts, meeting rooms and barbecue areas. Many also offer special provisions for memberships or preferential usage of the resort's facilities such as for golf and/or tennis.

AWA'E'E RESORT
Project Characteristics of Selected
Resort Condominium Projects

	Number of units	Units gross acre	Average units per building	Maximum story height	Year of first marketing
Island of Hawaii:					
Kanaloa at Keauhou	166	9.6	4	3	1979
Mauna Lani Terrace	80	6.0	7	3	1982
Mauna Kea Villas	40	1.3	1	1	1983
Mauna Lani Point	116	6.3	13	3	1985
The Shores at Waikoloa	114	10.0	10	3	1985
Island average	103	6.6	7	3	
Island of Maui:					
Kapalua Bay Villas	141	8.5	5	3	1975
Wailea Elua Village	152	6.4	6	2	1976
Kapalua Golf Villas	186	11.8	12	3	1977
Kapalua Ridge Villas	161	7.4	6	3	1978
Kapalua Ironwoods	40	4.3	4	2	1978
Wailea Ekolu	148	13.6	9	2	1978
Wailea Point	116	6.3	13	3	1985
Island average	135	8.3	8	3	
Average	122	7.6	11	3	

Exhibit V-F

Units	Three or more bedroom	Two-bedroom	One-bedroom
Percent district-	Percent district-	Percent district-	Percent district-
Number	Number	Number	Number
bution	bution	bution	bution
Total.			
100%	166	130	22%
100	80	54	23
100	40	37	-
100	55	35	31
100	66	42	27
100	407	298	22
100	141	49	65
100	136	98	28
100	186	107	42
100	161	56	65
100	40	75	30
100	148	73	27
100	129	97	-
100	941	61	38
100%	1,348	64%	33%
100	34	14	354
100	1	4	443
100	3	10	92
100	25	-	38
100	-	-	79
100	-	-	105
100	-	-	40
100	-	-	354
100	-	-	443

Island of Hawaii:
Kamaloa at Keanoou
Mauna Lanai Terrace
Mauna Kea Villas
Mauna Lanai Point
The Shores at Waikoloa

Subtotal of average

Island of Maui:
Kapalua Bay Villas
Wailea Elua Village
Kapalua Golf Villas
Kapalua Ridge Villas
Kapalua Ironwoods
Wailea Eo'u
Wailea Point

Subtotal of average

Total of average

AWAKE'E RESORT

Exhibit V-G

	Unit size (square feet)		
	One- bedroom	Two- or more bedroom	Three- or more bedroom
Island of Hawaii:			
Kanaloa at Keolu	1,292	1,776	-
Mauna Lani Terrace	1,150	1,450	2,200
Mauna Kea Villas	-	2,700	3,700
Mauna Lani Point	1,129	1,516	1,988
The Shores at Waikoloa	841	1,265	1,865
Island average	<u>1,103</u>	<u>1,742</u>	<u>2,438</u>
Island of Maui:			
Kapalua Bay Villas	1,050	1,500	-
Wailea Etua Village	950	1,400	-
Kapalua Golf Villas	950	1,300	-
Kapalua Ridge Villas	1,150	1,800	-
Kapalua Ironwoods	-	1,900	2,550
Wailea Ekolu	900	1,300	-
Wailea Point	-	1,600	2,559
Island average	<u>1,000</u>	<u>1,543</u>	<u>2,555</u>
Average	<u>1,046</u>	<u>1,626</u>	<u>2,427</u>

AWAKE'E RESORT

Unit Mix of Selected Resort Condominium Projects

	Units						Total	Percent distribution
	One-bedroom		Two-bedroom		Three- or more bedroom			
	Number	Percent distribution	Number	Percent distribution	Number	Percent distribution	Number	
Island of Hawaii:	36	22%	130	78%	-	-%	166	100%
Kanaloa at Keauhou	18	23	54	68	8	10	80	100
Mauna Lani Terrace	-	-	37	93	3	8	40	100
Mauna Kea Villas	17	31	35	64	3	5	55	100
Mauna Lani Point	18	27	42	64	6	9	66	100
The Shores at Waikoloa							407	100
Subtotal or average	89	22	298	73	20	5		
Island of Maui:	92	65	49	35	-	-	141	100
Kapalua Bay Villas	38	28	98	72	-	-	136	100
Wailea Elus Village	79	42	107	58	-	-	186	100
Kapalua Golf Villas	105	65	56	35	-	-	161	100
Kapalua Ridge Villas	-	-	30	75	10	25	40	100
Kapalua Ironwoods	40	27	108	73	-	-	148	100
Wailea Ekolu	-	-	125	97	4	3	129	100
Wailea Point							941	100
Subtotal or average	354	38	573	61	14	1		
Total or average	443	33%	871	64%	34	3%	1,348	100%

Exhibit V-F

Island of Hawaii:	Island of Maui:
Kanaloa at Keauhou	Kapalua Bay Villas
Mauna Lani Terrace	Wailea Elus Village
Mauna Kea Villas	Kapalua Golf Villas
Mauna Lani Point	Kapalua Ridge Villas
The Shores at Waikoloa	Kapalua Ironwoods
	Wailea Ekolu
	Wailea Point
Island average	Island average
	Average

AWAKE'E RESORT
Average Unit Sizes of Selected
Resort Condominium Projects

Unit size (square feet)			
One-bedroom	Two- or more bedroom	Three-	Total
1,292	1,776	-	1,534
1,150	1,450	2,200	1,600
-	2,700	3,700	3,200
1,129	1,516	1,988	1,544
841	1,269	1,865	1,325
1,103	1,742	2,438	1,841
1,050	1,500	-	1,275
950	1,400	-	1,175
950	1,300	-	1,125
1,150	1,800	-	1,475
-	1,900	2,550	2,225
900	1,300	-	1,100
-	1,600	2,559	2,080
1,000	1,543	2,555	1,494
1,046	1,626	2,427	1,638

Exhibit V-G

MAUI'S RESORT

Project Amenities of Recently Completed
Selected Comparable Resort Condominium Projects

Resort/project	Number of units	Recreation center	Swimming pool	Jacuzzi	Sauna	Tennis courts	Meeting rooms	Landscaped garden/ lagoon area	Other amenities
Island of Hawaii:									
Mauna Lani Terrace	80	X	X	X	X	X	X	X	Two separate amenity areas, also include barbecue areas and waterfalls.
Mauna Lani Point	116	X	2	X	X	7			
Mauna Kea Villas	40		40			9			Use of resort facilities, privileges at resort golf course.
The Shores at Maikooloa	114	X	X	X		3	X	X	Barbecue areas. Use of resort facilities.
Kanaloa at Kaeohou	166	X	3			2			Barbecue area.
Island of Maui:									
Kapalua Golf Villas	186	X	4						Reception center; use of resort facilities.
Kapalua Ridge Villas	161	X	2						Use of resort facilities.
Kapalua Ironwoods	40	X	2			2			Use of resort facilities.
Malibu Estate	148	X	2						Barbecue area.
Malibu Point	129	2	4	X				X	Barbecue area; indoor racquetball court; exercise gym; paddle tennis and pickleball courts; boat parking.

Source: Hawaii TRK Service, Condominium Guide, 1982 and updates; Guidelines Corporation, Hawaii Condominiums, 1985; project sales brochures.

Exhibit V-H

REVIEW OF MARKET TRENDS

This section reviews condominium market trends on the island and for the selected comparable projects in terms of sales absorption, prices, buyer profiles and buyer origins. The section concludes with an assessment of the market outlook for condominium unit sales on the island.

Unit Sales Absorption

Estimation of annual new condominium unit sales absorption on the island is based on information provided by the Hawaii TRK Service and the Multiple Listing Service (MLS) for condominiums sold in the Kohala and Kona areas. Since less than 5% of the resort condominiums on the island are located outside of these two districts, condominium sales in these areas are representative of the island of Hawaii resort condominium market.

Recorded sales which were not sold through MLS are representative of the annual absorption of new units and are summarized in Exhibit V-1. As shown in the exhibit, annual new condominium sales since 1978 have fluctuated dramatically from the current low of about 100 units to over 492 units in 1979 for an average of about 250 units per year over the period. Using a three-year moving average to smooth the fluctuations, between 195 and 398 units were sold annually for an average of about 270 units per year over the period. New condominium unit sales have slowed in recent years due to the:

- Lack of new inventory development on the island, except in a few high-end projects such as at Mauna Kea, Mauna Lani and Maikooloa Beach Resorts.
- Relatively slow visitor and real estate markets throughout the state until 1986.
- Relatively high interest rates until 1986.
- Uncertainty over the effects of Federal tax law changes on real estate investment deductions and amortization periods.

The most limiting factor to new condominium sales absorption on the island has been the lack of new inventory, except in the luxury market. Because of the ongoing and expected improvements in the visitor arrivals to the island and the recent drop in mortgage interest rates, new condominium development in the region is expected to be met with improved rates of unit sales absorption. Potential effects of the changes in Federal tax law in the resort condominium market are most likely to be experienced at those projects targeted at investor-buyers who primarily seek tax shelters, as noted in the previous section.

Unit Sales Prices

Condominium unit sales prices are analyzed three ways. The first discussion summarizes trends in new unit sales prices on the island. The two following analyses consider prices by project location and by number of bedrooms for new sales and resales at the selected comparable projects.

Exhibit Y-1

AWAKE'E RESORT

Estimated North Kona and South Kohala
New Condominium Unit Sales

1978 to 1986

Year	Annual new condominium sales(1)	Three-year moving average
1978	147	-
1979	492	-
1980	283	307
1981	419	398
1982	205	302
1983	118	247
1984	336	220
1985(2)	150	200
1986(3)	98	195
Average	250	267

(1) Estimated based on the number of sales recorded at the Bureau of Conveyances reported by Hawaii TML Service which do not go through the Multiple Listing Service.

(2) Annualized estimate based on first five months, adjusted for seasonality; comparable data for remainder of year not available.

(3) Annualized estimate based on first seven months.

• New unit sales prices - Average prices of new condominium units sold in the North Kona district since 1982 range from about \$150,000 up to \$250,000, as shown in Exhibit Y-J. The average represents projects located in the master-planned Keauhou Resort as well as stand-alone projects located in the Kailua area that do not offer private access to golf.

New unit sales prices in the South Kohala district have been significantly higher than in North Kona due to the high quality of recent developments in the district and their locations in prestigious, master-planned resorts that offer golf, sandy white beaches and other amenities. The average prices of new units sold in South Kohala have ranged from about \$300,000 for one-bedroom units to over \$900,000 for three- and four-bedroom units, as also shown in the exhibit. These high average prices are due in particular to sales at the following high-quality projects:

- Mauna Lani Terrace
- Mauna Kea Villas
- Mauna Lani Point
- Maikoloa Shores

• Prices by project location - Unit sales prices are strongly affected by the project's location with respect to ocean and golf frontage. However, the Mauna Kea Villas demonstrates that due to pent-up demand, a golf-front project that offers panoramic ocean views, location in a prestigious luxury resort and large, very high-quality units can support very high prices. Excluding this very exceptional "golf-front" project, recent unit sales prices among the selected comparable projects on the island of Hawaii have averaged 17% less per unit at golf-front projects than at oceanfront projects, as shown in Exhibit Y-K. Among the three recent South Kohala projects, the Mauna Lani Terrace and Point realized price premiums of about 33% per unit and 23% per square foot compared to the golf-front Maikoloa Shores.

On Maui, where there is a longer history of resort condominium development and a greater range of comparable projects, price differentials were even more dramatic than on the island of Hawaii. The selected comparable oceanfront projects on Maui commanded prices of 63% per unit and 52% per square foot less than golf-front projects, as also shown in the exhibit.

Overall, the selected comparable projects averaged 52% less per unit and 39% less per square foot at golf-front as compared to oceanfront projects, as also shown in the exhibit.

In addition, within projects of comparable location and quality, prices are strongly affected by the view orientation of particular units. Analysis of recent sales at ten ocean- and golf-front projects indicates that compared to units fronting the ocean, average unit sales prices within projects were 23% and 62% less at units offering partial ocean and golf views, respectively.

• Prices by number of bedrooms - Prices also vary considerably by unit size and number of bedrooms. Average unit prices at the selected projects ranged from \$239,000 for one-bedroom units to \$989,000 for

Exhibit V-J

AWAKE'E RESORT

Average Sales Prices of New Condominium Units
In North Kona and South Kohala

1982 to September 1986

	1982	1983	1984	1985	1986(1)
North Kona condominium prices:					
One-bedroom	\$ 197,400	194,440	229,050	159,000	N/A
Two-bedroom	146,580	218,230	186,670	250,000	N/A
Three- or more bedroom	-	-	-	-	-
All units	153,840	211,970	197,260	204,500	N/A
South Kohala condominium prices:					
One-bedroom	-	302,500	307,500	350,500	360,800
Two-bedroom	-	469,570	703,720	513,600	447,000
Three- or more bedroom	-	755,000	918,330	925,000	620,600
All units	-	434,900	683,260	552,400	469,300

N/A Not available.

(1) South Kohala average price includes units reported to have sold at the Mauna Lani Point and Maikoloa Shores, but unrecorded at the Bureau of Conveyances as of September 1986. North Kona data unavailable for 1986; very few new unit sales thought to have occurred due to lack of new product development in the district.

Source: Peat, Marwick, Mitchell & Co., based on Hawaii TRX Service and Multiple Listing Service.

Exhibit V-K

AWAKE'E RESORT

Average Unit Sales Prices by Project Location
and Island for Selected Resort Condominium Projects

January 1984 to September 1986

	Oceanfront projects		Golf-front projects	
	Per unit	Per square foot	Per unit	Per square foot
Island of Hawaii:				
Kanaloa at Keauhou	\$ 211,000	120	-	-
Mauna Lani Terrace	489,000	324	-	-
Mauna Lani Point	516,000	369	-	-
The Shores at Maikoloa	-	-	335,000	267
Island average	405,000	271	335,000	267
Island of Maui:				
Kapalua Bay Villas	237,000	220	-	-
Wailea Elua Village	426,000	324	-	-
Kapalua Golf Villas	-	-	194,000	133
Kapalua Ridge Villas	-	-	199,000	125
Kapalua Ironwoods	727,000	309	-	-
Wailea Ekolu	-	-	200,000	186
Wailea Point	767,000	369	-	-
Island average	539,000	306	198,000	148
Average	\$ 482,000	291	232,000	178
Difference from oceanfront location:			(17)%	(11)%
Island of Hawaii			(63)	(52)
Island of Maui			(52)%	(39)%
Total				

Buyer Profiles

The characteristics of resort condominium buyers are profiled for first-class and luxury projects. The characteristics of the typical buyers in each category are summarized in Exhibit V-M and discussed as follows:

- **Purchase motivation** - Purchase motivations vary significantly between the three categories. In the middle-priced, first-class market, buyers are often motivated by investment opportunities as well as the desire for a vacation or retirement home. Such purchasers typically require rental income to cover a portion of their unit holding costs and seek to realize capital gains upon the resale of their units. In contrast, the primary purchase motivation in the luxury or higher priced market is to have a vacation or retirement home in Hawaii.
- **Typical age** - The typical age of purchasers is comparable for both categories with an average age of 45 to 50. However, the first-class market tends to include buyers of a greater range of ages than does the luxury market.
- **Occupation** - The resort condominium purchaser is typically a professional such as an attorney or doctor, a chief executive officer of a large corporation, a successful entrepreneur or a corporate executive. Purchasers of first-class condominiums, however, include a greater share of professionals who tend to earn less than do the entrepreneurs or high-ranking corporate executives.
- **Household income** - Average annual household incomes range from about \$100,000 to \$350,000 in the first-class market and from \$200,000 and up at the more luxurious properties.
- **Investor sophistication** - Buyers in both markets are generally experienced investors. However, the luxury condominium buyers are even more likely to already own one or more vacation homes.
- **Place of origin** - In both markets, buyers are typically from the western United States, especially from California, Washington, Oregon and Alaska. Buyers from within the state are relatively more common in the less expensive condominium markets. The place of origin of buyers is discussed further below.

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AWAKE'E RESORT
Average Unit Sales Prices by Number of Bedrooms
for Selected Resort Condominium Projects
January 1984 to September 1986

	Units				Project average	
	One-bedroom		Two-bedroom		Three- or more bedroom	
	Per unit	Per square foot	Per unit	Per square foot	Per unit	Per square foot
Island of Hawaii:						
Kanaloa at Keauhou	\$ -	-	211,000	120	-	211,000
Mauna Lani Terrace	333,000	298	460,000	318	808,000	385
Mauna Kea Villas	-	-	936,000	349	1,252,000	336
Mauna Lani Point(1)	412,000	365	588,000	388	815,000	410
The Shores at Waikoloa	217,000	258	341,000	267	520,000	279
Island average	321,000	307	507,000	288	849,000	353
Island of Maui:						
Kapalua Bay Villas	222,000	220	269,000	238	-	237,000
Wailea Elua Village(2)	225,000	264	440,000	325	835,000	491
Kapalua Golf Villas	163,000	134	233,000	131	-	426,000
Kapalua Ridge Villas	171,000	125	278,000	127	-	194,000
Kapalua Ironwoods	-	-	594,000	310	1,195,000	306
Wailea Ekolu	167,000	192	209,000	184	-	727,000
Wailea Point(1)	-	-	706,000	360	1,500,000	200,000
Island average	190,000	187	390,000	239	1,176,600	425
Average	\$ 239,000	232	406,000	260	989,000	384
						463,000
						264

Exhibit V-L

- (1) Based on list prices for units, many reported to be in escrow.
(2) High price for three- or more bedroom sale based on one unit sale only.

AWAKE'E RESORT

Typical Buyer Characteristics by Class of Condominium

	First-class	Luxury
Example condominium projects	Kapalua Bay, Golf and Ridge Villas Mailea Ekele and Elua Kanalua at Keauhou Waikoloa Shores	The Villas at Mauna Kea Mauna Lani Terrace and Point Mailea Point Kapalua Ironwoods
Approximate unit price	\$175,000 to \$450,000	\$450,000+
Purchase motivation	Investment, vacation or retirement home	Vacation or retirement home
Typical age range	35 to 60 years	40 to 55 years
Occupation	Professionals, entrepreneurs and developers	Chief executive officers and self-employed entrepreneurs
Household income	\$100,000 to \$250,000	Over \$200,000
Investor sophistication	Experienced investors. Many own vacation homes elsewhere	Experienced investors. May be "trading up" and most own one or more vacation homes elsewhere
Origin	Mainland - majority from California. Few from Hawaii	Mainland - majority from west coast. Local buyers almost nonexistent
Purchasing entity	Couples, limited partnerships and trusts	Couples
Other characteristics	Has been a visitor to the resort and the area and would like to make an investment with the benefit of a vacation home	Typically has been a frequent visitor to the resort and has decided to purchase a vacation or possible retirement home

Exhibit V-M

Source: Discussions with realtors or representatives of Hawaii condominium projects.

- Purchasing entity - Married couples are a major market segment in both markets; however, the first-class market also includes small units.
- Other characteristics - The typical resort condominium buyer has visited the resort on several previous occasions. The luxury condominium buyer tends to be a frequent visitor to the resort or area who has decided to make a commitment to the area as a vacation destination. As previously mentioned, first-class condominium purchasers are often also motivated by investment considerations.
- Buyer Origins - Nearly all resort condominium buyers on the island of Hawaii reside in the United States. In the Kona district, U. S. residents are estimated to represent nearly 98% of the market, while in Kohala they represent about 93%, as shown in Exhibit V-N. California and other west coast residents represent the majority or about 55% of all buyers. Hawaii buyers are also an important market segment, representing about 16% of total island sales. Foreign resident buyers have been more prevalent in Kohala than in Kona due to increasing interest in high-quality resort projects by the Japanese. In Kona, by contrast, the few foreign buyers that have been observed are most likely to be Canadian, as shown in the exhibit.

Sales Outlook for the Island of Hawaii

New condominium unit sales on Hawaii Island since 1978 have averaged about 270 units per year based on a three-year moving average, as shown previously. This market is expected to expand in future years due to the expected:

- Strengthening of the island economy
- Increases in visitor arrivals to the island
- Increase in condominium product development and diversity
- Lower and more stable interest rates
- Increased market awareness of the island of individual resorts

The long-term outlook for new condominium unit sales on the island, however, may also be affected in the short term by public uncertainty over the effects of expected changes in Federal tax law provisions and the loss of some tax incentives to investment. Thus new unit sales to 1990 may remain at about the same levels as observed in recent years. Thereafter, the sales absorption of new units on the island is projected to increase, as shown in the following table:

Projected New Condominium Sales for the Island of Hawaii 1991 to 2010		
	Units sold	
	Average annual	Total
1991 to 1995	350	1,750
1996 to 2000	450	2,250
2001 to 2005	550	2,750
2006 to 2010	675	3,375
Total		10,125

AWAKE'E MARKET ASSESSMENT

This section presents the market assessment for resort condominium development at Awake'e in terms of the Resort's potential market orientation, supportable rooms at Awake'e and a proposed development strategy.

Potential Market Orientation

The potential market orientation of condominium development at Awake'e is affected by the following factors:

- The first-class quality of the proposed hotel development at the Resort.
- The long ocean frontage but lack of sandy beaches at the site.
- The favorable location of the proposed condominium sites with respect to ocean and golf course views and frontage.
- Proposed competitive developments elsewhere on the island.

Based on the above-mentioned considerations, condominium development at Awake'e could have a first-class market orientation with units targeted primarily at buyers who seek vacation or future retirement homes. Based on unit usage observed at other resort condominium projects, however, it could be expected that many of the units would also be kept in visitor rental pools.

Supportable Rooms

Supportable rooms at Awake'e are estimated based on an 8% to 10% share of expected future new condominium unit sales on the island. This market share is considered achievable at Awake'e due to:

- The distribution of recent condominium sales among the island's other resort, which are estimated to be as shown below:

Keauhou	60%
Waikoloa Village	14
Mauna Kea	7
Mauna Lani	19
Total	100%

- The superior view orientations that would be available from most of the proposed condominium sites at Awake'e. All sites would offer ocean or golf frontage and ocean views could be offered from the majority of units due to the topography of the site.

- The recommended unit mix and pricing, as described below.

Thus, it is estimated that sales absorption at Awake'e could amount to about 140 to 175 units between 1991 and 1995 and up to 270 to 340 units between 2006 and 2010, as shown in Exhibit Y-9. This would represent average sales of 40 to 50 units per year over the 20-year period, or sellout of about one project phase per year. The projected sales absorption results in total market support for development of about 800 to 1,000 units between 1991 to 2010, as also shown in the exhibit.

Exhibit Y-9

AWAKE'E RESORT

Distribution of Resort Condominium Purchasers by Place of Residence

	Distribution(1)	
	Kona	Total
United States:		
California	36.6%	33.3%
Other west coast	17.6	36.7
Hawaii	27.4	13.3
Other United States	16.3	10.0
Subtotal	97.9	93.3
Foreign:		
Canada	1.5	-
Japan	.3	6.7
Other Far East	-	-
Other foreign	.3	-
Subtotal	2.1	6.7
Total	100.0%	100.0%

(1) Based on a sample of 365 resort condominium units sold from January 1982 to July 1984.

Source: Peat, Marwick, Mitchell & Co. based on information provided by Monitor Hawaii, An Analysis of Hawaii's Resort Condominium Market, November 1984.

Exhibit V-0

AWAKE'E RESORT
Projected Annual New Condominium Unit Sales
at Awake'e Resort

1991 to 2010

Years	Projected total island condominium sales	Awake'e projections			Cumulative sold units(1)	
		Period sales by market share	8% 10%	10%	Low	High
1991 to 1995	1,750	140	175	140	140	175
1996 to 2000	2,250	180	225	320	320	400
2001 to 2005	2,750	220	275	540	540	675
2006 to 2010	3,375	270	340	810	810	1,015
Total, rounded	10,125	810	1,015			
Average annual sales, rounded - 1991 to 2010	510	40	50			

(1) Based on 8% and 10% market shares, as shown.

Proposed Development Strategy

This section presents a strategy for condominium development at Awake'e based on the review of comparable projects presented previously in this chapter. A development strategy is outlined in terms of proposed unit mix, estimated unit sizes and prices and project facilities and amenities.

- Unit mix - Condominium units could include a majority of one- and two-bedroom units at all sites. The best sites, those offering ocean frontage and/or prime ocean view opportunities could also include up to 10% of units in a three-bedroom or two-bedroom plus den configuration. The proposed unit mix is summarized below:

One-bedroom	25 - 35%
Two-bedroom	60 - 70
Three- or more bedroom	5 - 10

- Unit sizes and prices - Like unit mix, unit sizes and prices could also vary by site. The oceanfront and prime ocean view sites, designated A and D in the master plan, could be expected to achieve unit prices ranging from about \$200,000 to \$450,000 and averaging \$350,000. Other condominium sites could achieve unit prices ranging from about \$150,000 to \$250,000 and averaging about \$200,000 per unit. Proposed net average unit sizes, prices and prices per square foot are summarized in the table below:

Proposed Condominium Unit Sizes and Prices
at Awake'e Resort

(1986 dollars)

	Average unit size(1)	Unit prices		Price per square foot
		Range	Average	
Oceanfront/ocean view sites	1,300	\$ 200,000 - 450,000	350,000	270
Other sites	1,100	150,000 - 250,000	200,000	180

(1) Net square feet, excluding lanai and garage spaces.

- Facilities and amenities - All developments are recommended to offer a landscaped recreation center, including a swimming pool, sauna and/or jacuzzi and barbecue area. The upscale oceanfront and prime ocean view sites could include additional dedicated amenities such as tennis courts, weight rooms and additional swimming pools and/or other water amenities. Experience has also shown that special resort golf privileges such as preferential reservation periods, lower membership fees and lower green fees greatly enhance sales absorption at upscale resort condominium projects.

The demand for commercial space at Aiea'e Resort is expected to be derived primarily from Resort visitors and residents and secondarily from other visitors to the region. This chapter describes the characteristics of selected resort shopping centers and summarizes the market projections for visitor and resident expenditures and the market support for commercial development at the Resort.

RESORT SHOPPING CENTER OVERVIEW

This section reviews the characteristics of five selected comparable resort shopping centers in Hawaii. This review provides the context for the commercial market assessment for Aiea'e Resort. Two of the centers examined, Whaler's Village and Maile Shopping Village, are located on the island of Maui, Coconut Plantation Marketplace and Princeville Center are on the island of Kauai and Keauhou Shopping Village is located on the island of Hawaii.

Description

The selected shopping centers were reviewed with respect to physical characteristics such as:

- Site area and gross leasable area
- Floor area ratios
- Architectural themes and building types

A summary of the characteristics of the selected shopping centers is found in Exhibit VI-A.

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MAIKE'E RESORT

Description of Surveyed Hawaii Resort Shopping Centers

	Year completed	Site area (acres)	Gross leasable area (square feet)			Floor area ratio(1)	Number of shops			Parking spaces	Parking ratio(2)	Building description
			Retail	Office	Total		Retail	Office	Total			
Maui:												
Whaler's Village	1970 and 1984	8.5	84,600	6,400	90,000	24.32	45	8	53	410	4.6	Groundfront, one- and two-story complex contained in 12 concrete and wood buildings. Whale museum located on a third floor building.
Maile Shopping Village	1977	10.8	21,500	4,500	26,000	5.7	24	5	29	181	5.8	One story plus mezzanine, wood frame with stucco siding. Luxury resort style.
Kauai:												
Coconut Plantation Marketplace	1972	8.0	63,600	-	63,600	18.3	73	-	73	354	5.6	Seven main one- and two-story buildings, with kiosks in interior courtyard.
Princeville Center	1977 and 1983	6.9	50,829	15,324	66,153	22.0	23	20	43	234	3.5	Eight 2-story wood frame buildings. Turn-of-the-century architecture.
Hawaii:												
Keauhou Shopping Village	1985	7.5	57,700	14,388	72,088	22.1	20	15	35	N/A	N/A	Six 1-story buildings and one 2-story office building. Free-standing supermarket.

N/A Not available.

(1) Ratio of gross leasable area to site area.

(2) Parking spaces per 1,000 square feet of gross leasable area.

Source: Discussions with shopping center management and International Council of Shopping Centers, Hawaii Shopping Center Directory, 1985.

Princeville Center has a turn-of-the-century architectural theme, which also relates to the resort's architectural theme. Wailea Shopping Village has a luxury resort style befitting the image sought at the Wailea resort area.

Building construction is typically single or multistoried retail shops in separate buildings. Tenants in second floor locations are typically office, rather than retail businesses. Whaler's Village is the only shopping center with numerous second floor retail tenants.

Resort Tenant Mix

This section describes the tenant mix at the selected resort shopping centers. Typically, the tenants at resort shopping centers are oriented towards the visitor market, with the exception of Princeville Center and Keahou Shopping Village, which also cater to the resort-residential market and the residents of surrounding communities. Office tenants are included at five of the selected centers. The tenant mix at the selected resort shopping centers are shown in Exhibit VI-8 and discussed below:

- Retail tenants - Retail tenants at the selected resort shopping centers, except Princeville as mentioned above, tend to be concentrated in a few retailing categories. The apparel, gift, craft or jewelry store, and restaurant categories generally represent 85% to 95% of the total retail space. Princeville Center, in contrast, has resident-oriented establishments such as a supermarket, hardware store and a bank, comprising more than two-thirds of the total retail space. Keahou Shopping Village is anchored by a large supermarket which represents over one-half of the total retail space. Whaler's Village and Coconut Plantation Marketplace have theater complexes comprising 4% and 10%, respectively, of total retail space. Drug and sundries are present in each of the centers but represented only a small portion of total retail space.
- Office tenants - Office tenants represent a portion of the tenant mix at each of the selected resort shopping centers except Coconut Plantation Marketplace. Office tenants represent 6% of total leasable space at Whaler's Village, 17% at Wailea Shopping Village, 23% at Princeville Center and 10% at Keahou Shopping Village. The relatively large portion of office space at Princeville Center reflects its residential market orientation. Office tenants are oriented toward the visitor market, with such tenants as travel agencies, and toward the residential market with tenants such as medical offices and contracting firms.

Market Performance

This section examines market performance of the selected resort shopping centers in terms of occupancy levels and retail sales levels during the 1983 through 1985 period.

- Occupancy levels - Occupancy levels at the selected shopping centers are very high with the weighted average occupancy level increasing from 96% in 1983 to 99% in 1985. The lowest occupancy levels, 90%, were

TABLE 1
Tenant Mix of Selected Resort Shopping Centers

Center	Total gross leasable square feet	Retail	Office	Other	Percent of total	Major tenants
Keahou Shopping Village	72,000	85	11	4	76	RITA Supermarket, Kona Supermarket, Bishop Estate, Keahou Restaurant, Drysdale Restaurant, Bank of Hawaii, Kona Steak House, Tivoli Hardware
Princeville Center	66,153	85	2	13	76	Foodland, Bank of Hawaii, Kona Steak House, Tivoli Hardware
Coconut Plantation Marketplace	63,000	40	24	10	100	Liberty House, Plantation Prime Rib, Andrus's, Farrell's
Wailea Shopping Village	26,000	65	22	13	80	Sony's Boutique, Wailea Plantation, Wailea Restaurant, Wailea Court, Wailea Condominiums
Whaler's Village	90,000	27	15	4	94	Crab Catcher, Wailea Plantation, Wailea Restaurant, Wailea Court, Wailea Condominiums

Source: Discussions with shopping center management.

Princetonville Center has a turn-of-the-century architectural theme, which also relates to the resort's architectural theme. Malles Shopping Village has a luxury resort style befitting the image sought at the Malles resort area.

Building construction is typically single or multistoried retail shops in separate buildings. Tenants in second floor locations are typically office, rather than retail businesses. Whaler's Village is the only shopping center with numerous second floor retail tenants.

Resort Tenant Mix

This section describes the tenant mix at the selected resort shopping centers. Typically, the tenants at resort shopping centers are oriented towards the visitor market, with the exception of Princetonville Center and Kaunoh Shopping Village, which also cater to the resort, residential market and the residents of surrounding communities. Office tenants are included at five of the selected centers. The tenant mix at the selected resort shopping centers are shown in Exhibit VI-B and discussed below:

• **Retail tenants** - Retail tenants at the selected resort shopping centers, except Princetonville as mentioned above, tend to be concentrated in a few retailing categories. The apparel, gift, craft or jewelry store, and restaurant categories generally represent 85% to 95% of the total retail space. Princetonville Center, in contrast, has resident-oriented establishments such as a supermarket, hardware store and a bank, comprising more than two-thirds of the total retail space. Kaunoh Shopping Village is anchored by a large supermarket which represents over one-half of the total retail space. Whaler's Village and Coconut Plantation Marketplace have theater complexes comprising 4% and 10%, respectively, of total retail space. Drug and sundries are present in each of the centers but represented only a small portion of total retail space.

• **Office tenants** - Office tenants represent a portion of the tenant mix at each of the selected resort shopping centers except Coconut Plantation Marketplace. Office tenants represent 6% of total leasable space at Whaler's Village, 17% at Malles Shopping Village, 23% at Princetonville Center and 10% at Kaunoh Shopping Village. The relatively large portion of office space at Princetonville Center reflects its residential market orientation. Office tenants are oriented toward the visitor market, with such tenants as travel agencies, and toward the residential market with tenants such as medical offices and contracting firms.

Market Performance

This section examines market performance of the selected resort shopping centers in terms of occupancy levels and retail sales levels during the 1983 through 1985 period.

• **Occupancy levels** - Occupancy levels at the selected shopping centers are very high with the weighted average occupancy level increasing from 96% in 1983 to 99% in 1985. The lowest occupancy levels, 90%, were

	Whaler's Village	Malles Shopping Village	Coconut Plantation Marketplace	Princetonville Center	Kaunoh Shopping Village
Total gross leasable square feet	90,000	26,000	62,000	66,193	72,088
Retail:					
Apparel	27%	46%	40%	85	85
Gifts/jewelry/art	15	22	24	4	11
Drug/sundry	4	2	4	2	16
Restaurant	42	28	22	18	2
Snack food	2		10	4	2
Theater	4				5.4
Supermarket				82	4
Hardware				11	4
Other retail	4	4	1	3	
Total retail space	100%	100%	100%	100%	100%
Percent of total:					
Retail	94%	80%	100%	73%	76
Office	6	17		23	10
Vacant	1	3	1	4	14
	100%	100%	100%	100%	100%
Major tenants	El Crab Catcher Lillian's Rusty Harpoon H. M. S. Bounty Chico's Cantina Ming Court Cinemas	Susu's Boutique Malles Pantry Sandcastle Restaurant	Liberty House Plantation Prime Rib Andrade's Farrell's	Foodland Bank of Hawaii Chuck's Steak House True-Value Hardware	KTA Supermarket Mitchell's Restaurant Drysdale Restaurant Kaunoh Resort/ Bishop Estate offices

Source: Discussions with shopping center management.

experienced by Wailea Shopping Village and the Coconut Plantation Marketplace in 1983. Coconut Plantation Marketplace has increased its occupancy to almost 100% as Kauai has recovered from the effects of Hurricane Iwa and through aggressive marketing strategies such as the busing of cruise ship tourists to the center. Wailea Shopping Village does not benefit to any great extent from tourists visiting from off-resort, but its occupancy level has increased to about 99% in 1985 as Wailea has matured. Whaler's Village was 100% occupied from 1983 to 1985 and currently has a waiting list of several hundred prospective tenants. Princeville Center had an occupancy level of 97% in 1985, with most of the vacant space consisting of second-story office space. The Keolu Shopping Village is currently 85% occupied after the completion of the major portion of the center over one year ago in summer 1985.

- Retail sales levels - Retail sales levels are stated in dollars per square foot of gross leasable area per year. Sales levels at the selected resort shopping centers are significantly higher than levels experienced at neighborhood or regional shopping centers. The weighted average of retail sales for the selected resort shopping centers increased from \$320 per square foot in 1983 to \$445 per square foot in 1985. Shopping centers that experienced the higher sales per square foot were those which cater to the upscale visitor markets, contain a complementing mix of quality retail goods and have greater shopper traffic due to strong traffic generators such as ocean view restaurants. Shopping centers with lower sales per square foot provided for a greater amount of resident-oriented goods such as supermarkets, hardware stores and home furnishings. The following table summarizes the various sales levels:

Selected Hawaii Resort Shopping Center
Annual Sales Per Gross Leasable Square Foot

	1983 to 1985		
	1983	1984	1985
Low	\$ 208	251	267
High	400	490	700
Weighted average	320	382	445

Source: Discussions with shopping center management.

Whaler's Village has been very successful in achieving high sales revenues per square foot. The success of Whaler's Village reflects its marketing strategy to orient the shopping center around six restaurants which are considered its major tenants and to serve as destinations for visitors in the Kapaeha area. This strategy was implemented during 1984 and resulted in a 75% increase in retail sales levels from 1983 to 1985. High sales levels can also be attributed to a strategy of not duplicating hotel shops and to targeting the upscale visitor market. Whaler's Village management has chosen the best local retailers on Maui and Oahu as tenants and have rejected national chains who, according to Whaler's Village management, have difficulties in adjusting to local market needs.

Summary

The resort shopping centers surveyed were highly successful as evidenced by high retail sales levels and high occupancy levels. The success of these centers can be directly attributed to the degree to which they serve the needs of their primary market, the visitor industry. The centers' ability to serve the needs of visitors is reflected in their tenant mixes which emphasize restaurants, apparel and gift stores. The resort shopping centers were an integral part of the resorts and served to enhance the visitor's experience by providing expanded and interesting dining and shopping opportunities.

AWAKE'E MARKET ASSESSMENT

This section summarizes the retail market segments which could provide the market support for a retail center at Awake'e Resort, projects the retail support from the expenditures of the market segments and estimates the supportable retail space based on desired retail sales levels at the Awake'e commercial center.

Retail Market Segments

The projected population to support retail space at Awake'e Resort, as shown in Exhibit VI-C, is identified to consist of:

- Awake'e Resort guests
- Awake'e Resort residents
- Off-Resort visitors and residents

The visitor and resident population expected to reside in the Resort's hotels and condominiums are estimated based on projected units developed, occupancy rates and unit usage patterns. As shown in the exhibit, the population of the Awake'e Resort is projected to increase from almost 1,000 persons in 1995 to almost 2,000 persons by 2010.

Projected Expenditures

In order to estimate retail market support from the market-identified segments, expenditure patterns for retail items appropriate to visitor-oriented shopping centers were examined. Projected expenditure patterns are presented in Exhibit VI-D and are discussed below:

- Awake'e visitors - Based on expenditure pattern surveys by HMB and the projected distribution of west- and eastbound visitors to the islands, as shown previously, west- and eastbound visitors staying in condominiums and hotels at the Awake'e Resort are estimated to spend about \$106 per day in 1986 dollars. Of this amount, about \$48 per day is estimated to be spent on food and retail items as found in visitor-oriented shopping centers. Based on the experience of other resort shopping centers, a commercial center at Awake'e is estimated to capture about 35% of these selected expenditures. Thus the retail market support by Awake'e visitors could represent about \$5.5 million in sales in 1995 and about \$9.4 million in 2010 in 1986 dollars.

Exhibit VI-C

AWAKE'E RESORT
Projected Visitor and Resident Population
of Awake'e Resort
1995 to 2010

	1995	2000	2005	2010
Visitors:				
In hotels:				
Units	600	600	600	600
Average occupancy	75%	80%	80%	80%
Persons per unit	1.8	1.8	1.8	1.8
Subtotal	810	864	864	864
In condominium units:				
Units	150	350	600	900
Percent in rental pool	50%	50%	50%	50%
Average occupancy	60%	65%	70%	70%
Persons per unit	2.1	2.1	2.1	2.1
Subtotal	95	239	441	662
Total visitors	905	1,103	1,305	1,526
Residents:				
Full-time:				
Condominium units	150	350	600	900
Percent in full-time use	15%	15%	15%	15%
Average occupancy	95%	95%	95%	95%
Persons per unit	2.5	2.5	2.5	2.5
Subtotal	53	125	214	321
Part-time:				
Condominium units	150	350	600	900
Percent in part-time use	35%	35%	35%	35%
Average occupancy	20%	20%	20%	20%
Persons per unit	2.1	2.1	2.1	2.1
Subtotal	22	51	88	132
Total residents	75	176	302	453
Total visitors and residents, rounded	980	1,280	1,610	1,980

Exhibit VI-D

AWAKE'E RESORT
Projected Annual Retail Expenditures,
Visitors and Residents
1995 to 2010
(In 1986 dollars)

	1995	2000	2005	2010
Visitors(1):				
Daily retail expenditures(2)	\$ 905	\$ 1,103	\$ 1,305	\$ 1,526
Capture rate	35%	35%	35%	35%
Total visitors (millions)	5.5	6.8	8.0	9.4
Full-time residents(1):				
Persons per household	53	125	214	321
Average household income(3)	2.5	2.5	2.5	2.5
Percent on retail items(4)	35%	35%	35%	35%
Annual retail expenditures (millions)	.4	1.1	1.8	2.7
Capture rate	15%	15%	15%	15%
Total full-time (millions)	.1	.2	.3	.4
Part-time residents(1):				
Persons per household	22	51	88	132
Average household income(3)	2.5	2.5	2.5	2.5
Percent on retail items(4)	35%	35%	35%	35%
Annual retail expenditures (millions)	.3	.8	1.4	2.0
Capture rate	30%	30%	30%	30%
Total part-time (millions)	.1	.2	.4	.6
Off-Resort visitors and residents(5)	1.0	1.3	1.5	1.8
Total visitors and residents (millions)	6.7	8.5	10.2	12.2

- (1) As shown in Exhibit VI-C.
 (2) Based on westbound and eastbound visitor expenditure estimates provided by the Hawaii Visitors Bureau, Visitor Expenditure Survey, 1983; as inflated by the June 1986 Consumer Price Index.
 (3) Based on discussions with other Hawaii resort operators and realtors.
 (4) Percent of average higher budget family expenditures spent on selected retail items, as reported by the U. S. Bureau of Labor Statistics, autumn 1981, Urban Family Budgets and Corporate Indexes for Selected Urban Areas, 1982.
 (5) Estimated at 15% of the total projected annual retail expenditures.

AWAKE'E RESORT
Distribution of Retail Sales
 1995 to 2010
 (\$ in millions)

	1995		2000		2005		2010	
	Amount	Percent	Amount	Percent	Amount	Percent	Amount	Percent
Visitors	\$ 6.5	97.0%	\$ 8.1	95.3%	\$ 9.5	93.1%	\$ 11.2	91.8%
Residents	.2	3.0	.4	4.7	.7	6.9	1.0	8.2
Total	\$ 6.7	100.0%	\$ 8.5	100.0%	\$ 10.2	100.0%	\$ 12.2	100.0%

- Awake'e residents - Based on interviews with resort developers and real estate brokers, full- and part-time residents of Awake'e are estimated to have household incomes of \$60,000 and \$110,000, respectively. Full- and part-time residents at the Awake'e Resort are estimated to spend about 35% of their household incomes on food and retail items as would be found at the Awake'e commercial center. These items include all food consumed away from home and small portions of budgets for clothing, personal care and recreational expenditures. The center is estimated to capture about 15% of full-time and 30% of part-time resident expenditures on food and retail items. Thus, about \$0.2 million is projected to be spent by both full- and part-time residents in 1995. These expenditures are estimated to increase to \$1.0 million for both full- and part-time residents in 2010, as also indicated in Exhibit VI-D.

- Off-Resort visitors and residents - Off-Resort visitors and residents to the Awake'e Resort could be expected to provide secondary market support for the facility. This market segment could be expected to be attracted to the restaurants and shops at possibly the only oceanfront centers on the Kona and Kohala coast outside of Kona Town. The region is estimated to represent about 15% of the total retail expenditures at the Resort. Thus, this market segment is estimated to generate about \$1.0 million in retail expenditures in 1995 and \$1.8 million in retail expenditures by 2010, as also shown in the exhibit.

Together, these three market segments are estimated to generate total annual retail sales of about \$6.7 million in 1995 and are projected to double to about \$12.2 million by the year 2010, as summarized in Exhibit VI-E. As shown in the exhibit, the majority of the retail expenditures are projected to be generated by the visitors to the Awake'e Resort or the Kona and Kohala areas. However, about 3% of all retail expenditures are expected to be derived from the Resort's full- and part-time residents. This proportion would increase to about 8% of all expenditures in 2010 as additional condominium units are completed at the Resort.

Projected Supportable Commercial Space

The market support for commercial space at the Resort is based on the demand for retail and offices or service space which are reviewed in the following sections:

- Estimated supportable retail space - The estimated supportable retail space demand is based on the projected retail expenditures and a desired level of sales per square foot. A desired sales level of \$300 per square foot, in 1986 dollars is assumed. This level of sales is roughly equivalent to the 1985 sales levels of Coconut Plantation Marketplace and the Maile Shopping Village but substantially less than sales levels achieved at Maile's Village.

Based on these desired sales levels, Awake'e Resort could support approximately 22,300 square feet of retail space in 1995 and 40,700 square feet of retail space by 2010. However, the net retail demand at the Awake'e commercial center, taking into account about 9,000 square feet of retail space that could be expected to be provided by the Resort's hotel, is estimated to be about 13,300 square feet in 1995 and 31,700 square feet by 2010, as shown in Exhibit VI-F.

Exhibit VI-F

AWAKE'E RESORT

Projected Supportable Commercial Space
at Awake'e Resort

1995 to 2010

	1995	2000	2005	2010
Projected annual expenditures (in 1986 dollars; millions)	\$ 6.7	8.5	10.2	12.2
Desired sales per square foot	\$ 300	300	300	300
Estimated retail space demand(1)	22,333	28,333	34,000	40,667
Less hotel commercial space(2)	9,000	9,000	9,000	9,000
Net retail space demand	13,333	19,333	25,000	31,667
Plus office/service space(3)	2,354	3,411	4,412	5,588
Total supportable commercial space: Cumulative, rounded	15,690	22,740	29,410	37,250
Net additional	15,690	7,050	6,670	7,840

(1) Gross leasable square feet.

(2) Estimated at 15 square feet of retail space per additional hotel room for 600 rooms to be built in the 1991 to 1995 period.

(3) Estimated at 15% of total shopping center area.

- Estimated supportable office/service space - Based on the experience of the selected resort shopping centers surveyed, the supportable office/service space is estimated to be 15% of the total shopping center area. This brings the total supportable commercial space to 16,000 square feet in 1995 and 37,000 by 2010, as also shown in Exhibit IV-F.

SHOPPING CENTER
DEVELOPMENT GUIDELINES

This section summarizes concept guidelines for development in terms of development phasing and tenant mix.

Development Phasing

The current master plan for the Awake'e Resort establishes two sites for commercial use. These include a 3.5-acre oceanfront site near the Awake'e Bay hotel site and a 1.5-acre elevated site located on the side of the Pu'u Kuli cinder cone.

The proposed development phasing for the two commercial sites considers:

- Projected supportable commercial space at the Resort
- Type of use appropriate to the two sites
- Minimum space requirements to support a critical mass of retail activity

Based on these criteria two phases of commercial development are recommended as follows:

- Phase I - The initial phase for commercial development could include about 22,000 square feet and be developed by about the year 2000, or about seven years after the Resort's Hotel is completed. In prior years, the retail and restaurant facilities of the Hotel could accommodate the retail needs of Resort guests. The initial complex could be located on the ocean front site so as to create an unique resort amenity and a concentrated cluster of activity near to the Hotel and condominium developments.
- Phase II - The second phase of commercial development could include an additional 15,000 square feet of space and be developed by about 2010. This would result in a total of 37,000 square feet of retail area, or about one half of the current size of the Keauhou Shopping Village's total retail, supermarket and office space. Part of this phase could be developed on the second site on the side of Pu'u Kuli and contain a fine dining restaurant to take advantage of the outstanding views of the Kona and Kohala coastline afforded by the site. This site could be developed to cater to a more upscale market and could potentially emerge as one of the leading restaurant areas in the Kona and Kohala area.

Assuming a site coverage ratio of .20 for the 37,000 proposed square feet of commercial space, about 4.2 to 5.0 acres of commercially zoned land would be required at the Resort.

Design Concept

A resort commercial center at Awaiki'e Resort could enhance the quality of the Awaiki'e Resort by providing retail services and activities and dining opportunities for guests and residents of the Resort. The inclusion of quality oceanfront restaurants at the commercial center could serve to draw visitors and residents from the area to the Resort in a similar manner to Whaler's Village. The Resort commercial center could also have an identifiable theme associated with the overall theme of the Awaiki'e Resort to enhance the image of the Resort as a destination area for visitors and residents.

The experience of other selected resort shopping centers indicates that successful resort retail facilities require either:

- Strong anchor tenants to attract shoppers to the center such as the oceanfront restaurants at Whaler's Village in Kaanapali.
- High visitor traffic to the area such as visitors to the Coconut Plantation Marketplace on Kauai from the cruise ships and other visitor tour groups.
- Captured retail market in a fully developed area with little other retailing alternatives such as Maflea Shopping Village in Maflea and Whaler's Village in Kaanapali.
- Strong regional resident market such as Princeville Center at Princeville Resort.
- Combination of above factors.

With the limited market from the Resort itself, successful retail development at the Resort will need to attract the resident market from the region and off-Resort visitor market visiting the area on day trips. Thus the commercial facility at the Resort is proposed to include "anchor" restaurants and shops to attract both the on- and off-Resort market and a range of specialty resort shops and boutiques to supplement the anchors and to provide a wide variety of shopping experiences to those visitors coming to the commercial center.

One anchor to the Resort center could be two to three specialty/theme restaurants. These restaurants would provide an alternative to the food and beverage facilities in the hotels and cater to the regional market. These restaurants are proposed to either specialize in seafood or steak or be highly themed in atmosphere and decor in order to create a distinctive dining experience. The restaurants should capitalize on the ocean views afforded by the site.

The specialty retail shops would link the two "anchor" activities and provide the core of the retailing activities. These stores would include boutiques, jewelry, arts and crafts and related resort-type shops. In addition, the stores could include the type of stores characteristic of the area, such as water sports stores, local jewelry stores and related arts and crafts stores.

Tenant Mix

The tenant mix at the planned shopping center could include retail and office tenants. The mix of the tenant types is discussed in the following section.

- **Retail Tenants** - Due to the relatively high proportion of retail market support provided by the visitor segment, as shown in Exhibit IV-E, retail tenants at the Resort commercial center should be oriented primarily towards the visitor market. Furthermore, a substantial portion of the retail tenants should be oriented toward the upscale visitor market in order to cater to the visitors staying at the hotel and condominium units to be built in the 1995 to 2010 period.

The tenant mix for the retail center at completion is proposed as follows:

Proposed Retail Tenant Mix

	Percent of total retail area
Restaurants	35%
Snack shops	5
Apparel	25
Gifts	15
Jewelry and art	10
Drugs and sundries	2
Other	8
Total	100%

- **Office Tenants** - Office tenants at four of the five selected resort shopping centers surveyed represent up to 23% of total shopping center space. The Resort commercial center could support about 3,000 square feet of office space in Phase I and about 2,500 square feet of additional office space in Phase II for a total of 5,500 square feet. This amount of office space would represent about 15% of total leasable area in the completed center.

Possible office tenants might include medical offices, real estate offices, resort management firms and related travel companies.

APPENDIX B
ECONOMIC AND FISCAL IMPACT ASSESSMENT
FOR RESORT DEVELOPMENT



**Economic and Fiscal Impact
Assessment for
Resort Development
at the
Awake'e Resort
North Kona, Hawaii**

**Prepared for
KAHALA CAPITAL CORPORATION**

October 1986

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I - EXECUTIVE SUMMARY

In September 1986 Helber, Hastert, Van Horn & Kimura Planners (HHVHK) engaged Peat, Marwick, Mitchell & Co. (Peat Marwick) to prepare an economic and fiscal impact assessment for the proposed Awake'e Resort development in North Kona on the island of Hawaii. This chapter presents the background, objectives and approach of this engagement and reviews the major findings and conclusions of the study.

BACKGROUND

Kahala Capital Corporation proposes to develop a master-planned resort community on 349 acres located along the ocean in North Kona, Hawaii. The development is planned to include an 18-hole golf course, hotel facilities, multifamily condominiums, commercial areas and other supportive facilities and amenities. The development is identified as the Awake'e Resort (Resort).

Kahala Capital Corporation is preparing a request for change in land use designations under the County General Plan. Thus HHVHK has asked Peat Marwick to prepare an economic and fiscal impact assessment for the proposed Resort.

STUDY OBJECTIVES

The objectives of Peat Marwick's assistance were to:

1. Project the economic impacts of the proposed Resort with respect to:
 - Visitor expenditures
 - Employment
 - Resident income
 - Population
 - Housing
2. Project the fiscal impacts of the proposed Resort with respect to:
 - County government revenues and expenditures
 - State government revenues and expenditures
 - Affected state and county agencies

STUDY APPROACH

The study approach to address the aforementioned objectives was as follows:

1. Conferred with HHVHK to review the proposed development concept for the Resort.
2. Assessed the economic and demographic conditions of the Kona and Kahala regions and the island of Hawaii.

3. Surveyed the economic and fiscal impacts of other comparable resort developments in the state.
4. Projected the economic and fiscal impacts of the proposed hotel, condominium, commercial and recreational facilities for the Resort.
5. Reviewed and assessed state and county government agency responses to notification of the development proposal.
6. Summarized our findings in this report.

SUMMARY OF PROPOSED DEVELOPMENTS

This section presents a brief description of the site location and characteristics as well as the types of development proposed for the Resort.

Location

The Awake'e site consists of 349 acres of land located along the leeward coast of the island of Hawaii in the district of North Kona. The property is approximately three miles south of the Kona Village Resort and four miles north of the Keahole Airport. The resort areas of Waikoloa, Mauna Lani and Mauna Kea lie to the north of the proposed site. The site is about one-third mile west of the major regional access road, the Queen Kaahumanu Highway.

Resort Master Plan

The development concept for the Awake'e is for a compact, intermediate-sized resort community including hotel and condominium units, an 18-hole golf course and the necessary retail and service support facilities.

A total of 1,500 visitor units are planned, thus, the Resort would be much smaller in scale than the Keauhou, Mauna Kea, Mauna Lani and Waikoloa Beach Resorts, each of which is proposed to ultimately include 6,000 or more units.

The hotel would have about 600 rooms and be sited close to the coastline. The hotel is planned for the Kahaloa Bay area, with excellent views of Kuli Pu'u and the coastline.

About 900 condominium apartments would be positioned throughout the property. One group would be located on the slope of Pu'u Kuli, fronting the coast. Another along the entrance road to the Kahaloa Bay hotel and the balance of the units would be positioned around the golf fairways with varying views of the coast and Pu'u Kuli.

A par-72, 18-hole championship golf course would be the major recreational amenity of the development. It would also provide parklike frontages and view corridors for the condominium units and outstanding vistas for the golfers. The golf clubhouse would be sited in midproperty just off the main access boulevard and would contain a reservations and starting desk, offices, pro shop, locker rooms, lounge area and restaurant/coffee shop.

Two retail/commercial areas could offer shopping, dining and services for Resort and regional guests and residents. One would be located near Awa'e Bay and could include parking spaces for local residents utilizing the bay for recreational purposes. The second would be sited on the slopes of Pu'u Kuli and would contain a restaurant with panoramic views of the coast.

Summary of Proposed Developments

Because the necessary permit processes are expected to take a few years, the facility development is projected for a 20-year period beginning in 1991, or from 1991 to 2010. Most impacts are estimated based on the projected cumulative development in place, in five-year intervals beginning in 1995. For projection purposes, project completion is assumed to occur in the year 2010. At that time all of the planned hotel and condominium units and commercial space could be completed. The hotel, condominium, commercial and golf course developments are summarized in the following table:

Summary of Proposed Developments at Awa'e Resort

	1995 to 2010				
	1995	2000	2005	2010	
(Cumulative)					
Hotel units	600	600	600	600	
Condominium units	150	350	600	900	
Total units	750	950	1,200	1,500	
Commercial square feet of leasable area	-	22,000	22,000	37,000	
Golf course	1	1	1	1	

ECONOMIC IMPACTS

This section summarizes the expected impacts of Resort development on visitor expenditures, employment, resident income and housing demand.

Visitor Expenditures

The Resort will generate direct, indirect and induced visitor expenditures in the state. Visitors to the Resort will make direct expenditures for food, accommodations, gift items and other goods and services. These expenditures will, in turn, generate indirect and induced expenditures throughout the state through multiplier effects. Direct, indirect and induced, and total expenditures by the Resort's visitors are projected to be as shown in the following table:

Projected Total Annual Visitor Expenditures Attributable to Awa'e Resort

	1995 to 2010			
	(In millions; 1986 dollars)			
Expenditure type and place of stay	1995	2000	2005	2010
Direct:				
Hotel	\$ 27.5	29.3	29.4	29.3
Condominium	3.0	7.5	13.8	20.8
Subtotal	30.5	36.8	43.2	50.1
Indirect and induced	28.3	34.2	40.1	46.6
Total(1)	\$ 58.8	71.0	83.3	96.7

(1) Projected at \$1.93 per \$1.00 of direct expenditures.
Based on unpublished data from the State of Hawaii,
Department of Planning and Economic Development.

Employment

The planned development at the Resort will generate short-term employment during the construction of new facilities and long-term employment in the operation and maintenance of those facilities. Construction employment would be greatest during the first years of the project when the hotel and golf course, a portion of the condominiums and most of the infrastructure would be under construction. Operational employment could reach a relatively high level during the first few years when the hotel comes on line and could increase slightly over the remainder of the project as additional condominiums and commercial space are added. Direct operational and construction employment also supports indirect and induced employment in the state and in the county. A summary of the Resort's construction and operational employment effects is shown in the table below:

Projected Employment Effects Attributable to Resort Construction and Operations

	1991 to 2010			
	1991 - 1995	1996 - 2000	2001 - 2005	2006 - 2010
Type of employment				
Construction employment(1):				
Direct	172	53	59	71
Indirect and induced	240	73	81	99
Subtotal	412	126	140	170
Operational employment(2):				
Direct	715	870	925	1,065
Indirect and induced	644	750	800	903
Subtotal	1,359	1,620	1,725	1,968
Total	1,771	1,746	1,865	2,138

(1) Average annual person-years.

(2) Annual person-years at end of period.

Summary of On- and Off-Resort
Population Impact

Population category	1995 to 2010			
	(Average daily population)			
	1995	2000	2005	2010
On-Resort:				
Visitor	905	1,103	1,305	1,526
Resident	75	176	302	453
Subtotal	980	1,279	1,607	1,979
Off-Resort residents:				
In-migrant operational employees	107	157	185	213
In-migrant construction employees	51	16	18	21
Other household members	159	197	228	263
Subtotal	317	370	431	497
Total population impact	1,297	1,649	2,038	2,476

Employee Housing Requirements

Construction employment is temporary and therefore does not generate the long-term housing demands that are associated with operational employment. With generous housing subsidy allowances typically paid to construction workers, the demand for residential housing by construction employees is expected to be absorbed by units available in the short-term rental market of the Kona region. The maximum number of rental units needed during the peak construction period from 1991 to 1995 for off-island construction workers is estimated to be about 115 housing units.

Operational employment, on the other hand, generates long-term housing needs. All in-migrant operational employees from off-island would require additional housing. In addition, a portion of operational employees from on-island, such as those forming new households as a result of Resort employment, would also require additional housing. It is projected that about 160 direct operational employees would require additional housing by 1995, increasing to about 285 at project completion in 2010, as shown in the table below:

Summary of Employee Housing Requirements
and Affordable Housing Unit Need

	1995 to 2010			
	1995	2000	2005	2010
Direct operational employees requiring housing	159	217	248	285
Housing unit demand	115	155	176	203
Affordable housing unit need	36 - 45	49 - 62	57 - 71	66 - 82

Personal and Household Income

The Resort could be expected to have a significant impact on personal income for residents of the island and state. Personal income is defined as the wages and salaries paid to the direct construction and operational employees of the Resort. Personal income is projected on the basis of average industry wages and salaries for the various types of employment anticipated and on the projected future employment demands.

Total household income generated by visitor expenditures at the Resort would include the fringe benefits and proprietors' income paid by establishments that sell goods and services directly to visitors as well as the wages and salaries noted above. In addition, household income includes income generated through the effects of indirect and induced visitor expenditures.

Projected Annual Personal
and Household Income

Type of employment	1995 to 2010			
	1995	2000	2005	2010
Total personal income(1)	\$ 13.7	12.4	13.3	15.2
Total household income(2)	\$ 21.6	26.1	30.6	35.6

(In millions; 1986 dollars)

(1) Wages paid to direct construction and operational employees of the Resort.

(2) Wages, salaries, fringe benefits and proprietors' income in the state directly and indirectly supported by direct visitor expenditures at the Resort.

Population

The facility development at the Resort is projected to generate population growth at the Resort by visitors and residents in the Resort's facilities and in the community by the in-migrant operational and construction employees and other household members. Total population impact is projected to be about 1,300 by 1995, increasing to nearly 2,500 at project completion in 2010, as shown in the following table:

The number of additional housing units demanded will be less than the number of employees demanding housing because households could include more than one Resort employee. Additional housing unit demand by direct operational employees is projected to be about 115 units by 1995, increasing to about 200 units at project completion in 2010, as also shown in the table.

It is assumed that managerial and specialty employees with their higher salaries would be able to find affordable housing, but that 40% to 50% of the housing unit demand by nonmanagerial and nonspecialty employees might not be satisfied in the market place due to affordability factors. The affordable housing need for direct operational employees is projected to be about 35 to 45 units by 1995, increasing to about 70 to 80 units at project completion in 2010, as also shown in the table.

FISCAL IMPACTS

This section describes the expected fiscal impacts of the proposed developments in terms of additional revenues and expenditures to the governments of the county and the state of Hawaii.

County

The County of Hawaii (County) would receive additional revenues from the Resort's development through real property taxes on the hotel facilities, condominiums and commercial and recreational facilities. The County would also incur additional expenses in providing public services to the visitors and residents of the Resort and to those who would relocate from elsewhere in the state in order to take employment at the Resort. A summary of the projected additional revenues and expenses attributable to Resort development and the ratio of additional revenues to expenses that the County could experience are shown in the table below:

Projected Annual Revenues, Expenses
and Revenue/Expenditure Ratio
for the County of Hawaii

1995 to 2010

(In millions; 1986 dollars)

	1995	2000	2005	2010
New revenues	\$ 1.1	1.6	2.2	2.8
New expenditures	0.5	0.7	0.8	1.0
Net additional revenues	\$ 0.6	0.9	1.4	1.8
Revenue/expenditure ratio	2.2	2.3	2.8	2.8

State

Additional revenues to the State of Hawaii (State) would be generated by (1) the 4% general excise tax on direct, indirect and induced expenditures by Resort visitors and residents, (2) individual income tax and other miscellaneous State

taxes paid by the Resort's full-time residents who have come from out of state and (3) the 5% transient accommodations tax on visitors staying in the Resort's hotel and condominium units. On the other hand, the State would also experience additional expenses for State-provided public services for Resort visitors and residents who have come from out of state. Additional State revenues and expenses attributable to the Resort's development and the ratio of additional revenues to expenses are shown in the table below:

Projected Annual Revenues, Expenses
and Revenue/Expenditure Ratio
for the State of Hawaii

1995 to 2010

(In millions; 1986 dollars)

	1995	2000	2005	2010
New revenues	\$ 3.2	4.0	4.8	5.9
New expenditures	0.3	0.5	0.8	1.1
Net additional revenues	\$ 2.9	3.5	4.0	4.8
Revenue/expenditure ratio	10.7	8.0	6.0	5.4

PUBLIC SERVICES IMPACTS

Development of Awake'e Resort would create additional demands for police and fire protection, and public education, public health and recreational services and facilities. The cost of these additional services and facilities is taken into consideration in the aforementioned fiscal impact analysis. Written communications from the affected state and county government departments to date indicate no adverse effects from the Resort's development, but point out areas of concern and raise additional questions to be addressed as the planning process for Awake'e continues.

II - REGIONAL ECONOMIC SETTING AND PROJECT DESCRIPTION

This chapter reviews the regional economic setting of the proposed Aweke'e Resort including primary economic activities and population and employment patterns. The proposed project is also described in terms of its location, site characteristics and the proposed developments.

REGIONAL ECONOMIC SETTING

The entire island of Hawaii is defined for projection purposes as the Resort's impact area. However, economic and fiscal impacts will tend to be concentrated in the North and South Kohala and North and South Kona districts. These four districts are located along the western coast of the island of Hawaii, as shown in Exhibit II-A. A generation or two ago, the Kohala area was an agrarian community dominated by sugar plantations and pasture lands, while Kona was an area of coastal fishing villages and independent farmers on the mountain slopes. The economy of this region has changed considerably since Hawaii's statehood.

Primary Economic Activities

Coffee production and ranching provided Kona's economic base through much of this century, but it was an unsteady economy due to great fluctuations in the international coffee market. In the years following statehood and the introduction of jet service to the islands, the Kona coastline began to host an increasing number of visitors. In the 1960s and 1970s, North Kona fueled a building boom that spread to South Kohala and resulted in hundreds of new hotels and condominium units and residential dwellings.

Today the region is primarily supported by its real estate and visitor industries. The Kohala and Kona districts have ideal weather conditions, a black lava coastline with scattered sandy beaches and important historical sites. Among the major visitor attractions of the region are the City of Refuge, Captain Cook monument and Kona billfishing. Currently the South Kohala and North Kona districts are the heart of the island's visitor industry. As of February 1966 the 5,872 hotel and visitor condominium units in these two districts represented 81% of the island's total.

The availability of large parcels of land under single ownership and the establishment of horizontal property regime laws have permitted high-quality master-planned development in several resort areas along this coast. Three master-planned resorts currently exist in South Kohala:

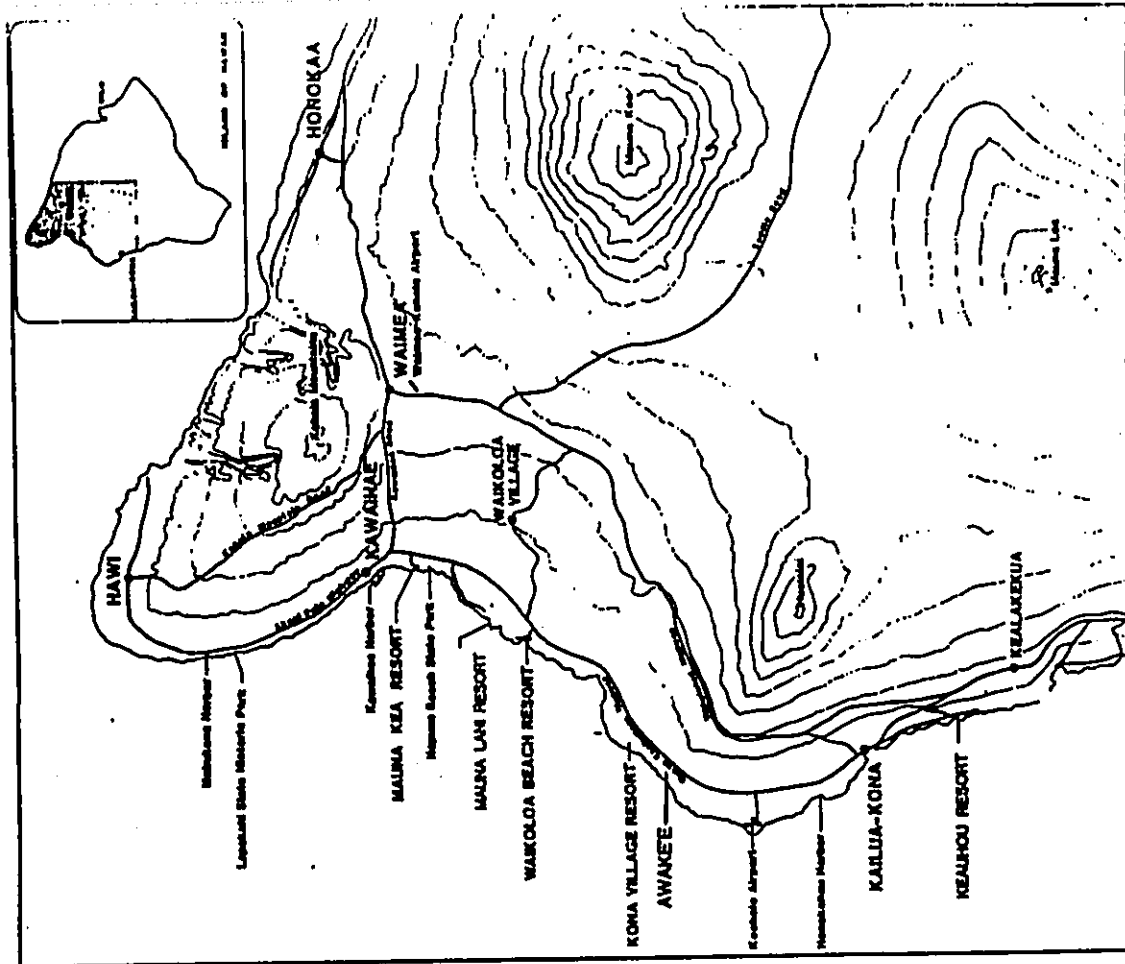
- Mauna Kea Resort
- Mauna Lani Resort
- Waikoloa Village and Waikoloa Beach Resort

The North Kona district includes the Kailua-Kona resort area and two master-planned resorts:

- Keauhou Resort
- Kona Village Resort

AWAKE'E RESORT

Location Map of the Aweke'e Resort



Population

Nearly one-third of Hawaii Island's population resides in the two Kohala and two Kona districts. The resident population of these four districts was 27,518 in 1980, as shown in Exhibit 11-8. Since 1970 the resident population for the area has increased at an annually compounded rate of growth of 6.5% per year, or nearly twice the 3.8% rate for the county as a whole. The North Kona district, including Kailua-Kona and the Kona Village and Keauhou Resorts, experienced the most rapid population growth at 11% per year, followed by the South Kohala district, including the Mauna Lani, Mauna Kea and Waikoloa Resorts, at 7.1% per year. There were 8,960 households in the Kohala and Kona districts in 1980 with an average household size of 3.07 persons each.

Resident population growth on the island since 1980 has been more gradual than during the 1970s and continues to be most rapid in the North Kona and South Kohala districts. Between 1980 and 1984, population grew 6.9% and 6.3% per year in North Kona and South Kohala, respectively, compared to 5.3% for the Kona and Kohala region as a whole and 3.5% for the island, as also shown in Exhibit 11-8.

Growth in the island's de facto population, including visitors present but excluding residents absent, has also slowed since the 1970s. De facto population grew about 3.1% per year between 1980 and 1984, or slightly less rapidly than resident population growth during the period, as also shown in Exhibit 11-8.

In 1980 the median age in the region ranged by district from 28.8 to 32 years of age, with the relatively older populations residing in areas less impacted by the visitor industry and recent population growth, as shown in Exhibit 11-C.

As also shown in the exhibit, median family incomes in the North and South Kona districts were higher than the county average of \$19,132, while in the North and South Kohala districts they were notably lower than the county average.

Employment Patterns

Labor force participation rates increased significantly in the North and South Kona districts between 1970 and 1980 but declined in the North and South Kohala districts, as shown in Exhibit 11-D. Female labor force participation, however, has increased throughout the region, with increases ranging from 18.5% and 10.6% over the ten years in North and South Kona, respectively, to 4.3% and 2.7% increases in North and South Kohala, respectively.

Overall declines in labor force participation in the two Kohala districts were due to their more modest increases in female participation and their declining rates in male labor force participation over the period, as also shown in Exhibit 11-D. This is attributed primarily to erosion in Kohala's traditionally male-dominated economic base of sugar cultivation and processing, coupled with the rise of resort- and tourism-related centers of employment in North Kona and South Kohala which provided many new work opportunities for women.

Information on labor force characteristics since 1980 is not available by district, but the State of Hawaii, Department of Labor and Industrial Relations (DLIR) prepares labor force estimates for the county as a whole. The DLIR estimates that in the first half of the 1980s, the civilian labor force has increased by 3.8% per year to about 50,600 persons in 1985, as shown in

ANALYSIS RESORT

Resident and De Facto Population of the
Kona and Kohala Districts and County of Hawaii
1970 to 1984

	April 1		July 1,		Average annual percent change 1970 - 1984
	1970	1980	1984	1984	
Resident population:					
North Kona	4,832	13,748	18,226	11.0%	6.9%
South Kona	4,004	5,914	6,730	4.0	3.1
North Kohala	3,326	3,249	3,403	(.2)	1.1
South Kohala	2,310	4,607	5,972	7.1	6.3
Total region	14,472	27,518	34,331	6.6%	5.3%
County of Hawaii	63,468	92,053	106,403	3.8%	3.5%
De facto population, County of Hawaii	65,700	98,700	112,600	4.2%	3.1%

Sources: State of Hawaii, Department of Planning and Economic Development, Hawaii State Statistical Areas Committee, Estimated Population of Hawaii by Districts, 1984 (Report CFC-64), 1985; and de facto population by counties from 1970 to 1984, Data Book, 1985; U. S. Bureau of the Census, 1980 Census of Population, Number of Inhabitants, Hawaii (PC 80-1-A13), 1981; and First Hawaiian Bank, Economic Indicators (May/June 1985), 1985.

AWAKE RESORT

Median Age and Family Income
in the Kona and Kohala Districts

Exhibit 11-C

District	Median age (years)	Median family income(1)
North Kona	28.8	\$ 21,134
South Kona	30.1	20,068
North Kohala	32.0	15,719
South Kohala	29.5	17,923
County of Hawaii	29.4	19,132
State of Hawaii	28.3	22,750

(1) Income of households in 1979.

Sources: U. S. Bureau of the Census, Census of Population and Housing, 1980; and special tabulation by the State of Hawaii, Department of Planning and Economic Development, 1982.

AWAKE RESORT

Labor Force Characteristics of the Kona
and Kohala Districts and County of Hawaii

1970 and 1980

	North Kona (census tracts 215 and 216)		South Kona (census tracts 213 and 214)		North Kohala (census tract 218)		South Kohala (census tract 217)		County of Hawaii	
	1970	1980	1970	1980	1970	1980	1970	1980	1970	1980
Potential labor force (persons aged 16+)	3,262	10,115	2,629	4,265	2,240	2,286	1,446	3,290	43,075	67,205
Civilian labor force	2,022	7,292	1,535	2,823	1,355	1,355	951	2,110	25,889	41,006
Percentage distribution:										
Armed services	- %	.1%	- %	- %	1.1%	1.0%	- %	- %	.4%	.3%
Civilian labor force	62.0	72.1	58.4	66.2	60.5	59.3	65.8	64.1	60.1	61.0
Not in labor force	38.0	27.8	41.6	33.8	38.4	39.7	34.2	35.9	39.5	38.7
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Civilian labor force participation rates:										
Male	78.5	82.0	69.6	76.1	71.6	66.6	84.4	78.3	63.6	70.5
Female	43.5	62.0	44.7	55.3	47.8	52.1	46.3	49.0	36.4	51.3
Average	62.0%	72.1%	58.4%	66.2%	60.5%	59.3%	65.8%	64.1%	60.1%	61.0%

Sources: U. S. Bureau of the Census, Census of Population and Housing, 1970, Census Tracts (Final Report, PHC(1)88, Honolulu, Hawaii, SHSA), 1972; and Summary Tape Files 1-A and 3-A, 1980; and State of Hawaii, Department of Planning and Economic Development, Community Profiles for Hawaii, 1973; and The Geographic Distribution of Hawaii's Racial Groups, 1970 and 1980 (SR 7152), 1982.

Exhibit 11-D

Exhibit II-E. However, county employment appears to have lagged behind labor force growth, resulting in an estimated 8.5% rate of unemployment in 1985, or about 2.2% more than in 1980.

Job losses since 1980 have occurred in the construction and manufacturing industries, while relatively high job increases were noted in the areas of retail trade, services, and finance, insurance and real estate, as also shown in Exhibit II-E.

County data on agricultural employment is not yet available for 1985. However, in the sugar industry alone, the State of Hawaii, Department of Planning and Economic Development (DPED) estimates that the island lost about 500 jobs between 1980 and 1984.

Social Characteristics

Exhibit II-F summarizes social characteristics of the regional population in terms of education, ethnicity and age in 1970 and 1980. All four districts of the Kona and Kohala region have exhibited increasing levels of educational achievement over the intercensal decade, as shown in the exhibit. This change was most pronounced in North Kona and South Kohala where development during the 1970s brought new economic opportunities. All districts also showed increases in the share of population of working force age; South Kona, North Kohala and South Kohala also showed relative growth in the population aged 65 or older.

Comparison of 1970 and 1980 U. S. Census data on ethnicity, unfortunately, is not productive because of the significant differences in the means employed in classifying ethnicity at the two enumerations.

PROJECT DESCRIPTION

The Resort would be located on the Kona coast of the island of Hawaii. The following subsections present a brief description of the site location and the types of development proposed for the Resort.

Location

The Awake'e Resort would be developed on 349 acres located on the leeward coast of the island of Hawaii in the district of North Kona, as shown in Exhibit II-6. The property is approximately three miles south of the Kona Village Resort and four miles north of the Keahole Airport. The three resorts of Maikoloa, Mauna Lani and Mauna Kea lie to the north of the proposed site, as also shown in Exhibit II-6. The site lies about one-third mile west of the major coastal traffic corridor, the Queen Kapihulu Highway.

Resort Master Plan

The development concept for Awake'e is for a compact, intermediate-sized resort community, including hotel and condominium units, an 18-hole golf course and the necessary retail and service support facilities.

A total of 1,500 visitor units are planned, thus, the Resort would be much smaller in scale than the Keauhou, Mauna Kea, Mauna Lani and Maikoloa Beach Resorts, each of which is proposed to ultimately include 6,000 or more units.

Exhibit II-E

AWAKE'E RESORT Average Annual Labor Force Estimates of the County of Hawaii

1980 and 1985

	1980	1985	Average annual percent change 1980-1985
Civilian labor force	41,950	50,600	3.8 %
Percent unemployed	6.3%	8.5%	.4
Monocultural wage and salary jobs by industry:			
Construction	2,000	1,300	(8.3)
Manufacturing	2,900	2,800	(.7)
Transportation, communications and utilities	1,900	2,000	1.0
Trade:	7,000	9,100	5.4
Wholesale (1980 and 1985, 1,400)			
Retail (1980, 5,700; 1985, 7,600; 5.9%)			
Finance, insurance and real estate	1,200	1,500	4.6
Services and miscellaneous:	7,000	8,400	3.7
Hotels (1980, 3,100; 1985, 3,600; 3.0%)			
Government	6,600	6,900	.9
Total	28,600	32,000	2.3 %

Sources: State of Hawaii, Department of Labor and Industrial Relations, Labor Force Data Book, annually updated, and Labor Area News (February), 1986.

AWAKE RESORT

Social Characteristics of the Kona and Kohala Districts and County of Hawaii

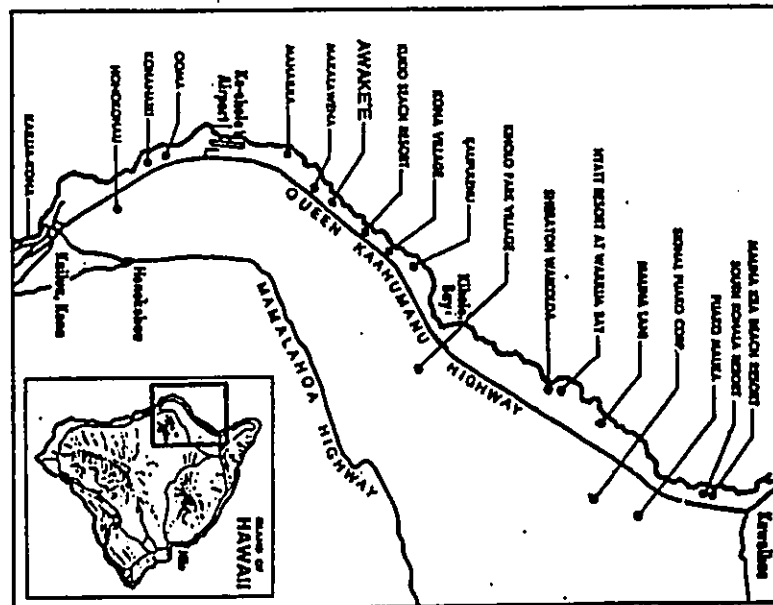
1970 and 1980

	North Kona (census tracts 215 and 216)		South Kona (census tracts 213 and 214)		North Kohala (census tract 218)		South Kohala (census tract 217)		County of Hawaii	
	1970	1980	1970	1980	1970	1980	1970	1980	1970	1980
Total population	4,832	13,748	4,004	5,914	3,326	3,249	2,310	4,607	63,468	92,053
Education (population aged 25+)(1):										
Less than 8 years	28.8%	8.0%	48.0%	23.6%	44.2%	29.0%	24.1%	8.6%	37.2%	20.1%
12 years	66.0	40.9	45.7	33.8	30.0	39.0	34.2	37.0	31.6	35.5
16 or more years	8.8	18.8	6.3	12.4	5.9	8.1	13.1	20.7	7.5	15.2
Ethnicity(1):										
Hawaiian	19.3	22.1	14.7	23.5	15.3	24.7	26.5	28.5	12.3	18.8
Japanese	23.1	11.8	39.6	27.5	23.8	16.1	24.4	14.6	37.5	26.6
Caucasian	44.0	53.8	17.7	30.0	25.6	27.8	39.2	46.5	28.8	35.0
Chinese	3.7	1.6	.8	.8	4.3	1.0	1.3	1.4	2.9	1.7
Filipino	8.4	7.2	26.3	13.0	29.2	23.9	6.6	5.6	16.5	13.9
Other	1.5	3.5	.9	5.2	1.8	6.5	2.0	3.4	2.0	4.0
Age:										
Under 5 years	9.1	9.1	8.5	9.8	10.0	9.2	9.3	10.2	8.6	9.1
5 to 17 years	27.0	20.3	26.6	17.2	29.4	22.9	28.3	23.6	27.8	21.5
18 to 64 years	55.7	63.9	55.3	62.4	51.1	54.3	56.0	58.6	54.4	59.2
65 or older	8.2	6.7	9.6	10.6	9.5	13.6	6.4	7.6	9.2	10.2

(1) Estimates based on 15% sample.

Sources: U. S. Bureau of the Census, Census of Population and Housing, 1970, Census Tracts (Final Report, PHC(1)88, Honolulu, Hawaii, SHSA), 1972; Census of Population and Housing, 1980, Census Tracts (PHC 80(2)13), 1983; and Summary Tape Files 1-A and 3-A, 1980; and State of Hawaii, Department of Planning and Economic Development, Community Profiles for Hawaii, 1973; and The Geographic Distribution of Hawaii's Racial Groups, 1970 and 1980 (SH #152), 1982.

Exhibit II-F



AWAKE RESORT
Resort Development Location

Exhibit II-G

The hotel would have about 600 rooms and be sited close to the coastline, as shown in the resort master plan in Exhibit 11-H. The hotel is planned for the Kahaloa Bay area, with excellent views of Pu'u Kuli and the coastline.

About 900 condominium apartments would be positioned throughout the property. One group would be located on the slope of Pu'u Kuli, fronting the coast, another along the entrance road to the Kahaloa Bay hotel and the balance of the units would be positioned around the golf fairways with varying views of the coast and Pu'u Kuli.

A par-72, 18-hole championship golf course would be the major recreational amenity of the development. It would also provide parklike frontages and view corridors for the condominium units and outstanding vistas for the golfers. The golf clubhouse would be sited in midproperty just off the main access boulevard and would contain a reservations and starting desk, offices, pro shop, locker room, lounge area and restaurant/coffee shop.

Two retail/commercial areas could offer shopping, dining and services for Resort and regional guests and residents. One would be located near Awake'e Bay and could include parking spaces for local residents utilizing the bay for recreational purposes. The second would be sited on the slopes of Pu'u Kuli and contain a restaurant with panoramic views of the coast.

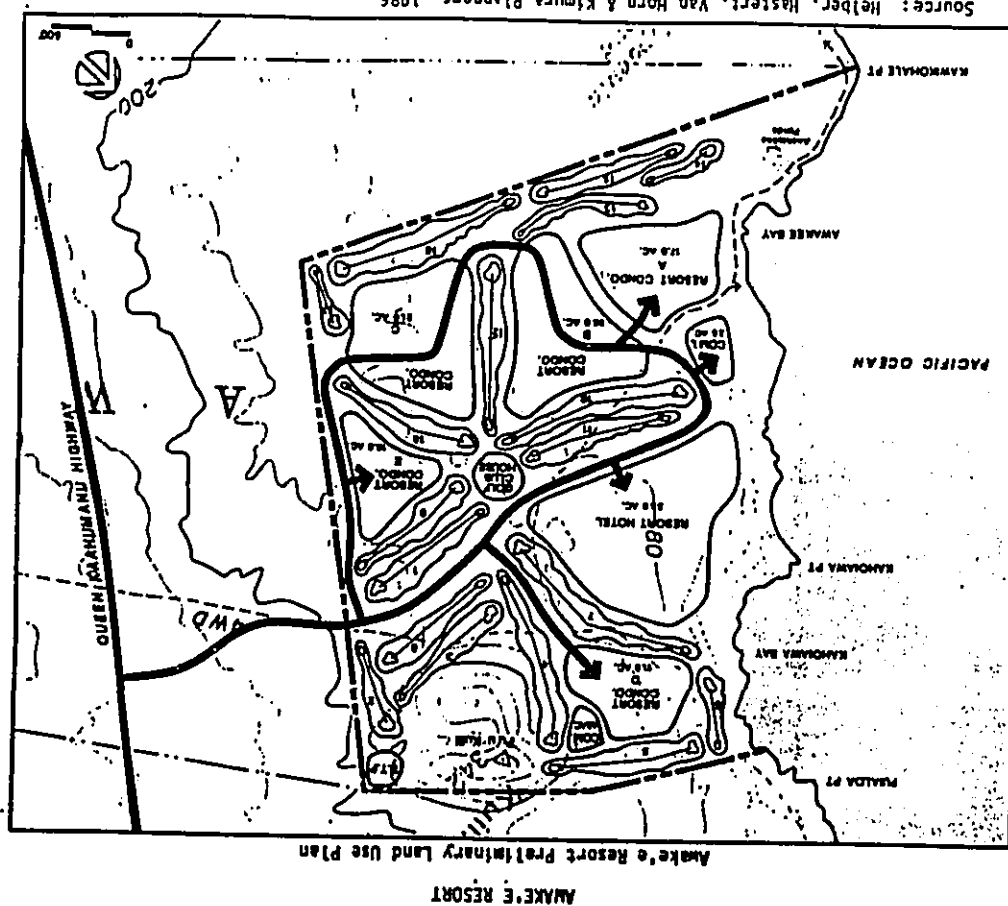
Summary of Proposed Developments

A summary of the proposed development schedule for hotel, condominium, commercial and golf course development is shown in the following table:

Summary of Proposed Developments
at Awake'e Resort

	1995 to 2010 (Cumulative)			
	1995	2000	2005	2010
Hotel units	600	600	600	600
Condominium units	150	350	600	900
Total units	750	950	1,200	1,500
Commercial square feet of leasable area	-	22,000	22,000	37,000
Golf course	1	1	1	1

Exhibit 11-H



Source: Helber, Haster, Van Horn & Kimura Planners, 1986.

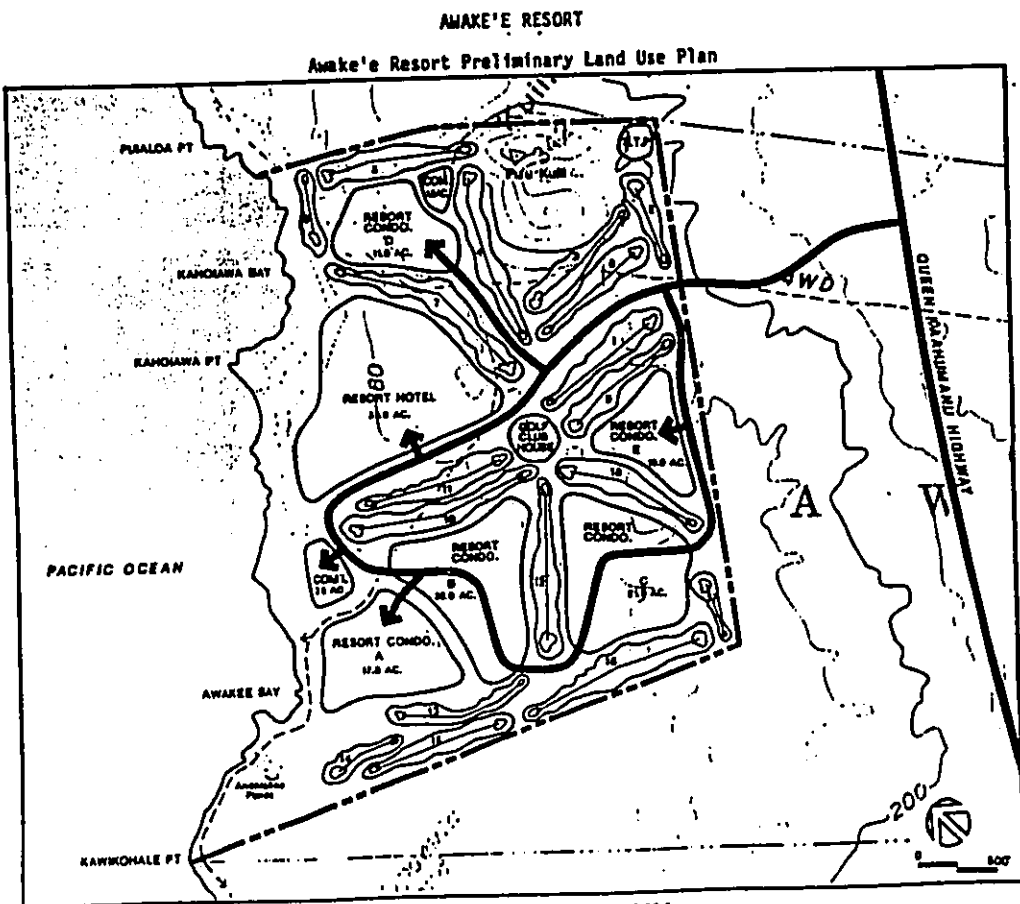
About 900 condominium apartments would be positioned throughout the property. One group would be located on the slope of Pu'u Kuli'i, fronting the coast. Another along the entrance road to the Kahaloa Bay hotel and the balance of them would be positioned around the golf fairways with varying views of the coast and Pu'u Kuli'i.

Two retail/commercial areas could offer shopping, dining and services for Rasot and regional guests and residents. One would be located near Anake'e Bay and could include parking spaces for local residents utilizing the bay for recreational purposes. The second would be sited on the slopes of Pu'u Kūlī and contain a restaurant with panoramic views of the coast.

A summary of the proposed development schedule for hotel, condominium, commercial and golf course development is shown in the following table:

**1995 to 2010
(Cumulative)**

	1995	2000	2005	2010
Hotel units	600	600	600	600
Condominium units	150	350	600	900
Total units	750	950	1,200	1,500
Commercial square feet of leasable area	-	22,000	22,000	37,000
Golf course	1	1	1	1



Source: Helber, Hastert, Van Horn & Kimura Planners, 1986.

Exhibit 11-H

III - ECONOMIC IMPACTS

This chapter describes the expected economic impacts of the Resort in terms of visitor expenditures, employment, resident income, population and housing. These impacts are assessed for the proposed hotel, condominium and commercial developments.

VISITOR EXPENDITURES

The Resort could generate direct, indirect and induced visitor expenditures in Hawaii. Visitors to the Resort would make direct expenditures for food, accommodations, gift items and other goods and services. These expenditures would, in turn, require those establishments serving direct visitor demands to purchase goods and services from other establishments in the state. The latter expenditures are considered an indirect effect of the original visitor expenditures. Induced expenditures are those made by employees and proprietors with income derived from establishments serving the direct and indirect visitor demands.

In order to estimate these expenditure effects, the analysis begins with a projection of the growth in visitor population expected to be driven by the proposed developments.

Visitor Population

Estimation of the average daily visitor population at the Resort is the basis for projecting the visitor expenditure impact of the Resort. The projected visitor population is based on the proposed facilities for visitor accommodations and on average occupancy and party size assumptions derived from a survey of comparable properties in the state.

The projected residential and visitor unit facility development at the Resort could amount to 1,500 units by project completion, consisting of approximately 40% hotel units and 60% condominium units, as shown in Exhibit III-A.

All of the hotel units and about 50% of the condominium units could be assumed to be used for visitor rentals. The projected occupancy rates for hotel units were assumed to be 75% in 1995, increasing to 80% in 2000 and thereafter. The projected occupancy rates for condominium units were assumed to be 60% in 1995, 65% in 2000 and 70% in 2005 and thereafter. Average party size was estimated at 1.8 and 2.1 for hotel and condominium units, respectively. Exhibit III-8 summarizes the assumptions regarding resident/visitor distribution, occupancy rates and average party sizes for the planned facilities.

Based on these assumptions, the projected visitor population could be expected to be about 900 in 1995, increasing to about 1,500 persons by project completion in 2010, as shown in Exhibit III-C.

Direct Visitor Expenditures

Direct visitor expenditures are projected based on average daily 1986 expenditures of \$93 and \$86 for hotel and condominium guests, respectively. Because they represent statewide averages, they could be assumed to represent a

AWAKE'E RESORT
Proposed Cumulative Residential and Visitor Unit
Facility Development
1995 to 2010

Facility type	1995	2000	2005	2010
Hotel units	600	600	600	600
Condominium units	150	350	600	900
Total units	750	950	1,200	1,500
Commercial square feet	-	22,000	22,000	37,000

Source: Peat, Marwick, Mitchell & Co.

Exhibit III-8

AWAKE'E RESORT

Assumptions for On-Resort Population Projections

1995 to 2010

Facility type	1995	2000	2005	2010
Hotel units:				
Average occupancy	75%	80%	80%	80%
Persons per unit(1)	1.8	1.8	1.8	1.8
Condominium units:				
Visitor use:				
Percent in rental pool	50%	50%	50%	50%
Average occupancy	60%	65%	70%	70%
Persons per unit(1)	2.1	2.1	2.1	2.1
Residential use:				
Full-time:				
Percent in full-time use	15%	15%	15%	15%
Average occupancy	95%	95%	95%	95%
Persons per unit(1)	2.5	2.5	2.5	2.5
Part-time:				
Percent in part-time use	35%	35%	35%	35%
Average occupancy	20%	20%	20%	20%
Persons per unit(1)	2.1	2.1	2.1	2.1

(1) Occupied units only.

Sources: Peat, Marwick, Mitchell & Co., based on interviews with resort operators and brokers at similar first-class resort developments, and Hawaii Visitors Bureau, Profile: The Resort Condominium Market and Profile: The Resort Hotel Market, 1985.

Exhibit III-C

AWAKE'E RESORT

Projected Average Daily Visitor Population at Awake'e Resort

1995 to 2010

Facility type	1995	2000	2005	2010
Hotel units	810	864	864	864
Condominium units	95	239	441	662
Total	905	1,103	1,305	1,526

Source: Peat, Marwick, Mitchell & Co.

conservative estimate of potential expenditures of visitors to Awa'ele. These expenditures were estimated based on 1983 Hawaii Visitors Bureau (HVB) expenditure data and updates according to Consumer Price Index trends as reported by the U. S. Bureau of Labor Statistics. Thus the direct visitor expenditures, in 1986 dollars, could amount to about \$31 million per year by 1995, increasing to \$50 million per year at project completion in 2010, as shown in Exhibit III-D.

Indirect and Induced Visitor Expenditures

Based on multipliers derived from the most recent information available from the DPED's State Input/Output Model, the projected direct visitor expenditures could be expected to generate indirect and induced expenditures throughout the state amounting to about \$28 million per year by 1995, increasing to \$47 million per year at project completion in 2010, as also shown in Exhibit III-D.

Including direct, indirect and induced effects, expenditures in the state attributable to Resort visitors are projected to total \$59 million per year in 1995, increasing to \$97 million per year at project completion in 2010, in 1986 dollars.

EMPLOYMENT IMPACT

Planned developments at the Resort will generate short-term employment during the construction of new facilities and long-term employment in the operation and support of those facilities. Employment effects may also be classified as being direct, indirect or induced. Direct effects are those directly supported by visitor expenditures, such as the employment of hotels and other establishments that serve visitors. Most of the direct employment effects would occur in the county of Hawaii, both at and outside of the Resort.

Indirect effects occur when directly affected establishments purchase goods or services from other businesses in order to meet additional visitor demands. Induced effects are defined as those supported throughout the state's economy when employees or proprietors directly or indirectly dependent on visitor expenditures spend their earnings.

Direct Construction Employment

Direct construction employment is that which would be supported directly by the construction of the various facilities. Such employment would include the on-site laborers, operatives and craftsmen, as well as the professional, managerial, sales and clerical workers whose usual places of employment may be elsewhere on the island or in the state.

Construction employment would be highest during the first five-year period of development when the 600 hotel rooms, the golf course, a major portion of the infrastructure and the first phase of condominiums are constructed. Construction employment is estimated to average about 170 person-years per year from 1991 to 1995, as shown in Exhibit III-E. Construction employment could then decrease to an average of about 50 person-years per year from 1996 to 2000 and then increase through the remainder of the project, reaching about 70 person-years per year from 2006 to 2010, as also shown in Exhibit III-E. Total construction employment for the 20-year period is estimated to be about 1,770 person-years.

AWA'ELE RESORT
Projected Total Annual Visitor Expenditures
1995 to 2010
(In millions; 1986 dollars)(1)

Expenditure type and place of stay	1995	2000	2005	2010
Direct:				
Hotel(2)	\$ 27.5	29.3	29.4	29.3
Condominium(3)	3.0	7.5	13.8	20.8
Subtotal	30.5	36.8	43.2	50.1
Indirect and induced	28.3	34.2	40.1	46.6
Total(4)	\$ 58.8	71.0	83.3	96.7

(1) 1983 Hawaii Visitors Bureau expenditure data updated to 1986 dollars based on Consumer Price Index data reported by the U. S. Bureau of Labor Statistics.

(2) Average daily expenditures estimated at \$93 in 1986 dollars.

(3) Average daily expenditures estimated at \$86 in 1986 dollars.

(4) Projected at \$1.93 per \$1.00 direct expenditure. Based on unpublished 1984 data from the State of Hawaii, Department of Planning and Economic Development.

Sources: Hawaii Visitors Bureau, Visitor Expenditure Survey, 1984 and 1983; First Hawaiian Bank, Research Department, Economic Indicators, January/February 1986; and U. S. Bureau of Labor Statistics, 1984.

AWAKE'E RESORT
Projected Direct Employment for Facility Construction
1991 to 2010
(Average annual person-years)

Facility type	1991 - 1995	1996 - 2000	2001 - 2005	2006 - 2010	Total person-years for 20-year project
Hotel units(1)	120	-	-	-	600
Condominium units(2)	32	42	53	63	945
Commercial(3)	-	3	-	2	22
Infrastructure(4):	8	-	-	-	40
Recreational amenities(5)	12	8	6	6	160
Other(6)	-	-	-	-	-
Total construction employment	172	53	59	71	1,767

- (1) Employment demand calculated at 0.5 full-time equivalent jobs per year per unit and an average two-year construction period per hotel.
- (2) Demand calculated at 0.7 full-time equivalent jobs per year per unit and an average 18-month construction period per project.
- (3) Demand calculated at 0.6 person-years per 1,000 square feet of gross leasable space.
- (4) Estimates based on construction cost estimates provided by Helber, Haster, Van Horn & Kimura Planners.
- (5) Includes an 18-hole golf course and clubhouse.
- (6) Includes sewage treatment, roads, water lines, electrical facilities, reservoir and drainage wells.

Indirect and Induced Construction Employment

The direct employment of construction workers at Resort projects will stimulate additional purchases of goods and services on the island of Hawaii and elsewhere in the state. In its most recent (1982) revisions to a model of the construction industry in Hawaii, the DPED calculated that 2.4 full-time jobs are created in the state for every full-time job in the building construction industry. This multiplier is used to project the indirect and induced employment to be supported by the direct construction employment.

A 1975 study of Kauai's economy suggested a regional capture rate of total indirect and induced employment amounting to about 20% of direct employment. Although the island of Hawaii's future economy may be expected to be more developed than was Kauai's economy in 1975, this figure is assumed to be appropriate due to the number of construction workers who are expected to come from off-island. (The actual share of construction employment going to off-island workers will depend on the timing of other major projects planned throughout the state.)

Exhibit III-F applies these findings to project the indirect and induced employment effects of construction for the project. As with direct construction, the greatest employment would occur in the first five-year period when indirect and induced construction employment effects are expected to provide employment opportunities for about 240 person-years per year, as shown in the exhibit. Indirect and induced construction employment could then fall to about 70 average annual person-years from 1996 to 2000 and then increase throughout the remainder of the project, reaching about 100 average annual person-years from 2006 to 2010, as also shown in the exhibit. Total indirect and induced employment for facility construction is estimated to be about 2,470 person-years over the entire 20-year period of which about 350 person-years could be captured on the island of Hawaii, as also shown in Exhibit III-F.

Direct Operational Employment

The majority of direct operational employment at the Resort would occur in the proposed hotel because of its relatively large size and its expected first-class level of service. First-class resort hotels in Hawaii are found to employ between 0.8 and 1.0 full-time equivalent direct employees per hotel unit. However, direct employment is also generated off-resort such as in airline industry and other travel-related jobs. Thus the overall direct hotel operational employment at the Resort is projected at 1.1 full-time equivalent employees per unit. In addition to hotel-related employment, condominium development at Awake'e is projected to create about 0.2 jobs per unit and commercial development, about one job for each 200 square feet of leasable area.

Thus, the Resort could be expected to have generated more than 700 full-time equivalent direct operational positions by 1995, and more than 1,000 full-time equivalent positions at project completion in 2010, as shown in Exhibit III-G.

Indirect and Induced Operational Employment

The Resort's operations would also indirectly generate employment elsewhere in the state. Recent studies on the economic impacts of tourism by the DPED indicate that each full-time hotel, resort residential and resort administrative

AWAKE'E RESORT
Projected Direct, Indirect and Induced Employment
for Facility Construction

1991 to 2010
(Average annual person-years)

Type of employment	Total person-years for			
	1991 - 1995	1996 - 2000	2001 - 2005	2006 - 2010
Direct(1)	172	53	59	71
Indirect and induced	241	73	82	99
Total(2)	413	126	141	170
Indirect and induced:				
On-island(3)	34	11	12	14
Elsewhere in state	207	62	70	85

(1) From Exhibit III-E.

(2) Direct employment multiplied by 2.4. State of Hawaii, Department of Planning and Economic Development, Hawaii Construction Model: Further Developments, 1982.

(3) Direct employment multiplied by 0.2. Anderson, et al., Kauai Socioeconomic Profile, 1975.

AWAKE'E RESORT
Projected Direct Employment
for Awake'e Resort Operations

1995 to 2010

Facility type	1995	2000	2005	2010
Total(1)	660	660	660	660
Resort residential(2)	30	70	120	180
Commercial(3)	-	110	110	185
Resort administration(4)	25	30	35	40
Total operational employment	715	870	925	1,065

(1) Projected at 1.1 full-time equivalent jobs per hotel unit.

(2) Projected at 0.2 full-time equivalent jobs per condominium unit.

(3) Projected at 1.0 job per 200 gross leasable square feet of commercial space.

(4) Estimated to follow growth of facility development. This category includes miscellaneous Resort employment such as Resort administration, property development and sales, accounting, maintenance of golf course and other grounds-keeping and infrastructural facilities.

employee supports 0.9 indirect and induced full-time equivalent positions elsewhere in the state. Results of the DPED study also suggest that resort retail and restaurant positions could support about 0.6 indirect and induced positions for each direct position. Thus indirect and induced operational employment could be expected to amount to about 650 full-time equivalent positions by 1995 and about 900 full-time equivalent positions at project completion in 2010, as shown in Exhibit III-H.

Total Operational Employment

Total direct, indirect and induced operational employment is estimated to represent nearly 1,400 full-time equivalent positions by 1995, increasing to nearly 2,000 positions at project completion in 2010, as also shown in Exhibit III-H.

RESIDENT INCOME

The Resort could be expected to have a significant impact on personal and household income for residents of the island and state. The Resort would generate resident income as employee wages, salaries and fringe benefits and as income to proprietors.

Personal Income

Personal income is defined as the wages and salaries paid to the direct construction and operational employees of the Resort. Personal income is projected on the basis of average industry wages and salaries for the various types of employment anticipated and on the projected future employment demands.

Personal income paid to Hawaii residents as a result of Resort construction and operations may be expected to be about \$14 million per year by 1995, increasing to about \$15 million per year at project completion in 2010, in 1986 dollars, as shown in Exhibit III-I.

Household Income

The dispersion of indirect and induced employment effects among many industries make it difficult to project the total income benefits of the Resort's development. However, estimation of total household income effects based on visitor expenditure levels permits a perspective on the statewide income benefits that would result from the Resort's development.

Total household income generated by visitor expenditures at the Resort would include the fringe benefits and proprietor's income paid by establishments that sell goods and services directly to visitors as well as the wages and salaries noted previously. In addition, household income includes income generated through the multiplier effects of indirect and induced visitor expenditures.

The DPED reports that the multiplier effects of visitor expenditures throughout the community have declined in recent years, but that each \$1.00 spent by visitors in 1985 is estimated to have generated \$0.71 in total income to households in the state. Assuming a similar multiplier effect for the expected expenditures of visitors to the Resort, it is projected that the Resort could contribute nearly \$22 million per year by 1995 and \$36 million per year in total household income in the state at project completion in 2010, in 1986 dollars, as also shown in Exhibit III-I.

AWAKE'E RESORT
Projected Direct, Indirect and Induced Employment
for Resort Operations
1995 to 2010

Type of employment	1995	2000	2005	2010
Direct(1)	715	870	925	1,065
Indirect and induced: Hotel and resort(2) Commercial(3)	644	684	734	792
	-	66	66	111
Subtotal	644	750	800	903
Total	1,359	1,620	1,725	1,968

(1) As shown in Exhibit III-G.

(2) Related to direct employment at the hotels, condominium units and in Resort administrative positions. Estimated as 0.9 indirect and induced employees per direct employees. State of Hawaii, Department of Planning and Economic Development, The Economic Impact of Tourism in Hawaii: 1970-1980, 1983.

(3) Estimated as 0.6 indirect and induced employees per direct employees. Ibid.

AWAKE'E RESORT

Projected Annual Personal and Household
Income From Direct Employment

1995 to 2010

(In 1986 dollars; millions)(1)

Type of employment	1995	2000	2005	2010
Construction(2)	\$ 4.2	1.3	1.4	1.8
Hotel and resort(3)	9.5	10.0	10.8	11.6
Commercial(4)	-	1.1	1.1	1.8
Total personal income	\$ 13.7	12.4	13.3	15.2
Total household income(5)	\$ 21.6	26.1	30.7	35.6

(1) 1984 State of Hawaii, Department of Labor and Industrial Relations data updated to 1986 dollars.

(2) Average annual wage of \$24,734, reflecting 30% workers from off-island and an average income of \$29,152 for construction workers throughout the state and \$22,840 for construction workers in the county of Hawaii (State of Hawaii, Department of Labor and Industrial Relations, 1985).

(3) Excluding tips. Hotel, resort residential and resort administration employment wages projected at the county of Hawaii hotel industry average of \$13,196 (State of Hawaii, Department of Labor and Industrial Relations, 1985).

(4) Commercial sector wages projected at \$9,704, based on average wages in retail industries on the island, industry classifications (State of Hawaii, Department of Labor and Industrial Relations, 1985; State of Hawaii, Department of Planning and Economic Development, 1983).

(5) Based on State of Hawaii, Department of Planning and Economic Development estimate of \$0.71 total household income for each \$1.00 spent by visitors to the state in 1985.

Source: State of Hawaii, Department of Labor and Industrial Relations, Employment and Payrolls in Hawaii: 1984, 1985.

PROJECTED POPULATION IMPACT

The development of facilities will lead to increased population at the Resort and elsewhere on the island. On any given day there will be visitors staying at the Resort's hotel and in residential units that have been put in visitor rental pools. There will also be persons residing during most or parts of each year in the Resort's condominiums. In addition, operational and construction employees attracted from off-island will add to the population of the region. This section discusses the on-Resort and off-Resort employee population impacts of the Resort's development.

Off-Resort Population Impact

The Awake'e Resort will impact the county's population by attracting employees for the Resort's construction and operation from off-island. Additional population growth will come from household members who accompany the in-migrant operational employees. Based on projections of employment at other resorts, it was assumed that 15% of operational employment would be filled by in-migrants by 1995, 18% by 2000 and 20% by 2005 and thereafter. For comparison, the Mauna Lani Bay Hotel estimates that one year after its opening, 9% of its work force had recently moved to the island of Hawaii. A higher share of in-migrants could be expected at Awake'e due to the impact of other resort developments expected in South Kohala and North Kona during the next 20 years.

Based on past experience, between 20% and 50% of the direct construction employees may be expected to come from off-island, with the actual amount related to the amount and scheduling of other major construction projects elsewhere in the state. For purposes of projection, about 30% of the construction workers at the Resort were assumed to come from off-island labor pools.

In-migrant operational supervisory and managerial employees at the Resort were assumed to be accompanied by two additional household members, while other operational employees were assumed to average one additional household member. Construction workers temporarily resident on the island are assumed to be accompanied by an average of 0.5 additional household members per worker. Based on the above-mentioned assumptions, total off-Resort population impact is projected to be about 320 by 1995, increasing to about 500 at project completion in 2010, as shown in Exhibit III-J.

On-Resort Population Impact

On-Resort population is comprised of visitors staying at the hotels and condominiums and residents in condominiums at the Resort. The average daily visitor population is projected to be about 900 persons by 1995, increasing to about 1,500 persons at project completion in 2010, as previously shown in Exhibit III-C. On-Resort resident population was projected using the assumptions concerning condominium development at the Resort shown previously in Exhibit III-A and assumptions about full- and part-time residential usage of the housing units shown previously in Exhibit III-B. On-Resort resident population is projected to be about 75 persons by 1995, increasing to 450 persons at project completion in 2010, as shown in Exhibit III-K. Resident population would represent about 8% of on-Resort population by 1995 and about 23% by 2010.

Exhibit III-J

AWAKE'E RESORT

Projected Off-Resort Population Impact

1995 to 2010

(Average daily population)

In-migrant type	1995	2000	2005	2010
Managerial and supervisory:				
Operational employees(1)	26	32	34	39
Other household members(2)	52	64	68	78
Subtotal	78	96	102	117
Other:				
Operational employees(3)	81	125	151	174
Construction employees(4)	51	16	18	21
Other household members(5)	107	133	160	185
Subtotal	239	274	329	380
Total	317	370	431	497

(1) In-migrants projected to account for 15% of operational employment by 1995, 18% by 2000 and 20% by 2005 and thereafter. Based on projections at other resorts. Managerial and supervisory positions assumed to represent 11% of total operational employees, of which 33% would be filled from off-island.

(2) Projected at two additional persons per household.

(3) Remainder of off-island operational employee in-migrants.

(4) Assuming 30% of workers come from off-island.

(5) Projected at one additional person per operational employee and 0.5 additional persons per construction employee.

Exhibit III-K

AWAKE'E RESORT

Summary of On- and Off-Resort Population Impact

1995 to 2010

(Average daily population)

Population category	1995	2000	2005	2010
On-resort:				
Visitor(1)	905	1,103	1,305	1,526
Resident	75	176	302	453
Subtotal	980	1,279	1,607	1,979
Off-resort residents(2):				
In-migrant operational employees	107	157	185	213
In-migrant construction employees	51	16	18	21
Other household members	159	197	228	263
Subtotal	317	370	431	497
Total	1,297	1,649	2,038	2,476

(1) As shown in Exhibit III-C.

(2) As shown in Exhibit III-J.

Total Projected Population Impact

In summary, the facility development at the Resort is projected to generate population growth in terms of visitors and residents at the Resort's facilities, and in-migrant operational and construction employees and their accompanying household members. The total population impact is projected to be about 1,300 persons by 1995, increasing to nearly 2,500 persons at project completion in 2010, as also shown in Exhibit III-K.

EMPLOYEE HOUSING REQUIREMENTS

This section presents the analysis of additional housing required on the island of Hawaii to support the direct construction and operational employment expected to be generated at the Resort.

Construction Employees

Construction employment is temporary and therefore does not generate the long-term housing demands that are associated with operational employment. With the generous housing subsidy allowances typically paid to construction workers, the demand for residential housing by construction employees is expected to be absorbed by units available in the short-term rental market of the Kona region.

Based on the construction experience of the Mauna Lani Resort facilities during 1981 and 1982, it was found that the peak construction employment was about 300 workers on site at one time. It was also found that over the construction period, the percentage of workers from off-island ranged from 16.5% to 44.8% and that 43% to 75% of the off-island workers rented housing. Assuming a "worst case" scenario for short-term rental housing impact, the maximum rental demand by off-island construction workers would be about 115 units, as shown in the table below:

Maximum Projected Rental Units Required for Off-Island Construction Workers at Awake'e Resort	
1991 to 1995	
Maximum workers on site	300
Percent from off-island	50%
Percent renting housing	75%
Maximum rental units required, rounded	115

Operational Employees

Exhibit III-L shows and explains the anticipated labor market sources of the Resort's direct operational employees. Up to 20% of employees are projected to be attracted from off-island. The majority of the on-island workers are expected to come from "available" sources of labor such as unemployed and

AWAKE'E RESORT
Projected Mix of Direct Operational Employees
1995 to 2010

Labor supply component	1995	2000	2005	2010
On-island sources:				
Available labor(1)	243	285	296	341
Regional turnover(2)	213	250	259	298
Other turnover(3)	152	178	185	213
Off-island sources - in-migrant(4)	107	157	185	213
Total operational employment	715	870	925	1,065

- (1) Unemployed and underemployed persons on-island and labor market entrants. Projected to account for 40% of on-island labor component.
- (2) Persons attracted from other work in North Kona. Projected to account for 35% of on-island labor component.
- (3) Persons attracted from other work elsewhere on the island. Projected to account for 25% of on-island labor component.
- (4) Based on projections of employment at other area resorts, projected to account for 15% by 1995, 18% by 2000 and 20% by 2005 and thereafter.

underemployed persons and labor market entrants. Even though other resorts presently under construction and planned for the island of Hawaii will draw down the available labor pool, the increased economic activity on the island will, in itself, draw more people to the island and maintain the available labor pool.

In Exhibit III-M, figures from Exhibit III-L are used to project the number of employees that may be expected to demand new housing. The labor supply components are discussed below:

- Off-island labor - The largest segment is expected to be in-migrants from off-island, all of whom would require additional housing.
- Available labor - Those hired from the "available" labor pool of the island may form new households in conjunction with their new employment, especially those who are recent graduates. It is projected that about 15% of the "available" labor component may be expected to seek new housing after becoming employed at the Resort.
- Regional turnover - Persons formerly employed elsewhere in Kona are presumed to be already settled in the area, or to be accustomed to commuting to work. Some of this labor segment may have taken new employment in order to be closer to their place of residence. Hence, no additional housing demand is projected for the regional turnover group.
- Other turnover - Those who had previously worked elsewhere on the island may be expected to generate some in-migration into the North Kona area. The homes that movers vacate are likely to be within commuting distance of Kona and hence could serve as potential housing for employees hired to refill the jobs that are vacated. However, 10% of this labor supply component may be expected to create additional demands for housing in the North Kona region as a result of employment at the Resort.

The demand for additional housing on the island of Hawaii is projected to be less than the number of employees requiring housing because households could include more than one Resort employee. The projected demand for additional housing units is shown by class of worker in Exhibit III-M. About one-fourth of the off-island in-migrants that were shown in Exhibit III-L could be expected to be experienced personnel brought to fill managerial or specialty positions. Such persons may be expected to be principally heads of households; thus each managerial level in-migrant is projected to generate demand for one additional home. On the other hand, experience has shown that many service employees share housing. Thus nonmanagerial and nonspecialty employees in need of new housing are projected to generate a housing unit demand at a ratio of 1.5 employees per additional housing unit.

The cumulative demand for additional housing directly attributable to the Resort's expansion is projected to amount to about 115 homes by 1995. Increasing to about 200 at project completion in 2010, as shown in Exhibit III-M. Between 19% and 23% of this unit demand would occur among persons in managerial or specialty positions with a relatively greater ability to afford housing. The remainder of the projected additional housing demand,

AWAKE'E RESORT
Direct Operational Employees Projected
to Demand Additional Housing
1995 to 2010

Labor supply component	1995	2000	2005	2010
On-island labor:				
Available labor(1)	36	43	44	51
Regional turnover(2)	-	-	-	-
Other turnover(3)	15	18	19	21
Off-island labor:				
Managerial(4)	26	32	34	39
Other(5)	82	124	151	174
Total	159	217	248	285

- (1) New household formation projected at 15%.
- (2) Assumed to be already settled in area or accustomed to commuting.
- (3) About 10% of transfers projected to generate additional housing demand on-island.
- (4) About 11% of operational employees assumed to be in a managerial and supervisory position of which 33% of managerial and supervisory positions assumed to be filled from off-island.
- (5) Remainder of off-island in-migrants.

about 90 in 1995, increasing to about 165 units at project completion in 2010, would come from the Resort's nonmanagerial and nonspecialty employees who would have lower incomes and a lesser ability to afford housing.

Data on the household incomes of hotel employees from the State of Hawaii, Department of Health's Health Surveillance Survey enables estimation of income distribution of the households projected to demand new housing. The survey suggests that about 40% of resort service-related household incomes fell below \$27,000 per year and about 50% fell below \$30,000 per year, in 1986 dollars. A household earning \$27,000 per year would be able to afford a housing unit costing \$73,000, assuming an 11% interest rate, 30-year amortization period, 10% down payment and mortgage payments equal to 28% of gross monthly income. A household income of \$30,000 per year would enable the purchase of a housing unit costing about \$82,000 under the same financing assumptions.

A survey of the pricing of single-family homes for sale in the North Kona district taken from the Hawaii Island - Kona Board of Realtors Multiple Listing Service, January 1986, shows a limited availability of single-family homes priced at or below \$80,000. Only about 8% of total single-family listings were priced at \$80,000 or below. Assuming employees with annual household incomes of \$27,000 or less would not be able to find affordable housing and employees with annual household incomes between \$27,000 and \$30,000 would have difficulty in finding affordable housing, about 36 to 45 affordable housing units would be needed in the county by 1995, increasing to 66 to 82 affordable units needed by 2010, as shown in Exhibit III-0.

Exhibit III-N

AWAKE'E RESORT
Projected Additional Housing Unit Demand for Direct
Operational Employees on the Island of Hawaii

1995 to 2010

Class of worker	1995	2000	2005	2010
Managerial or specialty(1)	26	32	34	39
Other(2)	89	123	142	164
Total	115	155	176	203

(1) Projected at 1.0 Resort employee per household.
(2) Projected at 1.5 Resort employees per household.

Exhibit III-0

AUXE'E RESORT

Projected "Affordable Range" Housing Units Required

1995 to 2010

	1995	2000	2005	2010
Total housing requirement(1)	115	155	176	203
Less managerial or specialty employee requirement	26	32	34	39
Total nonmanagerial or specialty requirement	89	123	142	164
Affordable housing units required:				
At 40%	36	49	57	66
At 50%	45	62	71	82

(1) From Exhibit III-H.

IV - FISCAL IMPACTS

The fiscal impacts of the Resort's proposed developments may be evaluated by comparing the tax revenues and expenditures that could be expected to be incurred. This chapter describes the expected fiscal impacts of the proposed developments in terms of additional revenues and expenditures to the governments of the county of Hawaii and the state of Hawaii. The projected impacts on public education, police and fire protection, health care and recreational facilities are also discussed.

REVENUES

Development at the Awake'e Resort would bring additional tax revenues to the county and state governments. County government revenues would be principally in the form of real property taxes on the new facilities. Revenues to the state government would be composed principally of general and specific excise taxes and personal income taxes. The sections following project the additional revenues that could be generated for the county and state governments as a result of the Resort's development.

County

Real property in the county is currently taxed at \$10.00 per \$1,000 of assessed value for land and \$8.50 per \$1,000 of assessed value for buildings, for all uses with the exception of improved residential land which is taxed at \$8.50 per \$1,000 assessed value.

Based on these rates, the hotel, condominium, commercial and golf course facilities envisioned at the Resort could be expected to generate about \$1.1 million per year by 1995, increasing to about \$2.8 million per year by 2010, in 1986 dollars, as shown in Exhibit IV-A.

State

Additional tax revenues to the state government would be generated by the 4% general excise tax on direct, indirect and induced expenditures by the Resort's visitors and also on expenditures by the Resort's part- and full-time residents. In addition, the Resort's full-time residents would pay individual income taxes and other state taxes such as liquor, tobacco, fuel, inheritance, estate and conveyances taxes. Based on state tax receipts in fiscal 1984, it is estimated that the individual income and other taxes mentioned previously amounted to \$980 per capita. This figure was calculated by taking average taxes per capita in the state and adjusting for the higher income levels expected for Resort full-time residents. Visitors would also pay the 5% transient accommodations tax on hotel room and condominium unit accommodations.

Total tax revenues to the state government are expected to be about \$3.2 million per year by 1995, increasing to about \$5.9 million by 2010, in 1986 dollars, as shown in Exhibit IV-B.

EXPENDITURES

Visitors and part- and full-time residents that could be expected to live at the Resort's condominium and single-family units would also necessitate additional expenditures of public resources. County government expenditures on behalf of

AWAKE'E RESORT
Projected Annual Real Property Tax Revenues
Attributable to Development at Awake'e Resort
1995 to 2010
(In millions: 1986 dollars)

Source of property tax revenue	1995	2000	2005	2010
Hotel units(1)	\$ 0.78	0.78	0.78	0.78
Multifamily units(2)	0.34	0.79	1.35	2.03
Commercial space(3)	0.00	0.01	0.01	0.02
Golf course(4)	0.01	0.01	0.01	0.01
Total revenues	\$ 1.13	1.59	2.15	2.84

(1) Based on estimated value of \$145,000 per room and a combined land and building tax rate of \$9.00 per \$1,000 assessed value.

(2) Based on estimated value of \$250,000 per unit and a combined land and building tax rate of \$9.00 per \$1,000 assessed value.

(3) Based on estimated value of \$60,000 per net leasable square foot and a combined land and building tax rate of \$9.00 per \$1,000 assessed value.

(4) Based on estimated assessed value of \$5,500 per acre for 148 acres and a tax rate of \$10.00 per \$1,000 assessed value, and clubhouse valued at \$500,000 and a tax rate of \$8.50 per \$1,000 assessed valuation.

Sources: Peat, Marwick, Mitchell & Co. and County of Hawaii Tax Assessor.

Exhibit IV-8

AWAKE'E RESORT

Projected Annual Revenues to the
State Government Attributable to
Development at Awake'e Resort

1995 to 2010

(In millions; 1986 dollars)

Revenue source	1995	2000	2005	2010
Visitors:				
General excise tax(1)	\$ 2.4	2.8	3.3	3.9
Transient accommodations tax(2)	0.8	1.0	1.2	1.5
On-resort residents (3):				
General excise tax(4)	0.0	0.1	0.1	0.2
Individual income and other taxes(5)	0.0	0.1	0.2	0.3
Total	\$ 3.2	4.0	4.8	5.9

- (1) Based on 4% of direct, indirect and induced visitor expenditures.
- (2) Based on 5% of estimated gross room revenues from hotel and condominium units rented to visitors. Average achieved room rates estimated at \$80 for hotel units and \$90 for condominium units.
- (3) Full-time and part-time residents of the Resort's condominiums, less 15% estimated to have been residents of the state.
- (4) Based on 4% of selected household budget items. Household incomes assumed to be \$60,000 for full-time residents and \$150,000 for part-time residents based on a survey of resort developers and real estate brokers at other resorts by Peat, Marwick, Mitchell & Co.
- (5) Estimated at \$980 per year per on-Resort full-time resident.

Sources: State of Hawaii, Department of Planning and Economic Development, The State of Hawaii Data Book, 1984, 1985; and Tax Foundation of Hawaii, Government in Hawaii: A Handbook of Financial Statistics, 1985.

residents would also increase in proportion to the number of employees coming from off-island to work in the operations of the new Resort.

Visitors are seen to necessitate public costs in terms of (1) public safety (such as increased needs for police and fire protection), (2) development and upkeep of highways, recreational facilities and natural resources, (3) health and sanitation measures and (4) cash capital improvements. Residents necessitate public costs in all the aforementioned areas, and also in education, retirement and pension funds, public welfare and other government functions.

County

The various county government expenditures for fiscal year 1984 were analyzed with respect to the relevant population served by each of the government functions. This analysis indicates that county government expenditures in 1984 totaled about \$540 per resident and \$340 per visitor, as shown in Exhibit IV-C. More recent expenditure estimates are not available and there is little evidence to suggest that 1986 expenditures would be significantly different on a per capita basis from 1984 expenditures.

Based on these county government outlays, public expenditures by the county on the behalf of the Resort's residents or visitors and employee in-migrants to the county could be expected to total about \$0.5 million per year by 1995, increasing to about \$1.0 million per year at project completion in 2010, in 1986 dollars, as shown in Exhibit IV-D.

State

A similar analysis of state government expenditures and the relevant populations for the various services indicates that expenditures in 1984 totaled about \$2,000 per resident and \$210 per visitor, as shown in Exhibit IV-E.

As for the county government expenditures, the 1984 figures are the most recent available and are considered valid indicators of current per capita government expenditures. State government expenditures are projected to total about \$0.3 million per year by 1995, increasing to about \$1.1 million per year at project completion in 2010, as shown in Exhibit IV-F.

REVENUE/EXPENDITURE ANALYSIS

The net fiscal impacts of the Resort's development to the county and state are estimated by comparison of the projected revenues and expenditures.

County

Comparison of projected public revenues and expenditures indicates that the county government may expect to net about \$0.6 million per year by 1995, increasing to \$1.8 million per year at project completion in 2010. In 1986 dollars, as shown in Exhibit IV-G. The analysis also indicates that additional county government revenues generated by the Resort would be 2.2 times the expenditures incurred by the county government by 1995, increasing to 2.8 times the expenditures at project completion in 2010, as also shown in the exhibit.

AWAKE'E RESORT
Projected Annual County Government Expenditures
Attributable to Development at Awake'e Resort

1995 to 2010

(In millions; 1986 dollars)

Population and expenditure type	1995	2000	2005	2010
Population:				
On-Resort:				
Visitors	905	1,103	1,305	1,526
Residents	75	176	302	453
Off-Resort residents	317	370	431	497
Total population	1,297	1,649	2,038	2,476
Expenditures:				
On-Resort:				
Visitors(1)	\$ 0.3	0.4	0.4	0.5
Residents(2)	0.0	0.1	0.2	0.2
Off-Resort residents(2)	0.2	0.2	0.2	0.3
Total expenditures	\$ 0.5	0.7	0.8	1.0

(1) Visitors estimated to require \$340 per capita in county government expenditures.

(2) Residents estimated to require \$540 per capita in county government expenditures.

Source: Peat, Marwick, Mitchell & Co.

AWAKE'E RESORT
County of Hawaii Per Capita Government Expenditures

1984

Function	Expenditures (000s)(1)	Service population(2)	1984 annual expenditure per resident visitor
General government	\$ 8,157	106,800	\$ 76.38
Public safety	22,701	114,600	198.09
Highways	5,214	114,600	45.50
Health and sanitation	2,922	114,600	25.50
Public welfare	2,406	106,800	22.53
Education	281	106,800	2.63
Recreation	5,300	114,600	46.25
Interest	3,563	106,800	-
Bond redemption	1,177	106,800	-
Retirement and pension	7,485	106,800	70.08
Mass transit	1,342	106,800	12.57
Cash capital improvements	2,891	114,600	25.23
Miscellaneous	1,442	106,800	13.50
Total	\$ 64,881		\$38.26
			340.57

(1) County government operating expenditures for fiscal year ended June 30, 1984 as reported in Tax Foundation of Hawaii, Government in Hawaii, 1985.

(2) Resident or de facto population estimates for the county as of January 1, 1984.

Source: Peat, Marwick, Mitchell & Co.

Exhibit IV-E

AWAKE'E RESORT
State of Hawaii Per Capita Government Expenditures
1984

Function	Expenditures (000s)(1)	Service population(2)	1984 annual expenditure Per resident Per visitor
General government	\$ 128,131	1,028,500	\$ 124.58
Public safety	73,344	1,127,700	65.04
Highways	49,041	1,127,700	43.49
Natural resources	17,172	1,127,700	15.23
Health and sanitation	72,631	1,127,700	64.41
Hospitals and institutions	114,557	1,028,500	111.38
Public welfare	328,400	1,028,500	319.30
Education	696,258	1,028,500	676.96
Recreation	13,827	1,127,700	12.26
Utilities and other enterprises	76,990	1,028,500	74.86
Debt service	213,293	1,028,500	207.38
Retirement and pension	126,006	1,028,500	122.51
Employees' health and hospital insurance	24,856	1,028,500	24.17
Unemployment compensation	78,278	1,028,500	76.11
Grants-in-aid to counties	18,173	1,028,500	17.67
Urban redevelopment and housing	11,618	1,028,500	11.30
Cash capital improvements	9,987	1,127,700	8.86
Miscellaneous	25,111	1,028,500	24.42
Total	\$ 2,077,673		1,999.93
			209.29

(1) State government operating expenditures for fiscal year ended June 30, 1984 as reported in Tax Foundation of Hawaii, Government in Hawaii, 1985.

(2) Resident or de facto population estimates for the state as of January 1, 1984.

Source: Peat, Marwick, Mitchell & Co.

Exhibit IV-F

AWAKE'E RESORT
Projected Annual State Expenditures
Attributable to Development at Awake'e Resort
1995 to 2010
(In millions; 1986 dollars)

Population and expenditure type	1995	2000	2005	2010
Population:				
On-Resort visitors	905	1,103	1,305	1,526
On-Resort residents(1)	64	150	257	385
Total	969	1,253	1,562	1,911
Expenditures:				
On-Resort visitors(2)	\$ 0.2	0.2	0.3	0.3
Off-Resort residents(3)	0.1	0.3	0.5	0.8
Total expenditures	\$ 0.3	0.5	0.8	1.1

(1) Full-time and part-time residents at the Resort's condominiums, less 15% estimated to have already been residents of the state.

(2) Visitors estimated to require \$210 per capita in state government expenditures.

(3) Residents estimated to require \$2,000 per capita in state government expenditures.

Source: Peat, Marwick, Mitchell & Co.

AWAKE'E RESORT
County Government Annual Revenue
and Expenditure Comparison
1995 to 2010
(In millions; 1986 dollars)

	1995	2000	2005	2010
New revenues	\$ 1.1	1.6	2.2	2.8
New expenditures	0.5	0.7	0.8	1.0
Net additional revenues	\$ 0.6	0.9	1.4	1.8
Revenue/expenditure ratio(1)	2.2	2.3	2.8	2.8

(1) New revenues divided by new expenditures.

Source: Peat, Marwick, Mitchell & Co.

State

Net fiscal benefits to the state government are projected to be \$2.9 million per year by 1995, increasing to \$4.8 million per year at project-completion in 2010, in 1986 dollars, as shown in Exhibit IV-H. The analysis also indicates that additional state government revenues generated by the Resort would be about 10.7 times the expenditures incurred by the state government by 1995, decreasing to about 5.4 times the expenditures at project completion, as also shown in the exhibit.

The relatively high revenue/expenditure ratio in 1995 is caused by the high ratio of visitors to residents present at the Resort at that time. Visitors contribute relatively more to state government revenues and cost less in state government expenditures than residents. As the Resort matures, the resident population becomes a greater percentage of Resort population and thus, the revenue/expenditure ratio decreases.

PUBLIC EDUCATION

The Resort's planned developments will increase demands on the public school system by inducing population growth and thereby increasing the number of school age children on the island. These additional students may be dependents of (1) the full-time resident owners of units at the Resort or (2) Resort employees. However, Resort residents who own units could be expected to generate relatively little new demand for public education because of the small share of units expected to be occupied by full-time residents and because of the profile of expected buyers. Buyers of luxury Resort units have typically completed their child-rearing years and those who do have school age children most often send their children to private schools.

Existing Services and Facilities

Public schools serving the areas in which the majority of the Resort's residents and employees are projected to live currently number as follows:

Public Schools by Area of Residence		
Service region	Elementary or Intermediate schools	
	High schools	High schools
North Kohala	1	1
South Kohala	1	-
North Kona	3	-
South Kona	3	1

South Kohala is also the location of two of the county's best known private schools, Hawaii Preparatory Academy (grades kindergarten through 12) and Parker School (grades 7 through 12).

Required Additional Facilities

Exhibit IV-I shows projected new secondary public school students that are expected to be attributable to the Resort's expansion. The projections shown are based on student per housing unit multipliers for luxury and middle-income residences, as supplied by the State of Hawaii, Department of Education.

Exhibit IV-H

AWAKE'E RESORT

State Government Annual Revenue
and Expenditure Comparison

1995 to 2010

(in millions; 1986 dollars)

	1995	2000	2005	2010
New revenues	\$ 3.2	4.0	4.8	5.9
New expenditures	0.3	0.5	0.8	1.1
Net additional revenues	\$ 2.9	3.5	4.0	4.8
Revenue/expenditure ratio(1)	10.7	8.0	6.0	5.4

(1) New revenues divided by new expenditures.

Source: Peat, Marwick, Mitchell & Co.

Exhibit IV-I

AWAKE'E RESORT

Student Generation for Hawaii County Public Schools
Attributable to Development of Awake'e Resort(1)

1995 to 2010

Grade level	1995	2000	2005	2010
K - 6	16	23	28	33
7 - 8	8	12	14	17
9 - 12	8	12	14	17
Total	32	47	56	67

(1) By on-Resort residents and off-Resort in-migrant operational employees.

Sources: State of Hawaii, Department of Education, 1985, and Peat, Marwick, Mitchell & Co.

The impact on the public school system is expected to be slight with about 30 additional students by 1995, increasing to about 70 additional students by 2010, as shown in the exhibit. Recent written communications from the superintendent of schools support this conclusion. About half of all new students shown are expected to be in grades kindergarten through 6; the other half in grades 7 through 12.

It may be expected that additional staff would eventually be required to meet the increased demand projected. The cost of such services are included in the analyses of public costs to the state presented in this chapter.

POLICE PROTECTION

Increased needs for police services are expected to occur because of the increases in de facto population that the Resort's expansion will incur. Much of this demand for new services is expected to be in the areas of traffic control and parking violations.

Studies relating tourism and crime in Hawaii have shown conflicting results. Incidences of robbery are consistently linked to increased tourism, but whether or not a relationship exists between tourism and more serious crimes (such as burglary, rape, murder or assault) remains unclear. Recently, the Kona and South Kohala police captains indicated that crimes associated with luxury visitors to establishments were minimal and were generally thefts by hotel employees from hotel rooms or rental cars. These incidents were also most frequently handled by security officers of the resort or hotel involved.

Existing Services and Facilities

Police service to North Kona is provided from the station in Captain Cook. A substation providing administrative services is located in Kailua-Kona. Current protection in the Awake'e area is minimal with one officer assigned to the area's patrol.

Required Additional Services

The County Police Department anticipates that the resident and visitor population growth projected for North Kona and South Kohala will be accompanied by a shift in criminal and traffic incidents. This shift is expected to necessitate an expanded police force at the Captain Cook and Waimea police stations and may eventually necessitate a new substation on the Kohala Coast. This would incur costs for personnel, equipment and capital outlays; such costs would be included in the projections of costs to the county government discussed in this chapter.

Recent written communications from the chief of police, County of Hawaii, indicates that he foresees no adverse effects from the proposed Awake'e Resort development.

FIRE PROTECTION

Resort development at Awake'e will create the need for additional fire protection services in the North Kona area.

Existing Services and Facilities

Fire protection for the North Kona district is provided by the 24-hour station at Kailua-Kona which has ladder, engine, medical and marine rescue services. The station is about 12 miles away from the main resort area at Awake'e and fire vehicles would require about 20 minutes to travel the distance. Back-up support for North Kona is provided by the Captain Cook station located to the south of Kailua-Kona.

Required Additional Services

A new fire station in South Kohala near the Mauna Lanai Resort is scheduled to become operational toward the end of 1987, according to the Hawaii County Fire Department. The new South Kohala station will be more distant from Awake'e Resort than the Kailua-Kona station. Thus primary fire protection service will continue to come from the Kailua-Kona station with the South Kohala station providing back-up support.

The county fire chief has recommended in recent written communication that fire sprinkler systems be installed in all commercial and residential structures because of expected delays in response from the present 24-hour fire stations. He also states that he has no objection to the proposed development if water supply and distribution is provided as required by AIA formulas and County Department of Water Supply regulations.

HEALTH CARE

The island of Hawaii has five hospitals. Hilo Hospital is the largest, followed in descending order by Kona Hospital, Honokaa Hospital, Kohala Hospital and Ka'u Hospital. In Hilo, the Life Care Center of Hilo also provides intermediate care, and various other medical groups on the island provide outpatient clinical services. An assistant to the State of Hawaii deputy director of health reports that health care services and facilities in West Hawaii need considerable upgrading. The improvement of regional health care delivery capabilities should be an important concern to developers in North Kona and South Kohala.

Existing Services and Facilities

The closest health care facility to Awake'e is the Kona Hospital. According to records of the State Health Planning and Development Agency, Kona Hospital has a total of 79 beds, 53 of which are for acute care and 26 for long-term care. According to the State of Hawaii, Department of Health, Kona Hospital has an active staff of 36 physicians. An administrator in the Department of Health described Kona Hospital's resources as inadequate for the needs of even the existing regional population.

A January 1985 study of the county's hospital facilities conducted by Alexander Grant & Company concluded that the Countywide pattern is presently one of low acute care utilization and high long-term care utilization. The study found that the major long-term care facilities of the island presently operate at or above their desired capacities and also that the Kohala service area appears to have an undersupply of physicians for its population.

Required Additional Facilities

Development of additional facilities at the Resort may be expected to impact the medical facilities discussed. An expanded population in the North Kona and South Kohala districts will eventually require additional acute care facilities. The administrator of Kona Hospital reported in February 1984 that the changing population profile of West Hawaii suggests a need for expanded services in the fields of care most needed by an older population such as in cardiovascular, orthopedic and urological care.

Likewise, an aging population and the movement of retirees to North Kona and South Kohala resort areas may be expected to contribute to the need for expansion of long-term care facilities in the region.

RECREATION

Awake'e Resort is expected to primarily affect shoreline recreational opportunities for residents because of its beachfront location. Current uses of the beach areas near the Resort include fishing and other food gathering, beachcombing and boat launching. The Resort would impose no access restrictions to public beach areas.

Existing and Planned Facilities

The DPED 1985 Data Book indicates that in 1984, the county government had 135 county government parks encompassing 1,463 acres, 18 state government parks with 1,578 acres (280 of which are developed), four national parks with a total acreage of 209,224 and one national wilderness area of 9,654 acres.

However, because of the island's newness, the coasts of Hawaii island are more often rugged than sandy. Thus, despite its large size, the island has only 29 sandy beaches and only 8 of these are improved. In comparison, Kauai, which has only 14% of Hawaii island's land area and less than half of its resident population, has 40 sandy beaches, 18 of which are improved, as noted in the 1985 Data Book.

The State Recreation Plan, Technical Reference Document by the State of Hawaii, Department of Land and Natural Resources noted nine golf courses on the island of Hawaii in 1980. Since this count, South Kohala has added two more golf courses, one at Mauna Lani Resort and one at Waikoloa Beach Resort. Golf courses at the three South Kohala resorts are all open to the public, subject to green fees and the availability of tee times. Preferential starting times are given to hotel guests at the three South Kohala resorts. Mauna Kea Resort also gives preferential starting times to resort property owners. An additional nine holes has also recently been added at Keauhou.

The Awake'e site has provided local residents with opportunities for fishing, boat launching, beachcombing and picnicking. The beach areas are not considered good swimming beaches due to lack of sand both on the shore and in the water. Current access to the shoreline areas is over a trail suitable for four-wheel drive and foot access only.

Required Additional Facilities

Development of Awake'e Resort would provide additional recreational facilities in the form of a championship 18-hole golf course, which will be made available to the public, and access to the shoreline areas through improved roads and the addition of public parking in the designated commercial area near Awake'e Bay.

In recent written communications from the director of the Department of Parks and Recreation, concerns about trails, public access and the anchialine ponds were expressed. The developer would need to address these concerns in more detail as the planning process continues.

APPENDIX C
PRELIMINARY ENGINEERING UTILITIES REPORT

PRELIMINARY ENGINEERING REPORT
FOR THE PROPOSED
AWAKEE RESORT DEVELOPMENT
North Kona, Hawaii

Prepared for:
Helber, Hastert, Van Horn and Kimura Planners

By:
Wilson Okamoto & Associates, Inc.

NOVEMBER 1986

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1. INTRODUCTION

This engineering report presents a preliminary evaluation of major infrastructure components for the Awake'e project, including site preparation, erosion control, roadway system, water supply; sanitary sewer facilities, and storm drainage improvements. A more complete description of the Awake'e development is presented in the Environmental Impact Statement prepared for the project.

This report is based on the proposed land use plan contained in the Environmental Impact Statement. Where project details are not available at this preliminary phase, projections and assumptions have been made based on developments of a similar nature.

II. SITE PREPARATION

Site preparation to precede building and infrastructure development will include clearing, grubbing, proof-rolling and mass grading of the area. Imported soils and other materials required to support vegetation and structures will then be placed on the site.

Clearing will involve cutting, stripping, removing and disposing of weeds, shrubs, brush, trees, and other unwanted surface materials on the site. Grubbing will remove stumps, roots, debris, and logs from the ground surface. All cleared and grubbed materials will be hauled off-site and disposed of at County approved disposal site(s).

Proof-rolling of the site will be required to verify and locate volcanic-related cavities, voids, or lava tubes. Identified cavities and lava tubes will be properly backfilled to stabilize the surface.

Mass grading and other earthwork operations to excavate high spots and fill depressions will follow. Grading of the undulating and irregular pahoehoe and a'a lava surfaces will require varying degrees of effort. Generally pahoehoe lava presents greater difficulty because of its hardness. On the other hand, the jagged and sharp-edged a'a surface can be more easily graded because of

its brittle structure. Mass grading and earthwork operations will be conducted in conformance with applicable government rules and regulations.

Inasmuch as existing on-site materials are unsuitable for vegetation and plant growth, the golf course and landscaped areas will require imported choker material and friable topsoil. The choker material will prevent migration and loss of fines and enhance moisture retention, while the overlying topsoil will serve as the primary medium for plant growth.

In addition, pads for future buildings and structures, will require placement and compaction of suitable cushion fill which must also be imported.

III. EROSION CONTROL

The susceptibility of the site to erosion during and after construction was assessed based on the "Severity Rating Number" system developed by the Hawaii Environmental Simulation Laboratory. The procedure establishes the generally accepted measure for erosion hazard potential.

The Erosion and Sedimentation Control Standards and Guidelines for the County of Hawaii adopted the Severity Rating Number System to define technical measures for assessing erosion hazard. It is this document which establishes a Severity Rating Number of 50,000 as the maximum acceptable for development projects in the County.

Projects with a Severity Rating Number exceeding 50,000 would not be approved unless mitigating measures are included to reduce the rating to an acceptable level.

To determine the Severity Rating Number and estimate the tonnage of soil loss from the project site, the following parameters and conditions were assumed:

1. The areal extent of earthwork or grading will be limited to increments of two acres or less, in compliance with guidelines of the County Grading Ordinance.

2. Sediments will be controlled on-site to prevent adverse impacts on downstream areas.

3. The extremely high permeability of the site will result in complete infiltration of surface runoff from graded areas. Thus, runoff from the site will not impinge upon coastal water quality.

Based on the foregoing, the Severity Rating Number and estimated soil loss were determined, as summarized below (see Appendix A for detailed computations):

1. Severity Rating Number	2 acres	10 acres
	27-493	136-2,464
2. Estimated Soil Loss (tons/ac.)		0.77-14.0 tons/acre

Should County approval for earthwork and grading in increments greater than 2 acres be secured, due to the low erosion potential of the area, the U.S. Department of Agriculture (Soil Conservation Service), and the U.S. Environmental Protection Agency (Office of Air and Water Programs) suggests numerous methods that can be utilized to control erosion, if necessary. These controls may include diversion swales, interceptor ditches or dikes, vegetative or artificial geofabric ground covers, ponds, and detention basins, etc.

IV. STORM DRAINAGE

The proposed storm drainage system for the Awa'e project is based on an evaluation of off-site and on-site hydrology. Off-site hydrology considers runoff from the slopes of Hualalei, mauka of the site, while on-site hydrology considers the volume of rainfall runoff from the site.

Off-site hydrological information on the project site was obtained from a 1971 study conducted by R.M. Towill Corporation for the planning and design of Queen Kaahumanu Highway. The study indicates that mean annual rainfall increases from approximately 20 inches at sea level to 60 inches at elevation 2,000 feet; then decreases with increasing elevation above the 3,000 foot elevation.

Mauka of the project site, rain falls on a geologic formation generally comprised of rocks of the Hualalei volcanic series, the last active flow of which occurred in 1800-1801. This highly permeable formation lacks definitive drainage ways, indicating that surface runoff is virtually non-existent. In the study, peak flows for large drainage areas was determined by the Soil Conservation Service Method. For areas of 200 acres or less, the Rational Method was used to estimate design flow.

Drainage areas mauka of the highway and immediately above the project site are designated in the study as Drainage Basins 2E, 2F and 2G with runoff volumes of 60 cfs, 10 cfs, and 110 cfs respectively. Based on this analysis, three pipe culverts were installed under the highway mauka of the project parcel to accommodate the storm runoff.

On-site runoff volumes under post-development conditions were estimated using the Rational Method as described in Appendix B. The results are summarized below.

Facility	Area	Runoff Quantity
Hotels	33 acres	93 cfs
Condo	79 acres	222 cfs
Commercial	5 acres	14 cfs
Golf Course	166 acres	minimal
Other	66 acres	minimal

The runoff estimation, however, is based on a generalized concept of development, and subject to further refinement.

Runoff on golf course and open areas are assumed to be almost non-existent because of the low annual rainfall and the highly permeable pahoehoe and a'a lava which extends from the shoreline and up on the Hualalei slopes for long distance. The permeability

of the lava materials is believed to exceed the rainfall intensity. Rainfall percolates into the ground so readily that surface accumulation would not occur during normal rainfall.

Because of the sparse rainfall and highly permeable local soil formation, the principal drainage facility requirements for the Awake development can be met principally by swales, ditches, seepage pits and dry-wells. Grated inlets and underground piping will be limited to large paved areas such as parking lots, and tennis courts. Open areas, including the golf course and landscaped spaces, will serve to retain and allow seepage of storm runoff.

A conceptual plan of the proposed drainage improvements is presented in Figure 1.

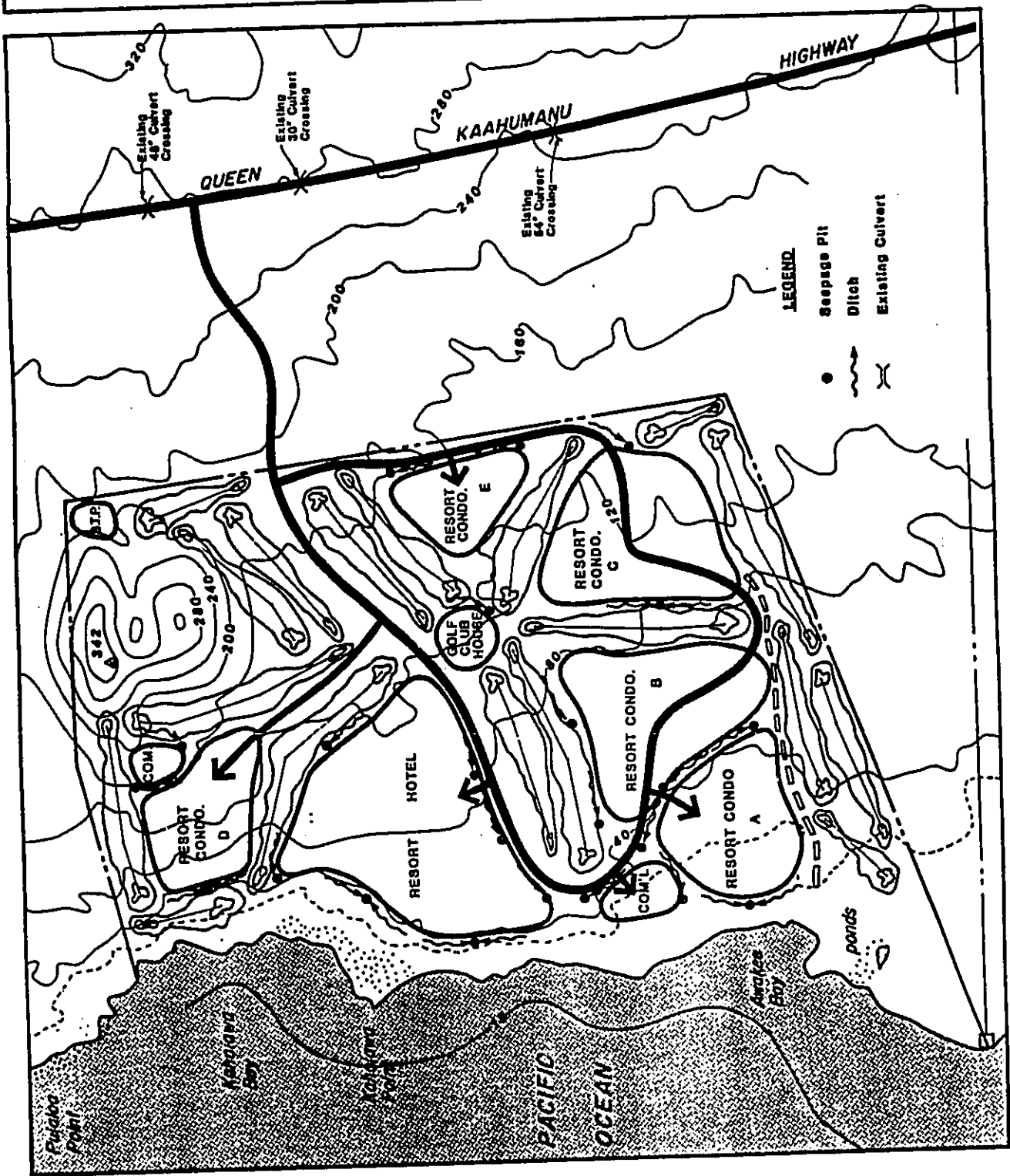
AWAKEE

Schematic
Drainage Plan

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Honolulu, Hawaii

Scale: 1" = 600'

Figure: 1

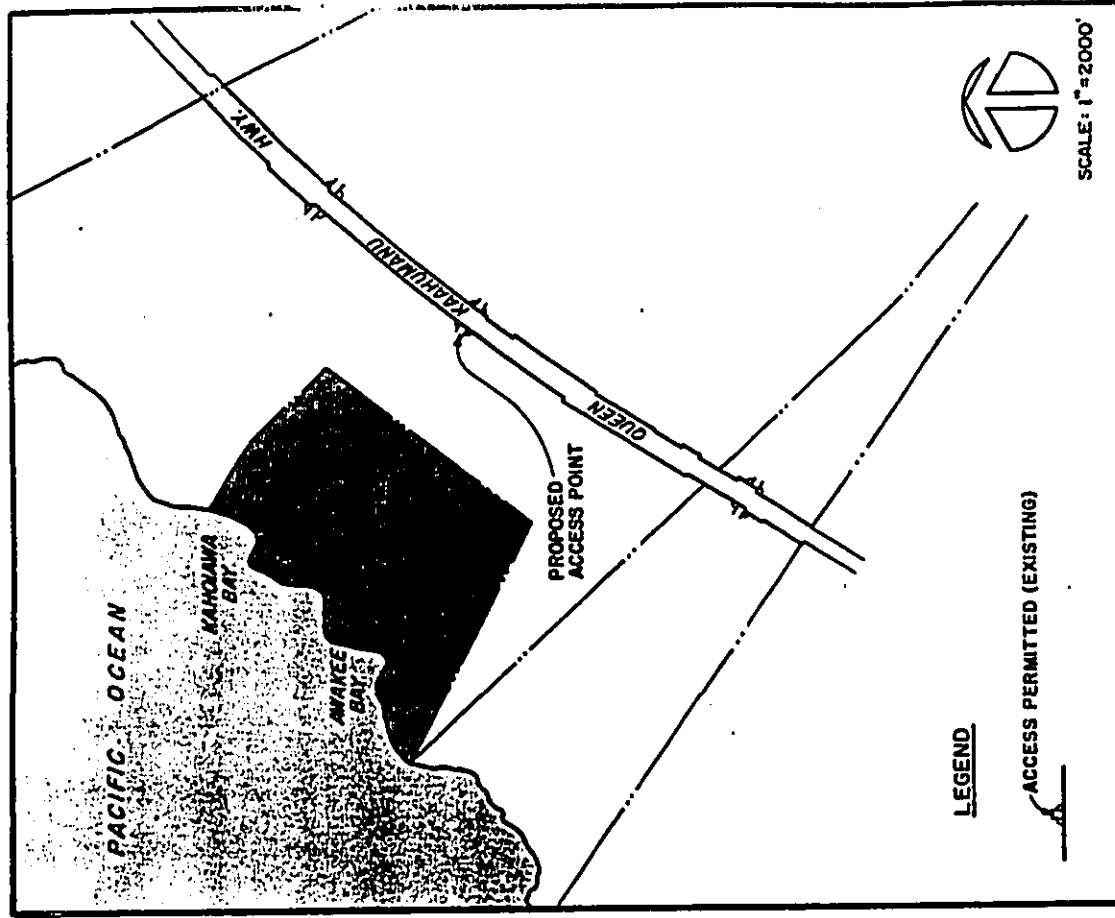


V. ROADWAY SYSTEM

The primary ground transportation facility serving the Awake's project is the two-lane Queen Kaahumanu Highway which is part of the State rural highway system connecting Kailua-Kona, Keahole Airport, and Kawaihae in the North Kona area. Queen Kaahumanu Highway is a Class I State Highway, a main traffic artery of high type pavement, bordered by stabilized shoulders. The design speed for the highway within a 350-foot right-of-way bordering the project site is 70 miles per hour. The estimated average daily traffic count along this highway is 5,000 vehicles at Keahole Airport. Traffic volume along Queen Kaahumanu Highway has been steadily increasing due to the proliferation of resort developments along the Kona Coast.

Access to the Awake's project will be provided through an at-grade connection on Queen Kaahumanu Highway and roadway improvements within an easement to be obtained through State of Hawaii property bordering the highway. Queen Kaahumanu Highway is a rural highway with controlled access. Although the planned connection to the highway was previously designed by the State Department of Transportation (DOT) as a permitted access point, in January, 1983 the access point was relocated 3,000 feet to the north. To connect the Awake access road to Queen Kaahumanu Highway, therefore, the developer will be required to negotiate with the DOT to restore the previously designated access point or to establish a new one capable of serving the development.

10



**Proposed Access Point
AWAKEE**

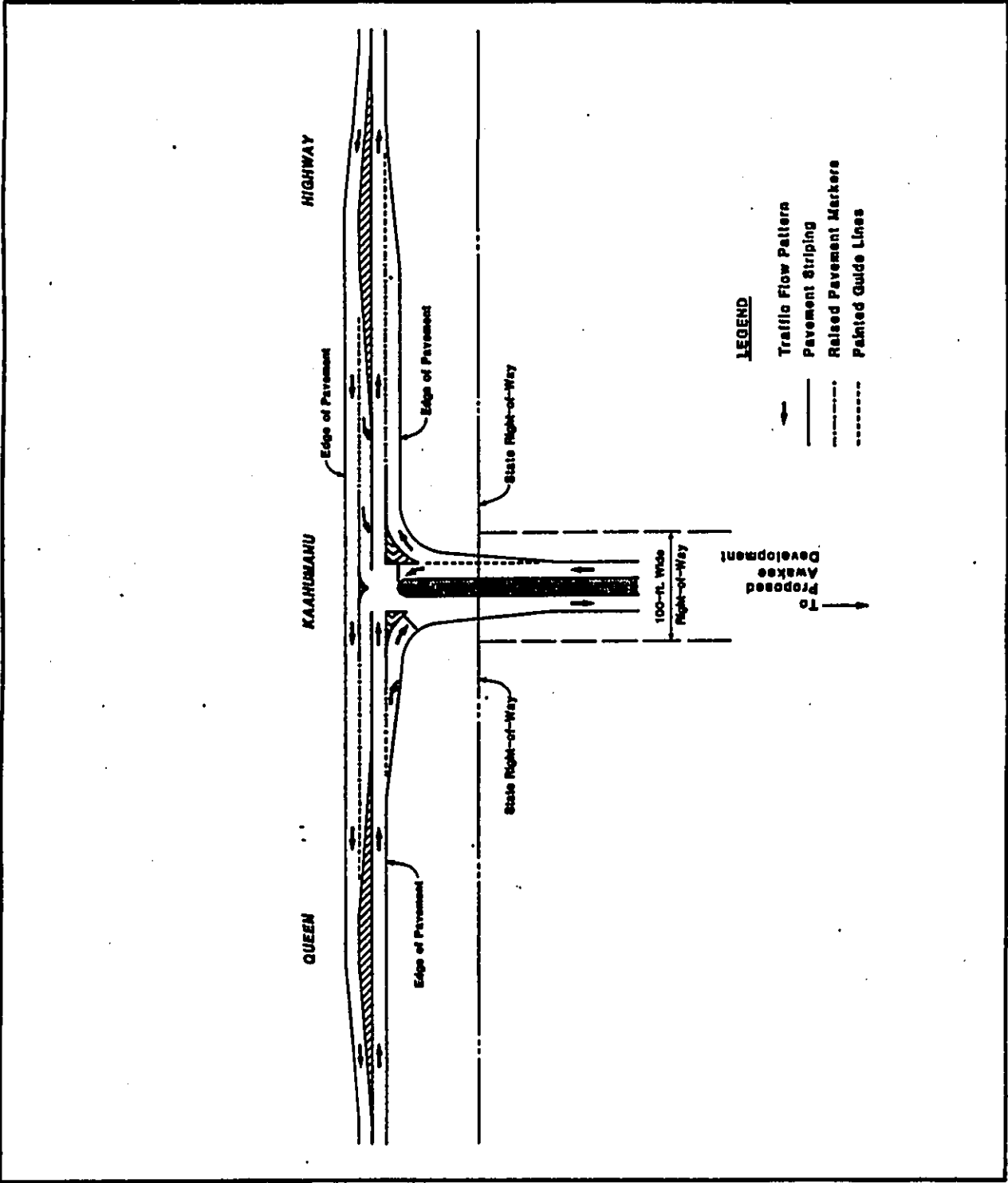
Figure: 2
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HONOLULU

To assure that the efficiency, speed, safety and traffic capacity of Queen Kaahumanu Highway is maintained, the Awa'e access road intersection will be designed to properly channel traffic entering and leaving the development through acceleration and deceleration lanes, and a left turn storage lane. In addition, protective at-grade, left-turn merging lane for traffic entering the north bound lane of the highway from the development will be provided, if warranted (see Figure 3).

Appropriate regulatory and warning signs will be posted at suitable locations along the highway to guide motorists and promote traffic safety.

The roadways and streets serving the project area can be described in three classifications: major, secondary, and minor. Each classification is designed to provide sufficient right-of-way width to accommodate improvements such as pavement, planting, street lights, and utilities, as appropriate.

Major streets are traffic arteries, designed to provide safe movement of through traffic in the most expeditious manner. Approximately 1,800 feet of roadway from the Awa'e project site to the Queen Kaahumanu Highway is proposed as a major street with a 100-foot right-of-way width, subject to review and concurrence of the State of Hawaii and concerned County agencies. The proposed typical roadway section is shown in Figure 4.



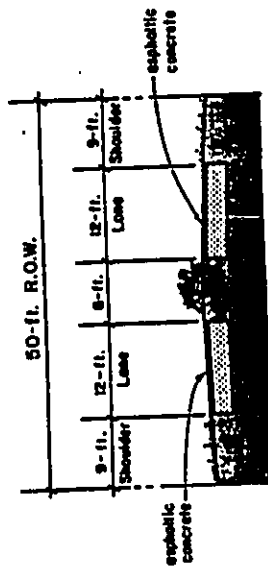
Schematic Traffic Channelization Plan

AWAKEE

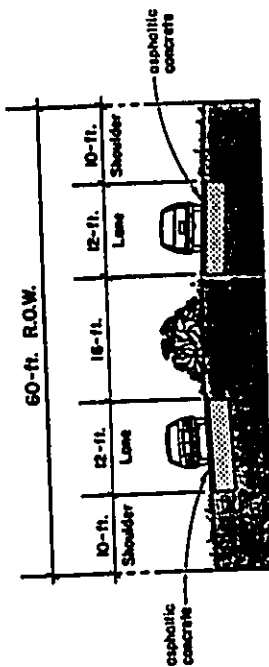
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Figure: 3

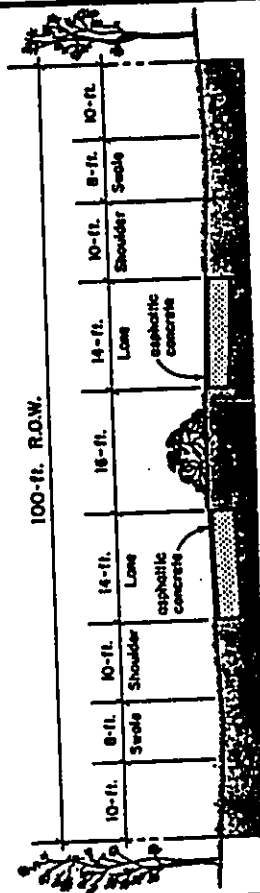
Not To Scale



50-ft. ROAD - TYPICAL SECTION



60-ft. ROAD - TYPICAL SECTION



100-ft. ROAD - TYPICAL SECTION

Typical Roadway Sections
AWAKEE

Figure: 4

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 HONOLULU, HAWAII 96813

Secondary streets are collector streets which collect and distribute traffic to and from major streets serving clusters of residential and business developments. Approximately 9,200 feet of the roadway within the Awake'e project site will be designed as secondary streets as comprising the main traffic circulation corridor. A roadway section having a 60-foot right-of-way width is proposed, as shown in Figure 4.

Minor streets are local streets providing access to individual residences, commercial areas or abutting properties. Approximately 1,600 feet of roadway in the Awake'e development will be designed as minor streets. The proposed roadway typical section for minor streets with a 50-foot right-of-way is as shown in Figure 4.

The proposed design speeds for the three roadway classifications serving the Awake'e project are as follows:

- Major street50 miles per hour
- Secondary street40 miles per hour
- Minor street30 miles per hour

The design vehicle for major streets, and secondary streets is the WB-50 (tractor and semitrailer vehicles), while the single unit vehicle (su) is designated for minor streets.

All roadways will have minimum 12-foot wide lanes with varying shoulder widths as shown on the respective proposed roadway sections in Figure 4.

A schematic roadway layout for the proposed development is shown on Figure 5. Other proposed roadway and street design criteria for the Wake's project are shown on Table 1.

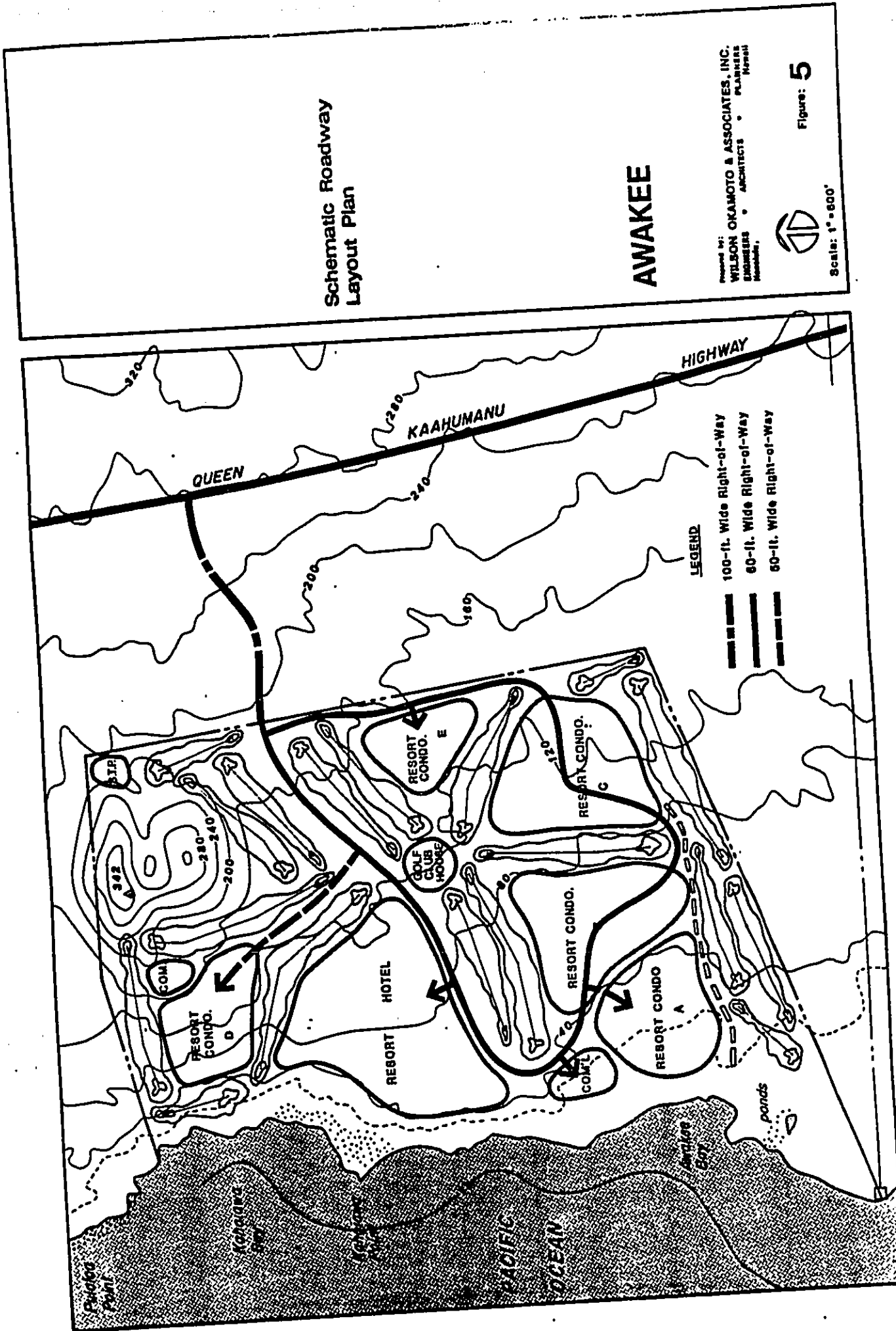


TABLE 1
PROPOSED ROADWAY DESIGN CRITERIA FOR AWAKEE PROJECT

	Major Street/ Secondary Arterial	Secondary/ Collector Street	Minor/Local Street
1. Design Speed (mph):	50	40	30
2. Profile Grade (%):			
a. Desirable	3	6	--
3. Alignment - Horizontal Curves:			
a. Sight Distance (Ft.) Min.	750	275	250
b. Minimum Radius (Ft.)	1800	550	300
4. Street Characteristics:			
a. Lane Width (Ft.)	14	12	12
b. Shoulder Width (Ft.)	10	8	8
c. R/W Width (Ft.)	100	60	50
d. Design Level Service	C	C	--
e. Design Vehicle Classification	WB-50	WB-50	SU

OTHER PROPOSED ROADWAY DESIGN CRITERIA

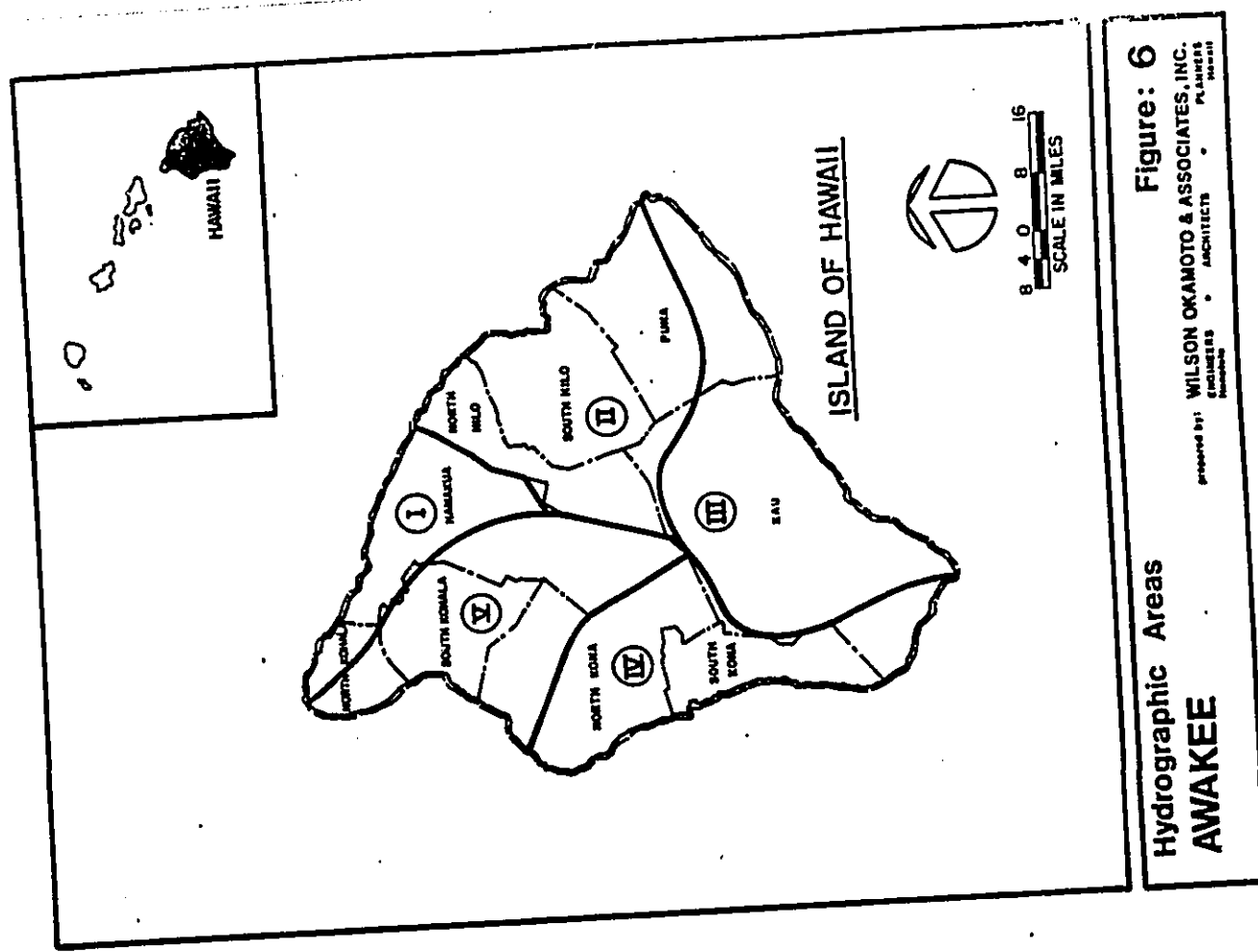
1. Grades:
 - a. Maximum: 15% (Minor only)
 - b. Minimum: 0.4%
2. Superelevation:
 - a. "e" Max.: 8%
 - b. Normal Crown: 2%
 - c. Pavement Type: AC
 - d. Traffic Volumes (Development)
 1. ADT: 5,800
 2. Truck Volume: 2%
 3. Design Hourly Volume: 600

VI. WATER RESOURCES AND SYSTEM

The Water Master Plan for the Island of Hawaii, dated December, 1980, divides the Island of Hawaii into five hydrographic areas corresponding to the Island's major drainage basins as shown in Figure 6. The County's municipal water systems are grouped accordingly. Water availability studies have been conducted by the State in each of these hydrographic areas. The Awake's project lies in the northwestern extent of the North Kona Hydrographic area.

The Awake's project is located on the leeward side of the island, along the shoreline bordering the northwestern slope of the Hualalei volcano. This part of the island is sheltered by Mauna Loa and Mauna Kea from the tradewind rainfall. Hence, much of the rainfall received is of the convective-type which amounts to between 75 and 100 inches annually and occurs in a belt at altitudes between 1,200 and 3,500 feet. A lower elevations, annual rainfall is between 15 and 20 inches.

Geologic characteristics of the project area generally are associated with the Hualalei Volcanic series, comprised of basaltic lava flows and other rocks and materials. The lava flows are highly permeable and contains water at sea level.



In a 1968 Preliminary Report on the Water Resources of the Kona Area, the United States Geological Survey described the occurrence of basal water throughout the Kona area in lava flows near sea level. The basal aquifer is believed to possess the largest water supply in the Kona area, its extent ranging from a few thousand feet to a few miles inland.

The report also suggested that small quantities of perched ground water may underlie the slopes of Hualalei. The possible existence of dike water in small amounts at greater depths was also indicated. In spite of investigations and explorations conducted in this area over the past few years, much remains to be studied, verified and confirmed.

The closest developed water source south of the project is the North Kona system which consists of several wells and a shaft at Kahaluu. The cumulative capacity of this source is 10.4 mgd. Presently, all available water in the North Kona system is committed. Moreover, further development of this system may be limited by the quantity of suitable water that may additionally withdrawn from the aquifer in Kahaluu. The northern extent of the North Kona water system terminates at the Keahole Airport area where an existing 12-inch waterline provides service for the airport facilities.

There are three existing wells located approximately three miles mauka of the project site that are privately owned or used (see Appendix D). One well is located at elevation 1,580 feet while the other two are located at elevation 1,350 feet. The three wells are drilled to elevation -67 feet to -111 feet elevation. Chloride levels of the water range from 38 mg/L to 90 mg/L.

While the Department of Water, County of Hawaii has continually sought to develop new sources to meet the increasing demands in the West Hawaii region, major water source development is a long-term venture. Therefore, a new private water source will be developed for the Awakee development. Well(s) at the 1,400-1,600 foot elevation will be drilled into the basal aquifer. The hydraulic gradient of the basal aquifer varies from half a foot to three feet per mile inland in this region.

Permits required for drilling the well include the State Department of Land and Natural Resources' Well Drilling Permit, required for any well drilled in the State, and the Department of Health's Drinking Water Permit, governing the activation of potable water sources. Other permits required for developments in general would also be applicable, depending on the location of the well. For example, the State Conservation District Use Application would be required if the well is drilled in the State Conservation District. County level review of the water source for the Awakee development would be toward

assuring that the source will adequately meet the needs of the development. This review would be conducted by the Department of Water Supply in coordination with the County Planning Department's processing of the subdivision permit for the development.

Water requirements for the Waialeale development were based on the Generalized Resort Site Development Simulation contained in Appendix C. While the Water System Standards of the County of Hawaii may also be used to estimate requirements, the more conservative site development simulation was used for deriving estimates, as shown in Table 2.

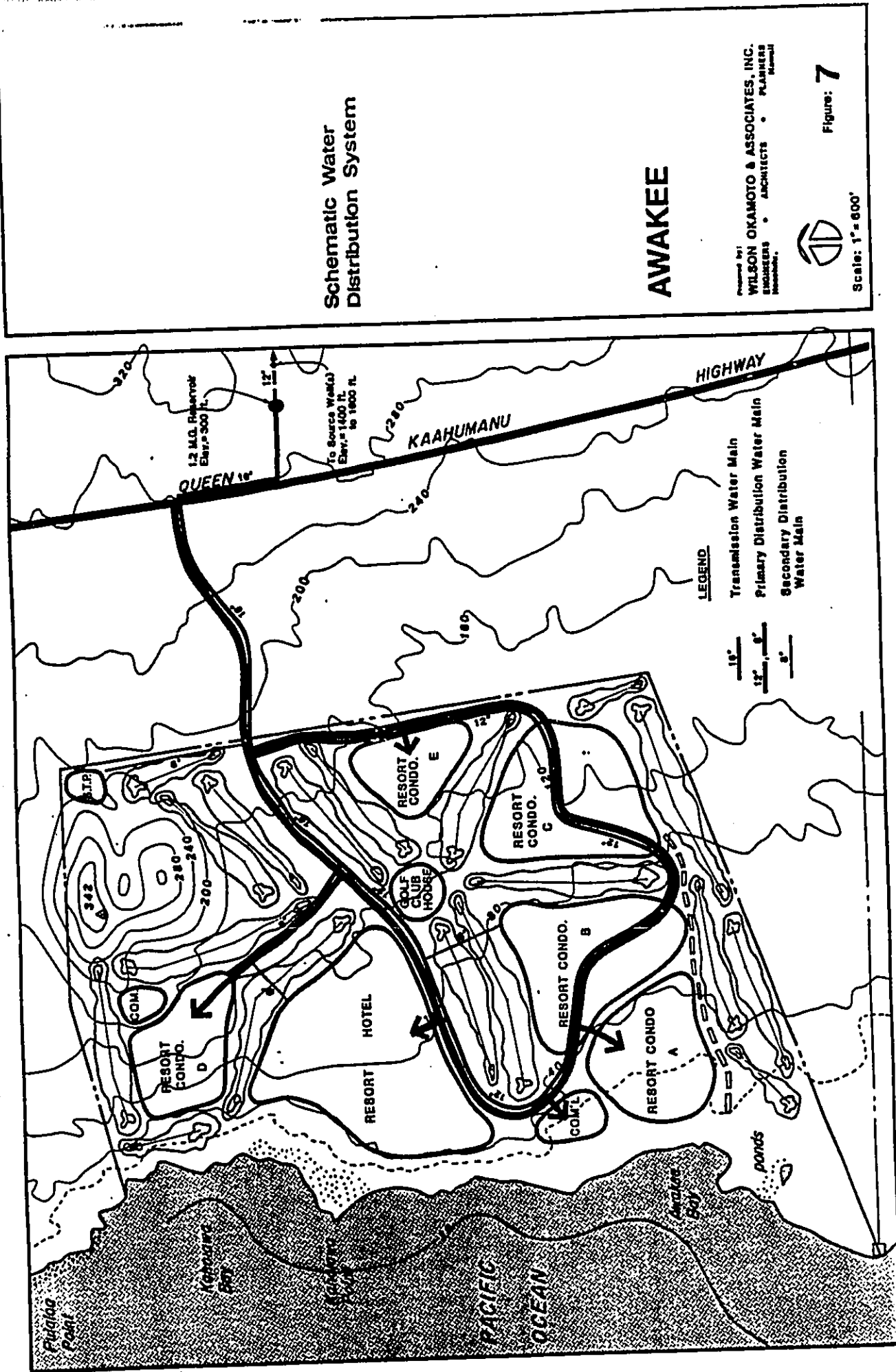
TABLE 2

Use	ESTIMATED PROJECT WATER REQUIREMENTS		
	Average Daily Demand (gpd)	Max. Daily Demand (gpd)	Peak Hourly Demand (gpd)
Hotel	288,000	432,000	1,440,000
Condo	373,500	560,250	1,867,500
Commercial	35,150	52,725	175,750
Recreational	12,500	18,750	62,500
Other	3,500	5,250	17,500
Totals	712,650	1,068,975	3,563,250

In formulating a preliminary engineering design, the guidelines set forth in the Water System Standards of the County of Hawaii were applied as presented in Appendix E.

Based on the estimated water system requirements, a preliminary water system plan was developed, as shown in Figure 7. The plan will require additional engineering details which will become available during the design phase. The basic components of the water system include:

1. Source well(s) at 1,400 - 1,600 feet elevation.
2. Transmission main from source wells to storage reservoir.
3. 1.2 MG storage reservoir at elevation 300 feet.
4. 3,000 feet of transmission main from storage reservoir to project site.
5. On-site water distribution system supplied by a 16" transmission main from the storage reservoir running along the primary resort arterial roadway. Primary distribution mains ranging from 8" to 12" branch off of the 16" transmission main to provide water to the main blocks of resort hotels, resort condominiums and commercial areas. Secondary distribution mains ranging from 6" to 8" branch off of the primary distribution mains and the transmission main to serve individual buildings and building complexes.



VII. SANITARY SEWER SYSTEM

Presently, there are no sewerage facilities in the Awake'e area. The closest public sewerage system is a small 0.04 million gallon per day (mgd) packaged treatment plant maintained by the State of Hawaii at the Keahole Airport to serve airport operations. The system provides secondary treatment, with effluent disposed in seepage pits. To the south of Awake'e, in the vicinity of the old Kona Airport, the Kailua-Kona municipal sewage treatment plant, operated and maintained by the County of Hawaii, has a capacity of 1.0 mgd. Major components of this secondary treatment facility include a 20-inch influent pipe, comminution channel, grit chamber, aeration and settling tanks, chlorine contact tank, effluent polishing reservoir. Effluent from the Kailua-Kona Plant is used to irrigate a County park near the old Kona Airport. Excess effluent is stored in a holding pond with overflow diverted into an injection well. It has been reported that the Kailua-Kona Sewage Treatment Plant is approaching its capacity of 1.0 mgd, with flows estimated at 0.6 to 0.7 mgd in 1981.

A new wastewater treatment facility with a design capacity of 2.8 mgd is currently being designed for a site near the Honokohau Harbor. This future treatment facility will include an ocean outfall extending 2,000 feet offshore, terminating at a depth of

500 feet. The distance between the Awake'e project site and the future sewage treatment facility is approximately 10 miles, making a hook-up economically unfeasible.

For the Awake'e development, therefore, a local self-contained sewerage system comprised of collection lines, force mains, treatment plant, disposal system, and pertinent appurtenances is considered appropriate. The general design for this system will be based on the estimation of wastewater generated, sewerage hydraulics, and treatment and disposal alternatives.

The volume of wastewater to be treated was estimated and based on the sum of water demand by visitors and employees developed through the Generalized Resort Development Site Simulation presented in Appendix C. A total wastewater flow of approximately 621,250 gpd was estimated for planning purposes, as shown in Table 3.

TABLE 3
WASTEWATER GENERATION ESTIMATES

Land Use	Area	Estimated Wastewater Generated
Resort Hotel	33 acres	204,000 gpd
Resort Condo	79 acres	373,500 gpd
Commercial	5 acres	27,750 gpd
Golf Course	166 acres	12,500 gpd
Other	66 acres	3,500 gpd
	TOTAL	621,250 gpd

The hydraulics of the sewer system provide for gravity flow toward central collection areas, from where a series of pump stations will lift the sewage to the treatment plant. The gravity line requirements are based on achieving a minimum full flow velocity of 2.0 feet per second and are designed using Manning's Formula, as presented in Appendix F. An 8-inch diameter pipe is the minimum required for a sewer main. Sewer pipes and appurtenances will require sufficient ground cover or special protection.

Pump or lift stations can be built-in-place or factory-built type. A stand-by unit for back-up capabilities is required for each station. Site and other improvements for the station may include grading, driveways, security fencing, and control housing.

The sewage treatment needs of the Awakee Development can be met by several design alternatives. Alternative treatment methods may include conventional activated sludge, contact stabilization, or aerated lagoons. Each of these methods has its advantages and disadvantages which should be further evaluated in the design phase.

In selecting a design for the sewage treatment plant, several factors should be considered. First, reliability and simplicity are important as skilled operators are scarce and replacement parts for equipment may be difficult to obtain. Second, fluctuation in flow and variation in the composition of the waste water should be

anticipated in resort-type developments such as Awakee. Third, options for facility expansion should be considered to accommodate additional loads as development proceeds.

Disposal of treated effluents can be accomplished through several alternative methods. Injection wells, if found environmentally acceptable for this area, would likely be effective given the highly permeable volcanic formation of the region. Evapotranspiration could also be considered, given the low rainfall and high year-round temperature of the area.

Re-use of treated effluent for irrigation as a means of disposal appears appropriate in view of the water shortage concerns in this arid area. This method of disposal is an acceptable practice and, in fact, is gaining popularity in many water-deficient areas. The Department of Health, State of Hawaii sets forth basic guidelines using treated effluent in irrigation. The level of treatment required to re-use treated wastewater for irrigation in public areas (e.g. parks, golf course, etc.) is secondary treatment with disinfection. Filtration of treated effluent is often included in the process to minimize clogging of irrigation equipment.

The recommended sanitary sewer system for the Awakee project is as shown on Figure 8. The system's herring-bone layout consists of gravity sewers and sewage lift stations (pressure sewers). Gravity

Schematic Sewer
Collection System

AWAKEE

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Honolulu, Hawaii


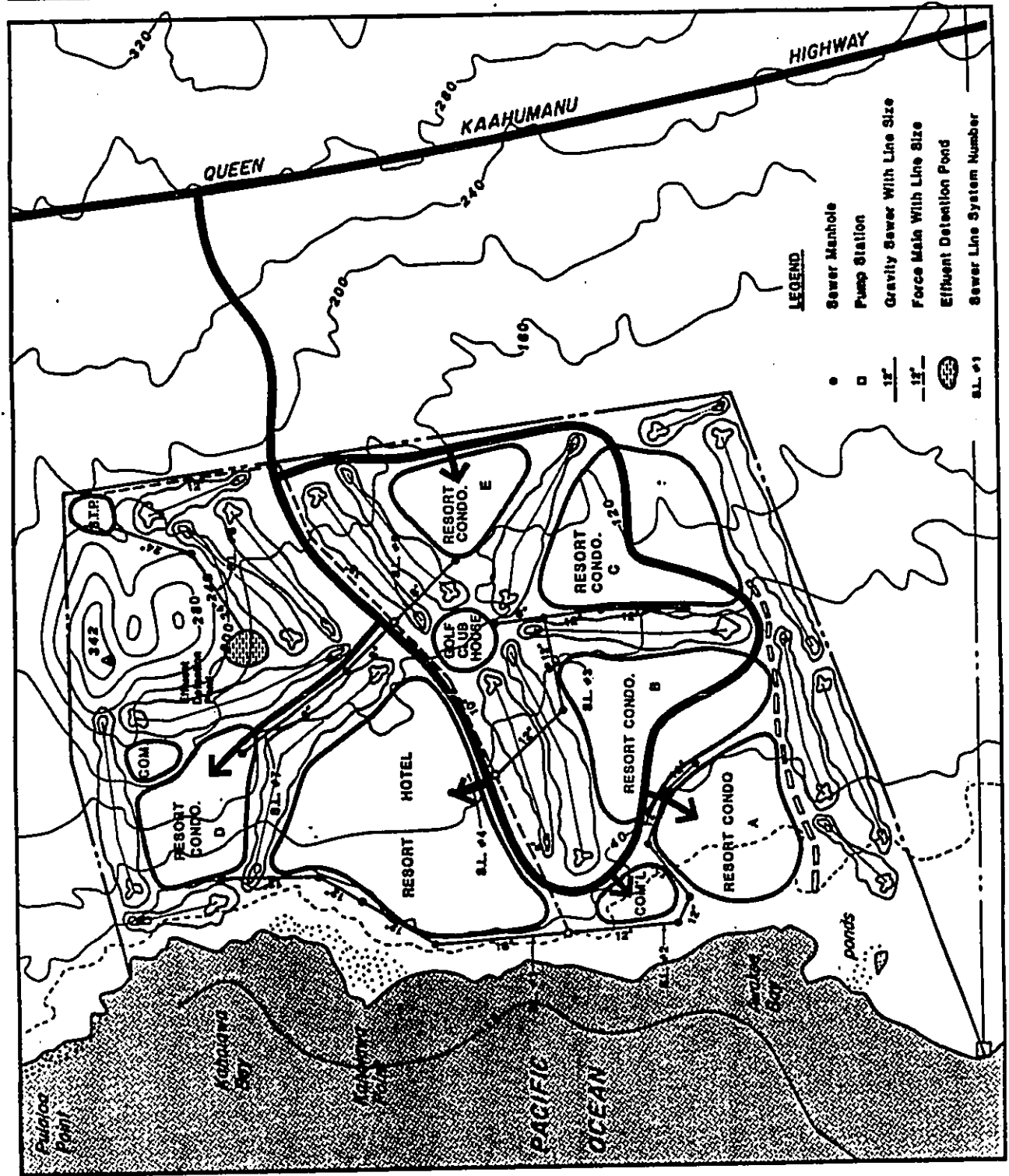


Figure: 8

Scale: 1"=600'



sewer lines from the main blocks of resort hotels, resort condominiums, and commercial areas are directed toward a pressure sewer system located along the primary resort arterial roadway. Collected sewage is transported under pressure to the treatment plant located near the Kuli cinder cone. Treated effluent is conveyed by gravity flow to a detention pond on the southwest side of the cinder cone, ultimately for irrigation use.

VIII. SOLID WASTE DISPOSAL

The volume of solid waste to be generated by the Awa'ee development can be estimated using a population projection and a municipal area load factor of 5 lb./capita/day. However, because the Awa'ee development is a resort that will accommodate a highly transient population, the waste generation factor can be adjusted to 3.5 lb./capita/day for residents and overnight visitors, and 1.0 lb./capita/day for day visitors. Using projected resident and visitor populations formulated in the Generalized Resort Site Development Simulation for the full development configuration (see Appendix C), the estimated quantity of solid waste generated by the Awa'ee development will be approximately 8.5 tons per day or approximately 3,000 tons annually.

It is estimated that for the next 2-3 years, the requirements for solid waste disposal can be met by the sanitary landfill at Kealahou in Kailua. When this municipal landfill reaches its capacity, a new landfill site at Puuanahulu will be opened. The Puuanahulu landfill is expected to serve the needs of the area for many years. Based on this available capacity, waste disposal methods other than disposal at the landfill does not appear economically or environmentally feasible.

Of the several alternatives for solid waste disposal, sanitary landfills or dump sites pose fewer disadvantages and environmental

impacts than the other alternatives. Incineration, which involves controlled burning and disposal of the ash at a much reduced volume than the initial waste has the disadvantage of high construction costs associated with air pollution control measures required to meet environmental regulations. Other methods not generally used in Hawaii are shredding, composting and bailing. These alternatives reduce the volume of waste but ultimately require another form of disposal.

IX. ELECTRIC POWER

Hawaii Electric Light Company, Ltd. (HELCO) provides power for the North Kona and South Kohala areas. Presently, overhead power lines run along a corridor approximately 3,000 feet mauka of Queen Kaahumanu Highway. Power for the Awa'e project will be tapped from this existing system. Power supply lines will probably run along the proposed easement through the State of Hawaii property.

Inasmuch as the power lines would need to cross Queen Kaahumanu Highway to reach the project site, their installation must be coordinated with the State Department of Transportation (DOT) during the design phase. Moreover, a permit will be required from the DOT Highways Division for installation of the utility lines within a State right-of-way. It is generally understood that the lines will be required to traverse the highway right-of-way underground. The extent beyond the right-of-way which the lines must remain underground will be coordinated with the DOT.

Preliminary consultation with HELCO indicates that a substation will be required to service that proposed development. The developer will be required to provide a lot suitable for it, most likely on the project site. Power distribution lines serving the development from the substation will probably be placed underground in concrete encased ducts within the roadway right-of-way. Further discussion of

substation requirements, installation of power lines, cost estimates and refund schedules will be provided to the developer by HELCO during the design phase.

X. TELEPHONE

Overhead telephone lines share the same utility corridor with the HELCO Facilities. Telephone service can be supplied to the project utilizing HELCO poles or by sharing direct burial trenches and concrete encased ducts used for the electric lines.

XI. COST ESTIMATES

Estimates for the infrastructure improvements are based on supporting facilities only. Infrastructure within development sites proposed for such as hotels, condominiums and commercial or business centers are not included.

Estimated costs for site preparation include only clearing, grubbing, proof rolling and mass grading of the site. The cost of import materials for landscaping is not included.

Roadway construction costs encompass access roads up to development sites but exclude roadways within those sites.

Estimated costs for the water system include those for developing a water source at an approximate elevation 1,400-1,600 feet and providing a storage reservoir at elevation 300 feet. Also included are costs for the transmission and distribution mains up to the development sites. Costs for water systems within the development sites are excluded.

Sewage systems cost include the treatment plant, detention pond, pump stations, force mains, and gravity collection sewerlines from the development sites. Costs for sewer systems within the development sites are excluded.

Drainage cost estimates include drainage improvements outside of the individual development sites.

The total estimated project cost is \$38,090,000, in 1986 dollars.

<u>ON-SITE COSTS:</u>	
Site Preparation (excluding golf course)	\$ 3,110,000
Golf Course (excluding clubhouse and maintenance facilities)	\$10,300,000
Roadways:	
60 Feet Road Right of Way	\$ 2,310,000
50 Feet Road Right of Way	\$ 370,000
Water Distribution System	\$ 2,410,000
Sewer System:	
Gravity Sewers	\$ 2,660,000
Force Mains	\$ 1,000,000
Sewage Pump Stations	\$ 700,000
Sewage Treatment Plant & Access Road	\$ 2,130,000
Sewage Effluent Detention Pond	\$ 780,000
Drainage	\$ 900,000
Erosion Control	\$ 200,000
Electrical & Telephone	\$ 3,000,000
TOTAL ON-SITE COSTS	\$29,870,000
<u>OFF-SITE COSTS:</u>	
Highway Connection	\$ 500,000
100 Feet Road Right-of-Way	\$ 670,000
Water Storage Reservoir	\$ 2,530,000
Water Source Development	\$ 4,520,000
TOTAL OFF-SITE COSTS	\$ 8,220,000
TOTAL PROJECT COST	\$38,090,000

REFERENCES

- County of Hawaii Department of Water Supply. Water System Standards. State of Hawaii. Volume I. 1985.
- Helber, Hastert, Van Horn & Kimura Planners. Awahee Resort North Kona Hawaii Full Development Configuration. Generalized Resort Site Development Simulation. October 24, 1986.
- R.M. Towill Corporation. Hydrology Study for Kailua-Kawahae Road, Section III Keahole to Hapuna, Districts of North Kona, South Kohala, Island of Hawaii. May 12, 1971.
- R.M. Towill Corporation. Hydraulic Report and Computations for Kailua-Kawahae Road, Section III Keahole to Hapuna, Phase II (Keahole to Anaehoomalu), District of North Kona and South Kohala, Island of Hawaii. February 1972, Revised: March 1972.

APPENDICES

- Appendix A: Erosion (Severisty Rating Number) Calculations
Appendix B: Runoff (Rational Method) Calculations
Appendix C: Generalized Resort Site Development Simulation
Appendix D: Well Data for Existing Well Nos. 4559-01, 4658-01, 4658-02
Appendix E: Water System Calculations
Appendix F: Sewer System Calculations

SEVERITY RATING NUMBER METHODOLOGY

The severity rating number is defined by the following equation:

$$H = (2FT + 30) AE$$

where H = severity rating number;

F = Unit factor for potential damage to areas downslope and downstream from the site;

T = Time duration of the project in years, from clearing or first disturbance to completion of all construction and protective measures;

D = Unit factor for potential sediment damage to coastal waters;

A = Area of disturbance, in acres; and

E = Soil loss rate in tons per acre per year, to be determined by use of the Universal Soil Loss Equation.

The value of "E" in the above equation is determined by the Universal Soil Loss Equation (USLE) which has the following form:

$$E = RK (LS)(CP)$$

where E = Annual soil loss in tons per acre.

R = Factor representing the total erosive effect of an average year's rainfall.

K = Soil erodibility factor. Values have been established for all soil series in Hawaii from maps published in the report Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai and Lanai, State of Hawaii, U.S. Dept. of Agriculture, Soil Conservation Service.

(LS) = Factor for length and steepness of slope combined. Length of slope (L) and percent slope (S) are to be determined by standard engineering methods from topographic maps for the site.

(CP) = Combined factor for the protective effect of ground cover and mechanical or engineering erosion control measures. Selection of the value of this factor will require analysis of the grading and construction schedule and the erosion control plan for the project.

APPENDIX A EROSION (SEVERITY RATING NUMBER) CALCULATIONS

RECEIVED AS FOLLOWS

WILSON OKAMOTO & ASSOCIATES
ENGINEERS, ARCHITECTS AND PLANNERS

ARCHITECTURAL
STRUCTURAL
CIVIL
PLANNING

COMPUTED BY MIM PROJECT 2671-01
CHECKED BY 9/25/86 SHEET NO. 4 OF 4 SHEETS
DATE 9/25/86 EROSION HAZARD

SOIL TYPE	E-VALUE	SEVERITY NO. 245	SEVERITY NO. 10AC
FLV	12.8	29	493
FLV	0.77	27	136
TCL	14.0	243	2404

ALL SEVERITY RATING NUMBERS ARE KEEL BE

LOW THE STANDARD VALUE OF:

50,000 FOR HAWAII

WILSON OKAMOTO & ASSOCIATES
ENGINEERS, ARCHITECTS AND PLANNERS

ARCHITECTURAL
STRUCTURAL
CIVIL
PLANNING

COMPUTED BY MIM PROJECT 2671-01
CHECKED BY 9/25/86 SHEET NO. 3 OF 4 SHEETS
DATE 9/25/86 EROSION HAZARD

(B) FOR FLV	ASSESSING CONDITION OF EXHIBIT
CP = 0.15	APPLIES
$E = (32)(0.10)(1.6)(0.15) = 0.77$	
FOR 2 ACRES	
$H = (24)(0.7) + 3(4)(2)(0.77)$	27
FOR 10 ACRES	
$H = (24)(0.7) + 3(4)(10)(0.77)$	36

(C) FOR TCL

R = 32	(POSTULATING WORST CASE)
K = 0.20	(EXPLANATION OF H'S VALUE FOR
S = 15.0	PRO SOIL TYPE APPLIES HERE (PO)
CP = 0.15	APPLIES
$E = (32)(0.20)(15)(0.15) = 36$	
FOR 2 ACRES	
$H = (24)(0.7) + 3(4)(2)(36)$	493
FOR 10 ACRES	
$H = (24)(0.7) + 3(4)(10)(36)$	2404

PRELIMINARY STORM DRAINAGE ASSUMPTIONS AND CALCULATIONS

A. Individual development sites less than 100 acres. Therefore use $T_m = 10$ years.

B. Rational Method: $Q = CIA$

where Q = flow rate in cubic feet per second;
 C = runoff coefficient;
 I = rainfall intensity in inches per hour for duration equal to time of concentration; and
 A = drainage area in acres.

Other hydrologic criteria used in the runoff calculation are:

- Recurrence Interval (T_m) = 10 years
- Intensity of 1-hour rainfall = 1.75 inches
- Runoff coefficient:
 - Infiltration - high = 0.02
 - Relief - rolling = 0.01
 - Vegetal cover - good = 0.03
 - Development type - hotel/apart. = 0.45
- Overland flow = Plate 3 of County Storm Drainage Standard
- Rainfall intensity for known duration = plate 4 of County Storm Drainage standard.

C. Runoff Coefficients:

Post-development -

Infiltration	-----	high	= 0.02
Relief	-----	rolling	= 0.01
Vegetal cover	-----	good	= 0.03
Development type	-----	hotel/apart.	= 0.45
			<u>0.51</u>

D. Time of Concentration:

Using Table 2, "Approximate Average Velocities of Runoff for Calculating Time of Concentration" in Storm Drain Standards, DPM, County of Hawaii, assume overland flow to be grass and pavements with average slopes of 4-7%, average velocity = 8 fps. Time of concentration based on overland flow path of average 600 feet lot length is 600 ft./8 fps = 75 seconds = 1.3 minutes.

E. Rainfall Intensity:

Intensity of 1-hour Rainfall = 1.75 inches.
 Design rainfall intensity = 5.5

APPENDIX B RUNOFF (RATIONAL METHOD) CALCULATIONS

F. Calculation of runoff quantities:

Resort Hotel =
Site 1 = $0.51 \times 5.5 \times 33 = 93 \text{ cfs.}$

Resort Condominium =
Site A = $0.51 \times 5.5 \times 17 = 48 \text{ cfs.}$
Site B = $0.51 \times 5.5 \times 20 = 56 \text{ cfs.}$
Site C = $0.51 \times 5.5 \times 21 = 59 \text{ cfs.}$
Site D = $0.51 \times 5.5 \times 11 = 31 \text{ cfs.}$
Site E = $0.51 \times 5.5 \times 10 = 28 \text{ cfs.}$

Commercial Site:

Resort Commercial = $0.51 \times 5.5 \times 3 = 8 \text{ cfs.}$
Restaurant = $0.51 \times 5.5 \times 2 = 6 \text{ cfs.}$

Recreation Facilities and other areas to remain open as pre-development condition.

C-35

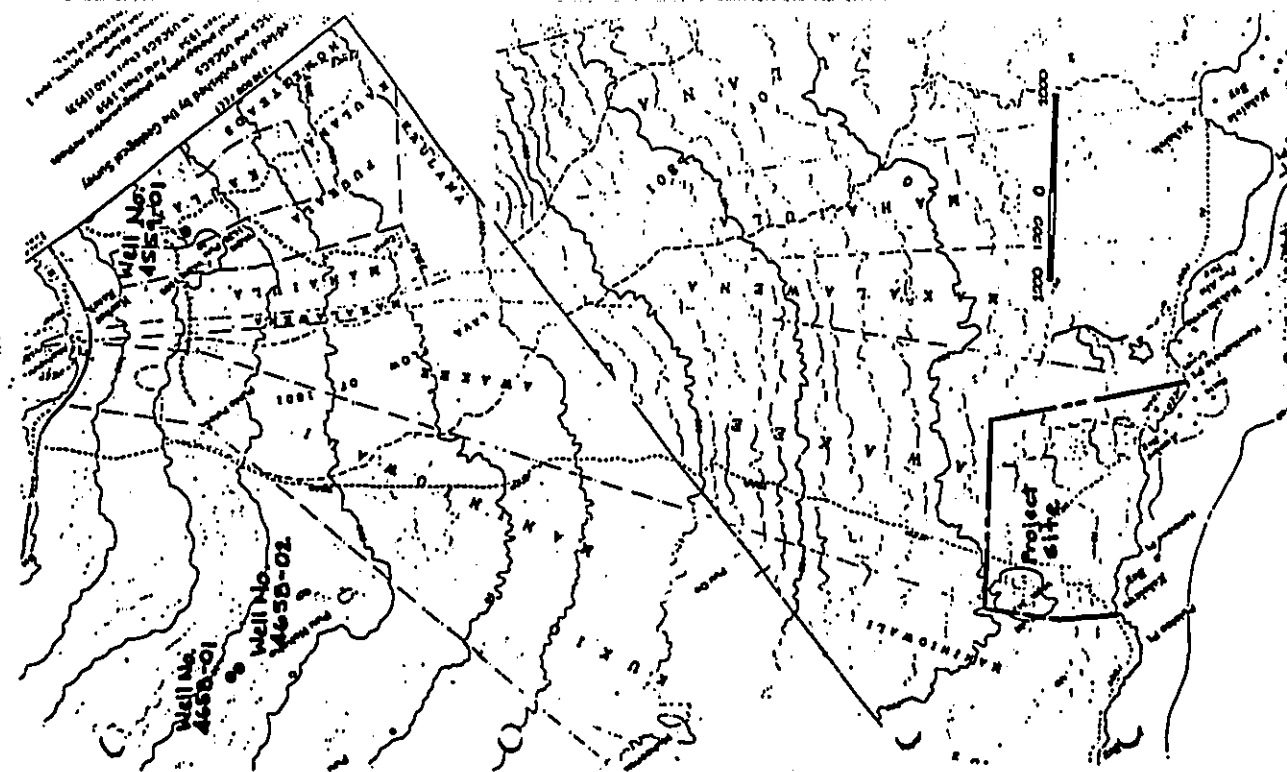
[illegible]

PROJECT REPORT NAME: 01/2/94
FULL DEVELOPMENT CONSTRUCTION

Facility	Area (Acres)	# of Units	Units / acre	Building Area (Sq Ft) per Unit	Building Area (Sq Ft) Total	Building Height in Stories	Parting Wall: Required	Site Area (Acres) Sq Ft	Landscaping: % of Site	Landscaping Area (Acres)	Visitors per Unit	Visitor Population	Landscaping per Unit
HOTELS	100.00	100	1.00	1700	170000	4	000	100000	1	200	1.00	100	1.1
Total Hotels	100.00	100	1.00	1700	170000	4	000	100000	1	200	1.00	100	1.1
RESIDENTIAL	100.00	100	1.00	1700	170000	4	000	100000	1	200	1.00	100	1.1
RESIDENTIAL, 10	10.00	10	1.00	1700	17000	4	000	10000	1	20	1.00	10	0.1
RESIDENTIAL, 20	20.00	20	1.00	1700	34000	4	000	20000	1	40	1.00	20	0.2
RESIDENTIAL, 30	30.00	30	1.00	1700	51000	4	000	30000	1	60	1.00	30	0.3
RESIDENTIAL, 40	40.00	40	1.00	1700	68000	4	000	40000	1	80	1.00	40	0.4
RESIDENTIAL, 50	50.00	50	1.00	1700	85000	4	000	50000	1	100	1.00	50	0.5
RESIDENTIAL, 60	60.00	60	1.00	1700	102000	4	000	60000	1	120	1.00	60	0.6
RESIDENTIAL, 70	70.00	70	1.00	1700	119000	4	000	70000	1	140	1.00	70	0.7
Total Res Residential	100.00	100	1.00	1700	170000	4	000	100000	1	200	1.00	100	1.1
COMMERCIAL	100.00	100	1.00	1700	170000	4	000	100000	1	200	1.00	100	1.1
RESTAURANT	10.00	10	1.00	1700	17000	4	000	10000	1	20	1.00	10	0.1
Total Commercial	100.00	100	1.00	1700	170000	4	000	100000	1	200	1.00	100	1.1
RECREATION FACILITIES	100.00	100	1.00	1700	170000	4	000	100000	1	200	1.00	100	1.1
BEACH SET BACK	10.00	10	1.00	1700	17000	4	000	10000	1	20	1.00	10	0.1
Total Recreation	100.00	100	1.00	1700	170000	4	000	100000	1	200	1.00	100	1.1
OTHER	100.00	100	1.00	1700	170000	4	000	100000	1	200	1.00	100	1.1
STP	10.00	10	1.00	1700	17000	4	000	10000	1	20	1.00	10	0.1
PUR HOTEL	10.00	10	1.00	1700	17000	4	000	10000	1	20	1.00	10	0.1
BEACH SET BACK	10.00	10	1.00	1700	17000	4	000	10000	1	20	1.00	10	0.1
Total Other	100.00	100	1.00	1700	170000	4	000	100000	1	200	1.00	100	1.1
GRAND TOTAL	100.00	100	1.00	1700	170000	4	000	100000	1	200	1.00	100	1.1

PROJECT REPORT NAME: 01/2/94
FULL DEVELOPMENT CONSTRUCTION

Facility	Population	Water Demand (Gal / Day) Visitor	Water Demand (Gal / Day) Visitor	Water Demand (Gal / Day) Employee	Water Demand (Gal / Day) Employee	Water Demand (Gal / Day) Air Con	Total Water Demand (Gal / Day)	Sanitation Water Demand (Gal / Day)	Sanitation Water Demand (Gal / Day)	Electricity Demand (KW)	Telephone Poles Demand	Solid Waste Production (Tons/Day)
HOTELS	100	100	17000	0	2000	0	20000	0	0	0	100	0.00
Total Hotels	100	100	17000	0	2000	0	20000	0	0	0	100	0.00
RESIDENTIAL	100	100	17000	0	2000	0	20000	0	0	0	100	0.00
RESIDENTIAL, 10	10	10	1700	0	200	0	2000	0	0	0	10	0.00
RESIDENTIAL, 20	20	20	3400	0	400	0	4000	0	0	0	20	0.00
RESIDENTIAL, 30	30	30	5100	0	600	0	6000	0	0	0	30	0.00
RESIDENTIAL, 40	40	40	6800	0	800	0	8000	0	0	0	40	0.00
RESIDENTIAL, 50	50	50	8500	0	1000	0	10000	0	0	0	50	0.00
RESIDENTIAL, 60	60	60	10200	0	1200	0	12000	0	0	0	60	0.00
RESIDENTIAL, 70	70	70	11900	0	1400	0	14000	0	0	0	70	0.00
Total Res Residential	100	100	17000	0	2000	0	20000	0	0	0	100	0.00
COMMERCIAL	100	100	17000	0	2000	0	20000	0	0	0	100	0.00
RESTAURANT	10	10	1700	0	200	0	2000	0	0	0	10	0.00
Total Commercial	100	100	17000	0	2000	0	20000	0	0	0	100	0.00
RECREATION FACILITIES	100	100	17000	0	2000	0	20000	0	0	0	100	0.00
BEACH SET BACK	10	10	1700	0	200	0	2000	0	0	0	10	0.00
Total Recreation	100	100	17000	0	2000	0	20000	0	0	0	100	0.00
OTHER	100	100	17000	0	2000	0	20000	0	0	0	100	0.00
STP	10	10	1700	0	200	0	2000	0	0	0	10	0.00
PUR HOTEL	10	10	1700	0	200	0	2000	0	0	0	10	0.00
BEACH SET BACK	10	10	1700	0	200	0	2000	0	0	0	10	0.00
Total Other	100	100	17000	0	2000	0	20000	0	0	0	100	0.00
GRAND TOTAL	100	100	17000	0	2000	0	20000	0	0	0	100	0.00



APPENDIX D

WELL DATA FOR WELL NOS. 4559-01, 4658-01, 4658-02

WELL DATA FOR WELLS 4559-01, 4658-01, 4658-02

The following well data was obtained from records at the Department of Land and Natural Resources, Water and Land Development Division, State of Hawaii. See Figure D-1.

Well No. 4559-01

Name or Location - Kalaheo
Owner or User - Huehue Ranch
Year Drilled - 1985
Driller - Mavrick Drilling Co.
Coordinates - Latitude 194515, Longitude 1555903
Type Construction - Percussion
Casing Diameter - 10 inches

Elevations:

- ground surface = 1579 ft.
- bottom of hole = -76 ft.
- bottom of solid casing = 0 ft.
- bottom of perforated casing = -30 ft.
- total depth = 1655 ft.

Initial Test:

- static head = 7.8 ft.
- chloride level = 60 mg/L

Pumping Test:

- pump rate = 150 gpm
- drawdown = 17.0 ft.
- chloride level = 90 mg/L
- water temperature = 22.2°C

Well No. 4658-01

Name or Location - Cambridge Pac.
Owner or User - Cambridge Pac.
Year Drilled - 1981
Driller - Water Resources International
Coordinates - Latitude 194639, Longitude 1555811
Type Construction - Rotary
Casing Diameter - 12 inches

Elevations:

- ground surface = 1345 ft.
- bottom of hole = -67 ft.
- bottom of solid casing = -17 ft.
- bottom of perforated casing = -67 ft.
- total depth = 1412 ft.

Initial Test:

- static head = 6.9 ft.
- chloride level = 38 mg/L

Pumping Test:

- pump rate = 420 gpm
- drawdown = 13.9 ft.
- specific well capacity = 30 gpm/ft. of drawdown
- chloride level = 38 mg/L
- water temperature = 22.5°C

Well No. 4658-02

Name or Location - Kaupulehu
Owner or User - Kaupulehu Developments (Barnwell) Ind.)
Driller - Water Resources International
Year Drilled - 1986
Coordinates - Latitude 194638, Longitude 1555811
Type Construction - Rotary
Casing Diameter - 12.5 inches

Elevations:

- ground surface = 1354 ft.
- bottom of hole = -111 ft.
- bottom of solid casing = 4 ft.
- bottom of perforated casing = -111 ft.
- total depth = 1465 ft.

Initial Test:

- static head = 2.5 ft.
- chloride level = no record

Pumping Test:

- pump rate = 580 gpm
- drawdown = 19.1 ft.
- chloride level = 42 mg/L
- water temperature = 21.0°C

PRELIMINARY WATER SYSTEM DESIGN CRITERIA

A. Fire Flow Requirements:

Use	Flow in GPM/Duration in Hour
a. Hotels	2,000/2
b. Low Rise Apartments	1,500/1

B. Flow Factor:

- a. Maximum daily demand = 1.5 x Average day
- b. Peak hourly demand = 5 x Average day

C. Service Pressure:

- a. Minimum Residual (fire flow-condition) = 20 psi
- b. Maximum desirable static = 125 psi

D. Pipeline Sizing - Pipelines to be sized to meet larger of:

- a. Maximum day flow + fire flow with residual of 20 psi.
- b. Peak hour flow with minimum residual pressure of 40 psi.

E. Maximum velocity in main (without fire flow) is 6 feet per second.

F. Pipe Flow and Head Loss:
Pipe flow and head loss to be computed by Hazen-Williams formula

G. Reservoir Sizing:
Reservoir to be sized to meet the largest of:

- a. Capacity equal to or greater than fire flow.
- b. The maximum daily demand.

The highest elevation of the service area is approximately 200 feet at the sewage treatment plant. Minimum required residual pressure is 20 psi x 2.31 feet/psi = 46 feet of head. Head loss, including friction and minor losses, is determined from the flow rate, pipe size, velocity, length, and fittings. The greatest flow occurs when a fire flow condition (1000 gpm @ STP) is required of the system in addition to the peak hour requirement.

The friction head loss and other minor losses through the system is estimated to be approximately 40 feet. Therefore the tank elevation should be:

Service area highest elevation	200 feet
Minimum residual pressure head	46 feet
Head loss and other losses	40 feet
	<u>286 feet</u>
SAY	300 feet

APPENDIX E WATER SYSTEM CALCULATIONS

WILSON OKAMOTO & ASSOCIATES
ENGINEERS, ARCHITECTS AND PLANNERS

COMPUTED BY: EN
CHECKED BY: 11/26/1986
PROJECT: 2671-01
SHEET NO. OF SHEETS

USE	Ave. Daily Demand (gpd)	Max. Daily Demand (gpd)	Peak Hourly Demand (gpd)
HOTEL	208000	632000	1440000
CONDO A	10550	105025	362750
CONDO B	83000	174500	450000
CONDO C	9150	130725	625750
CONDO D	91300	136950	656500
CONDO E	4500	62250	207500
RESORT COM'L	29450	4475	147250
RESTAURANT	5700	8550	20500
GOLF COURSE	12500	18150	62500
OTHER	3500	5250	17500
TOTALS	112650	1068975	3563250

MAX. DAILY DEMAND = 1.5 X AVE. DAILY DEMAND
PEAK HOURLY DEMAND = 5.0 X AVE. DAILY DEMAND
AVE. DAILY DEMAND OBTAINED FROM AWAKEE REPORT
FULL DEVELOPMENT CONFIGURATION

WILSON OKAMOTO & ASSOCIATES
ENGINEERS, ARCHITECTS AND PLANNERS

COMPUTED BY: EN
CHECKED BY: 11/26/1986
PROJECT: 2671-01
SHEET NO. OF SHEETS

SERVICE AREA	POTABLE WATER DEMAND (GPD)	MAX. DAILY DEMAND (GPD)	PEAK HOUR DEMAND (GPD)	MAX. DEMAND FIRE FLOW (GPM)
CONDO A, B, RESORT COM'L & OTHER	166500	249150	932500	2194
HOTEL, CONDO A, B, RESORT COM'L & OTHER	474500	717150	2372500	2494
CONDO C & E	128450	192975	643250	2154
CONDO D & RESTAURANT	97000	145500	485000	2101
ENTIRE DEVELOPMENT	772650	1068975	3563250	2742

REVISED 10/22/86

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PLANNING

COMPUTED BY: EN
CHECKED BY: 10/2/00
PROJECT: AWAKEE RESORT
SHEET NO. OF SHEETS

INB	C	PIPE SIZES	@ 6.0 FPS	MAX VELOCITY
2	1	12"	1.5	1.5
2	2	10"	1.5	1.5
2	3	8"	1.5	1.5
2	4	6"	1.5	1.5
2	5	4"	1.5	1.5
2	6	3"	1.5	1.5
2	7	2"	1.5	1.5
2	8	1 1/2"	1.5	1.5
2	9	1"	1.5	1.5
2	10	3/4"	1.5	1.5
2	11	1/2"	1.5	1.5
2	12	1/4"	1.5	1.5

PIPE SIZE FLOW RATES

11-11-11

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
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01107425

[illegible][illegible]

TIME BASED ON 2.0 EPS MAX. VELOCITY.

ALL INFORMATION CONTAINED HEREIN IS UNCLASSIFIED

REDUCE HEADLOSSES

--- AND ALSO COVERED WAS THE AVAILABILITY OF PIPE SIZES

APPURTENANCES

C-41

BASIS FOR GRAVITY SYSTEM DESIGN

Gravity sewers are designed to carry peak flow without surcharge. Peak flow is the sum of the maximum flow and the wet weather infiltration/inflow, where maximum flow is determined by multiplying the average flow by a flow factor. Gravity sewer system design is based on the Mannings Formula of

$$V = 1.486 \frac{r^{2/3} s^{1/2}}{n}$$

where V = velocity of flow in ft./sec.

n = roughness coefficient (Manning's)

r = hydraulic radius, in ft.

s = slope, in ft./ft.

Flows are designed to attain mean velocities of not less than 2.0 feet per second at full flow.

APPENDIX F

SEWER SYSTEM CALCULATIONS

RECEIVED AS FOLLOWS

REVISED 10/22/86
REVISED 11/25/86

ARCHITECTURAL
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PLANNING

WILSON OKAMOTO & ASSOCIATES
ENGINEERS, ARCHITECTS AND PLANNERS

COMPUTED BY: EN

CHECKED BY: 10/1/86

DATE: 10/1/86

PROJECT: 2671-01

SHEET NO. OF SHEETS

AWAKEE RESORT

SHEET NO. OF SHEETS

AWAKEE RESORT

SHEET NO. OF SHEETS

ESTIMATED WASTEWATER GENERATED

AVERAGE PER CAPITA FLOW OF WASTEWATER = 80 GPD

(DESIGN STANDARD OF THE DIV. OF WASTEWATER MANAGEMENT, STATE OF HAWAII, DM-101, FEB. 1984)

THE FOLLOWING ESTIMATES WERE BASED ON THE "AWAKEE RESORT NORTH KONA, HAWAII FULL DEVELOPMENT CONFIGURATION, 9/2/86 DRAFT"

SACILITY	NO. OF UNITS	VISITORS PER UNIT	EMPLOYEES PER UNIT	POPULATION PER UNIT	SEWAGE (GPD) GENERATED	SEWAGE (GPD) TREATED
HOTEL #1	600	1.90	1.1	1800	144000	204000
RESCORT RES. #A	170	2.70	0.2	493	39440	70550
RESCORT RES. #B	200	2.70	0.2	500	46400	83000
RESCORT RES. #C	210	2.70	0.2	609	48720	87150
RESCORT RES. #D	220	2.70	0.2	630	51040	93000
RESCORT RES. #E	100	2.70	0.2	290	23200	41500
RESCORT COMMERCIAL		420	155	775	62000	23250
RESTAURANT		120	30	150	12000	4500
GOLF COURSE		200	50	250	20000	12500
OTHER		100	20	120	9600	3500
TOTALS				5705	456400	621250

SINCE THE ESTIMATED SEWAGE BASED ON THE FULL DEVELOPMENT IS GREATER THAN THE ESTIMATED SEWAGE BASED ON THE 1984 GUIDE LINE, THE GREATER ESTIMATE FOR PRELIMINARY SEWER DESIGN IS BEING USED.

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PLANNING

WILSON OKAMOTO & ASSOCIATES
ENGINEERS, ARCHITECTS AND PLANNERS

COMPUTED BY: EN

CHECKED BY: 11/22/86

DATE: 11/22/86

PROJECT: 2671-01

SHEET NO. OF SHEETS

AWAKEE RESORT

SHEET NO. OF SHEETS

SEWERLINE #1 FLOW RATES

1500 + 91300 + 95000 GPD = 0.15 cfs

95000 + 81600 = 176600 GPD = 0.27 cfs

176600 + 86000 = 262600 GPD = 0.40 cfs

SEWERLINE #2 FLOW RATES

83000 GPD = 0.13 cfs

83000 + 10550 = 93550 GPD = 0.24 cfs

93550 + 3500 + 25250 = 122300 GPD = 0.20 cfs

SEWERLINE #3 FLOW RATES

87150 GPD = 0.13 cfs

12600 GPD = 0.02 cfs

87150 + 12600 = 99750 GPD = 0.15 cfs

SEWERLINE #4 FLOW RATES

40000 GPD = 0.06 cfs

41500 GPD = 0.06 cfs

SEWERLINE #5 FLOW RATES

621250 GPD = 0.96 cfs (TOTAL SEWAGE GENERATED)

SEWERLINE #7

NO FLOW IS CALCULATED FOR THIS LINE. IT IS PROVIDED FOR FLEXIBILITY. RESORT ZONING AREA CAN USE THIS LINE AS A PARTIAL RELIEF TO SEWERLINE #1.

RECEIVED AS FOLLOWS

**WILSON OKAMOTO & ASSOCIATES
ENGINEERS, ARCHITECTS AND PLANNERS**

- ☐ ARCHITECTURAL
- ☐ STRUCTURAL
- ☐ CIVIL
- ☐ PLANNING

COMPUTED BY: EN
CHECKED BY: _____
DATE: 11/26/86

AWAKEE RESORT

PROJECT 2671-D1
SHEET NO. OF SHEET'S

AWAKEE RESIST PROJECT 2671-D1

COMPUTED BY: EN
CHECKED BY: 11

[illegible]

P2 POPULATION: * ASSUMED VALUE

[illegible]

P2 POPULATION * ASSUMED VALUE

RECEIVED AS FOLLOWS

ARCHITECTURAL
STRUCTURAL
CIVIL
PLANNING

WILSON OKAMOTO & ASSOCIATES
ENGINEERS, ARCHITECTS AND PLANNERS

COMPUTED BY EN PROJECT 2671-01
CHECKED BY 10 SHEET NO. 4 OF 5 SHEETS
DATE 11 1986

DESIGN FOR PIPES TO BE FLOWING HALF FULL

USE MANNINGS EQ. $V = \frac{1.486}{n} R^{2/3} S^{1/2}$

$n = 0.015$
SLOPE, S SHALL NOT BE LESS THAN MINIMUM AS PER
DESIGN STANDARDS OF THE DIVISION OF WASTEWATER
MANAGEMENT VOL. 1, PAGES 104-105, DPW, CITY OF HON.

THE FOLLOWING CALCULATIONS FOR FLOW CAPACITIES FOR VARIOUS
PIPE SIZES FLOWING HALF FULL AT MIN. SLOPE

D (in)	0	12	18	24
A (sq ft)	0.015	0.015	0.015	0.013
P (ft)	0.71	0.39	0.88	1.67
R (ft)	1.05	1.57	2.36	3.14
V (ft/s)	0.16	0.25	0.37	0.50
Q (cfs)	0.0044	0.0028	0.0016	0.0008
V (ft/s)	1.94	2.08	2.04	2.04
Q (cfs)	0.33	0.61	1.80	3.2

8" PIPE @ $S = 0.0085$ HALF FULL, $Q = 0.46$ cfs

12" PIPE @ $S = 0.005$ HALF FULL, $Q = 1.00$ cfs

ARCHITECTURAL
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PLANNING

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ENGINEERS, ARCHITECTS AND PLANNERS

COMPUTED BY MIM PROJECT 2671-01
CHECKED BY 9 SHEET NO. 4 OF 5 SHEETS
DATE 12 1986

PIPE SIZING (CONT.)

PIPE FLOW 3/4" FULL



$$A = \frac{1}{2} \pi R^2 - \frac{1}{2} R^2 \theta$$

$$P = R \theta$$

$$R = \frac{D}{2} = 10.625$$

$$\theta = 2 \cos^{-1} \left(\frac{1.732}{2} \right) = 60^\circ$$

$$A = \frac{1}{2} \pi \left(\frac{D}{2} \right)^2 - \frac{1}{2} \left(\frac{D}{2} \right)^2 \theta$$

$$A = \frac{1}{2} \pi \left(\frac{D}{2} \right)^2 - \frac{1}{2} \left(\frac{D}{2} \right)^2 \theta$$

$$P = \frac{D}{2} \theta$$

$$R = \frac{D}{2} = 5.3125$$

$$\theta = 2 \cos^{-1} \left(\frac{1.732}{2} \right) = 60^\circ$$

$$A = \frac{1}{2} \pi \left(\frac{D}{2} \right)^2 - \frac{1}{2} \left(\frac{D}{2} \right)^2 \theta$$

$$P = \frac{D}{2} \theta$$

$$R = \frac{D}{2} = 5.3125$$

$$\theta = 2 \cos^{-1} \left(\frac{1.732}{2} \right) = 60^\circ$$

$$A = \frac{1}{2} \pi \left(\frac{D}{2} \right)^2 - \frac{1}{2} \left(\frac{D}{2} \right)^2 \theta$$

$$P = \frac{D}{2} \theta$$

$$R = \frac{D}{2} = 5.3125$$

$$\theta = 2 \cos^{-1} \left(\frac{1.732}{2} \right) = 60^\circ$$

$$A = \frac{1}{2} \pi \left(\frac{D}{2} \right)^2 - \frac{1}{2} \left(\frac{D}{2} \right)^2 \theta$$

$$P = \frac{D}{2} \theta$$

$$R = \frac{D}{2} = 5.3125$$

$$\theta = 2 \cos^{-1} \left(\frac{1.732}{2} \right) = 60^\circ$$

$$A = \frac{1}{2} \pi \left(\frac{D}{2} \right)^2 - \frac{1}{2} \left(\frac{D}{2} \right)^2 \theta$$

$$P = \frac{D}{2} \theta$$

$$R = \frac{D}{2} = 5.3125$$

$$\theta = 2 \cos^{-1} \left(\frac{1.732}{2} \right) = 60^\circ$$

$$A = \frac{1}{2} \pi \left(\frac{D}{2} \right)^2 - \frac{1}{2} \left(\frac{D}{2} \right)^2 \theta$$

$$P = \frac{D}{2} \theta$$

$$R = \frac{D}{2} = 5.3125$$

$$\theta = 2 \cos^{-1} \left(\frac{1.732}{2} \right) = 60^\circ$$

$$A = \frac{1}{2} \pi \left(\frac{D}{2} \right)^2 - \frac{1}{2} \left(\frac{D}{2} \right)^2 \theta$$

$$P = \frac{D}{2} \theta$$

$$R = \frac{D}{2} = 5.3125$$

RECEIVED AS FOLLOWS

Revised 11/20/80

ARCHITECTURAL
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WILSON OKAMOTO & ASSOCIATES
ENGINEERS, ARCHITECTS AND PLANNERS

COMPUTED BY: EN
CHECKED BY: 10/13/80
DATE: 10/13/80
PROJECT: AWAKEE RESORT
SHEET NO. 267 OF 267

FORCE MAIN

FROM PUMP STA. 2 TO PUMP STA. 4.2
PEAK FLOW = 2.42 cfs
FOR 8" PIPE, $V = 6.93$ FPS
T.D.H. REQ'D = $20 \times (1.4 \times 11000/1000) = 17.6$ FT
USE 8" PIPE

FROM PUMP STA. 4.2 TO PUMP STA. 23
PEAK FLOW = 3.1 cfs
FOR 10" PIPE, $V = 5.88$ FPS
T.D.H. REQ'D = $60 \times (1.4 \times 11000/1000) = 14.0$ FT
USE 10" PIPE

FROM PUMP STA. 23 TO S.P.
PEAK FLOW = 3.45 cfs
FOR 12" PIPE, $V = 4.79$
T.D.H. REQ'D = $15 \times (1.4 \times 11000/1000) = 9.6$ FT
USE 12" PIPE

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ENGINEERS, ARCHITECTS AND PLANNERS

COMPUTED BY: EN
CHECKED BY: 10/1/80
DATE: 10/1/80
PROJECT: AWAKEE RESORT
SHEET NO. 268 OF 268

SEWER LINE SIZES (SEE SKETCH FOR LAYOUT)

IN DETERMINING LINE SIZES THE FLOW CAPACITIES FOR VARIOUS PIPE SIZES FLOWING 1/2 FULL AND 3/4 FULL AT MIN. SLOPE WERE CONSIDERED. HOWEVER IN SOME CASES, OVER SIZING OF PIPES WERE CONSIDERED SINCE THEY CAN BE LAID AT A USHER SLOPE.

FORCE MAIN

38. Force Mains

38.1 Locations: Force mains should be located in streets or along road right-of-ways whenever possible.

In locating force mains, ease of installation and maintenance and elimination of high points shall be considered. Air release valves shall be installed on high points. Easement widths shall conform to the requirements as set forth in Section 24.5.

38.2 Sizing:

38.2.1 Force mains shall be sized not less than 4 inches in diameter (6 inch minimum is preferred).

38.2.2 Velocities in force mains shall be as follows:

a. Minimum: 3.0 fps (desirable)
1.75 fps (absolute)

b. Maximum: 10.0 fps

38.2.3 Force mains shall be designed to carry the maximum rate of pumping without excessive frictional head loss. Total dynamic head should not exceed 100 feet.

RECEIVED AS FOLLOWS

10-INCH PIPE.

Discharge in		Loss of Head in Feet per 1000 feet of length.									
Gallons per 24 Hours.	Cubic Feet per Second.	100	125	150	175	200	225	250	275	300	325
300,000	0.461	0.85	0.61	0.49	0.41	0.35	0.30	0.26	0.23	0.20	0.18
320,000	0.493	0.91	0.65	0.52	0.43	0.37	0.32	0.28	0.24	0.21	0.19
340,000	0.525	0.96	0.70	0.56	0.46	0.40	0.34	0.30	0.26	0.23	0.21
360,000	0.557	1.02	0.75	0.60	0.50	0.43	0.37	0.32	0.28	0.24	0.22
380,000	0.589	1.08	0.80	0.64	0.53	0.46	0.40	0.35	0.30	0.26	0.24
400,000	0.621	1.14	0.85	0.68	0.56	0.49	0.42	0.37	0.32	0.28	0.25
420,000	0.653	1.20	0.90	0.72	0.60	0.52	0.45	0.40	0.35	0.30	0.27
440,000	0.685	1.26	0.95	0.76	0.63	0.55	0.47	0.42	0.37	0.32	0.29
460,000	0.717	1.32	1.00	0.80	0.67	0.58	0.50	0.45	0.40	0.35	0.31
480,000	0.749	1.38	1.05	0.84	0.71	0.62	0.53	0.48	0.42	0.37	0.33
500,000	0.781	1.44	1.10	0.88	0.75	0.65	0.56	0.50	0.45	0.40	0.35
520,000	0.813	1.50	1.15	0.92	0.79	0.69	0.60	0.54	0.48	0.43	0.38
540,000	0.845	1.56	1.20	0.96	0.83	0.72	0.63	0.57	0.51	0.46	0.41
560,000	0.877	1.62	1.25	1.00	0.87	0.76	0.67	0.61	0.55	0.50	0.45
580,000	0.909	1.68	1.30	1.04	0.91	0.80	0.71	0.64	0.58	0.53	0.48
600,000	0.941	1.74	1.35	1.08	0.95	0.84	0.75	0.68	0.62	0.57	0.52
620,000	0.973	1.80	1.40	1.12	0.99	0.88	0.79	0.72	0.66	0.61	0.56
640,000	1.005	1.86	1.45	1.16	1.03	0.92	0.83	0.76	0.70	0.65	0.60
660,000	1.037	1.92	1.50	1.20	1.07	0.96	0.87	0.80	0.74	0.69	0.64
680,000	1.069	1.98	1.55	1.24	1.11	1.00	0.91	0.84	0.78	0.73	0.68
700,000	1.101	2.04	1.60	1.28	1.15	1.04	0.95	0.88	0.82	0.77	0.72
720,000	1.133	2.10	1.65	1.32	1.19	1.08	0.99	0.92	0.86	0.81	0.76
740,000	1.165	2.16	1.70	1.36	1.23	1.12	1.03	0.96	0.90	0.85	0.80
760,000	1.197	2.22	1.75	1.40	1.27	1.16	1.07	1.00	0.94	0.89	0.84
780,000	1.229	2.28	1.80	1.44	1.31	1.20	1.11	1.04	0.98	0.93	0.88
800,000	1.261	2.34	1.85	1.48	1.35	1.24	1.15	1.08	1.02	0.97	0.92
820,000	1.293	2.40	1.90	1.52	1.39	1.28	1.19	1.12	1.06	1.01	0.96
840,000	1.325	2.46	1.95	1.56	1.43	1.32	1.23	1.16	1.10	1.05	1.00
860,000	1.357	2.52	2.00	1.60	1.47	1.36	1.27	1.20	1.14	1.09	1.04
880,000	1.389	2.58	2.05	1.64	1.51	1.40	1.31	1.24	1.18	1.13	1.08
900,000	1.421	2.64	2.10	1.68	1.55	1.44	1.35	1.28	1.22	1.17	1.12
920,000	1.453	2.70	2.15	1.72	1.59	1.48	1.39	1.32	1.26	1.21	1.16
940,000	1.485	2.76	2.20	1.76	1.63	1.52	1.43	1.36	1.30	1.25	1.20
960,000	1.517	2.82	2.25	1.80	1.67	1.56	1.47	1.40	1.34	1.29	1.24
980,000	1.549	2.88	2.30	1.84	1.71	1.60	1.51	1.44	1.38	1.33	1.28
1,000,000	1.581	2.94	2.35	1.88	1.75	1.64	1.55	1.48	1.42	1.37	1.32
1,020,000	1.613	3.00	2.40	1.92	1.79	1.68	1.59	1.52	1.46	1.41	1.36
1,040,000	1.645	3.06	2.45	1.96	1.83	1.72	1.63	1.56	1.50	1.45	1.40
1,060,000	1.677	3.12	2.50	2.00	1.87	1.76	1.67	1.60	1.54	1.49	1.44
1,080,000	1.709	3.18	2.55	2.04	1.91	1.80	1.71	1.64	1.58	1.53	1.48
1,100,000	1.741	3.24	2.60	2.08	1.95	1.84	1.75	1.68	1.62	1.57	1.52
1,120,000	1.773	3.30	2.65	2.12	1.99	1.88	1.79	1.72	1.66	1.61	1.56
1,140,000	1.805	3.36	2.70	2.16	2.03	1.92	1.83	1.76	1.70	1.65	1.60
1,160,000	1.837	3.42	2.75	2.20	2.07	1.96	1.87	1.80	1.74	1.69	1.64
1,180,000	1.869	3.48	2.80	2.24	2.11	2.00	1.91	1.84	1.78	1.73	1.68
1,200,000	1.901	3.54	2.85	2.28	2.15	2.04	1.95	1.88	1.82	1.77	1.72
1,220,000	1.933	3.60	2.90	2.32	2.19	2.08	1.99	1.92	1.86	1.81	1.76
1,240,000	1.965	3.66	2.95	2.36	2.23	2.12	2.03	1.96	1.90	1.85	1.80
1,260,000	1.997	3.72	3.00	2.40	2.27	2.16	2.07	2.00	1.94	1.89	1.84
1,280,000	2.029	3.78	3.05	2.44	2.31	2.20	2.11	2.04	1.98	1.93	1.88
1,300,000	2.061	3.84	3.10	2.48	2.35	2.24	2.15	2.08	2.02	1.97	1.92
1,320,000	2.093	3.90	3.15	2.52	2.39	2.28	2.19	2.12	2.06	2.01	1.96
1,340,000	2.125	3.96	3.20	2.56	2.43	2.32	2.23	2.16	2.10	2.05	2.00
1,360,000	2.157	4.02	3.25	2.60	2.47	2.36	2.27	2.20	2.14	2.09	2.04
1,380,000	2.189	4.08	3.30	2.64	2.51	2.40	2.31	2.24	2.18	2.13	2.08
1,400,000	2.221	4.14	3.35	2.68	2.55	2.44	2.35	2.28	2.22	2.17	2.12
1,420,000	2.253	4.20	3.40	2.72	2.59	2.48	2.39	2.32	2.26	2.21	2.16
1,440,000	2.285	4.26	3.45	2.76	2.63	2.52	2.43	2.36	2.30	2.25	2.20
1,460,000	2.317	4.32	3.50	2.80	2.67	2.56	2.47	2.40	2.34	2.29	2.24
1,480,000	2.349	4.38	3.55	2.84	2.71	2.60	2.51	2.44	2.38	2.33	2.28
1,500,000	2.381	4.44	3.60	2.88	2.75	2.64	2.55	2.48	2.42	2.37	2.32
1,520,000	2.413	4.50	3.65	2.92	2.79	2.68	2.59	2.52	2.46	2.41	2.36
1,540,000	2.445	4.56	3.70	2.96	2.83	2.72	2.63	2.56	2.50	2.45	2.40
1,560,000	2.477	4.62	3.75	3.00	2.87	2.76	2.67	2.60	2.54	2.49	2.44
1,580,000	2.509	4.68	3.80	3.04	2.91	2.80	2.71	2.64	2.58	2.53	2.48
1,600,000	2.541	4.74	3.85	3.08	2.95	2.84	2.75	2.68	2.62	2.57	2.52
1,620,000	2.573	4.80	3.90	3.12	2.99	2.88	2.79	2.72	2.66	2.61	2.56
1,640,000	2.605	4.86	3.95	3.16	3.03	2.92	2.83	2.76	2.70	2.65	2.60
1,660,000	2.637	4.92	4.00	3.20	3.07	2.96	2.87	2.80	2.74	2.69	2.64
1,680,000	2.669	4.98	4.05	3.24	3.11	3.00	2.91	2.84	2.78	2.73	2.68
1,700,000	2.701	5.04	4.10	3.28	3.15	3.04	2.95	2.88	2.82	2.77	2.72
1,720,000	2.733	5.10	4.15	3.32	3.19	3.08	2.99	2.92	2.86	2.81	2.76
1,740,000	2.765	5.16	4.20	3.36	3.23	3.12	3.03	2.96	2.90	2.85	2.80
1,760,000	2.797	5.22	4.25	3.40	3.27	3.16	3.07	3.00	2.94	2.89	2.84
1,780,000	2.829	5.28	4.30	3.44	3.31	3.20	3.11	3.04	2.98	2.93	2.88
1,800,000	2.861	5.34	4.35	3.48	3.35	3.24	3.15	3.08	3.02	2.97	2.92
1,820,000	2.893	5.40	4.40	3.52	3.39	3.28	3.19	3.12	3.06	3.01	2.96
1,840,000	2.925	5.46	4.45	3.56	3.43	3.32	3.23	3.16	3.10	3.05	3.00
1,860,000	2.957	5.52	4.50	3.60	3.47	3.36	3.27	3.20	3.14	3.09	3.04
1,880,000	2.989	5.58	4.55	3.64	3.51	3.40	3.31	3.24	3.18	3.13	3.08
1,900,000	3.021	5.64	4.60	3.68	3.55	3.44	3.35	3.28	3.22	3.17	3.12
1,920,000	3.053	5.70	4.65	3.72	3.59	3.48	3.39	3.32	3.26	3.21	3.16
1,940,000	3.085	5.76	4.70	3.76	3.63	3.52	3.43	3.36	3.30	3.25	3.20
1,960,000	3.117	5.82	4.75	3.80	3.67	3.56	3.47	3.40	3.34	3.29	3.24
1,980,000	3.149	5.88	4.80	3.84	3.71	3.60	3.51	3.44	3.38	3.33	3.28
2,000,000	3.181	5.94	4.85	3.88	3.75	3.64	3.55	3.48	3.42	3.37	3.32

36

6-INCH PIPE.

Discharge in		Loss of Head in Feet per 1000 feet of length.									
Gallons per 24 Hours.	Cubic Feet per Second.	Value at 1 foot Head.	Value at 1/2 foot Head.	100	125	150	175	200	225	250	275
80,000	0.0774	0.39	0.00	0.13	0.14	0.17	0.21	0.26	0.31	0.36	1.3
90,000	0.0858	0.47	0.00	0.16	0.20	0.24	0.32	0.41	0.51	0.61	1.8
100,000	0.0942	0.55	0.00	0.21	0.27	0.32	0.41	0.51	0.67	1.15	2.4
110,000	0.1026	0.63	0.01	0.30	0.35	0.41	0.51	0.67	0.86	1.40	3.1
120,000	0.1110	0.71	0.01	0.35	0.43	0.51	0.71	1.07	1.63	2.9	
130,000	0.1194	0.79	0.01	0.40	0.53	0.61	0.86	1.30	2.22	4.7	
140,000	0.1278	0.87	0.01	0.50	0.63	0.73	1.03	1.55	2.65	5.6	
150,000	0.1362	0.95	0.01	0.60	0.74	0.86	1.31	1.84	3.11	6.6	
160,000	0.1446	1.10	0.02	0.67	0.90	1.10	1.62	2.48	4.17	8.5	
170,000	0.1530	1.20	0.02	1.10	1.26	1.40	2.06	3.10	5.3	11.2	
180,000	0.1614	1.42	0.03	1.37	1.67	1.85	2.50	3.85	6.0	14.0	
190,000	0.1698	1.58	0.04	1.67	1.91	2.22	3.10	4.70	8.0	17.0	
200,000	0.1782	1.73	0.05	1.99	2.29	2.65	3.71	5.0	9.0	20.2	
210,000	0.1866	1.89	0.06	2.30	2.69	3.11	4.32	6.0	11.2	23.9	
220,000	0.1950	2.05	0.07	2.71	3.10	3.50	5.0	7.0	13.0	27.5	
230,000	0.2034	2.21	0.08	3.11	3.55	4.14	5.8	8.5	15.0	31.7	
240,000	0.2118	2.36	0.00	3.54	4.07	4.70	6.0	10.0	17.0	36.0	
250,000	0.2202	2.50	0.12	4.70	5.4	6.3	8.5	13.3	22.5	48.0	
260,000	0.2286	2.65	0.18	6.0	6.9	8.0	11.3	17.0	29.0	62	
270,000	0.2370	2.85	0.19	7.5	8.6	10.0	14.0	21.2	30.0	76	
280,000	0.2454	3.04	0.24	9.1	10.4	12.1	16.9	25.6	40.8	92	
290,000	0.2538	3.23	0.29	10.5	12.4	14.4	20.1	30.5	52	110	
300,000	0.2622	3.43	0.35	12.8	14.0	17.0	23.8	36.0	61	130	
310,000	0.2706	3.62	0.41	14.7	16.0	19.0	27.5	41.0	71	160	
320,000	0.2790	3.82	0.47	17.0	19.5	22.6	31.6	48.0	82	173	
330,000	0.2874	4.05	0.52	21.0	24.9	28.9	40.4	61	101	221	
340,000	0.2958	4.25	0.57	26.9	31.9	35.5	50	70	129	274	
350,000	0.3042	4.45	0.64	32.9	37.8	43.8	61	83	158	334	
360,000	0.3126	4.67	0.70	39.2	48.1	52	73	111	189	400	
370,000	0.3210	4.90	0.77	46.0	53	61	86	130	220	470	
380,000	0.3294	5.13	0.80	51	70	82	114	173	265	620	
390,000	0.3378	5.36	0.86	78	90	104	146	221	377	800	
400,000	0.3462	5.59	0.92	112	130	162	225	470	690	990	
410,000	0.3546	5.82	0.98	137	159	222	337	570	1210		
420,000	0.3630	6.05	1.05	162	188	263	400	680	1440		

RECEIVED AS FOLLOWS

Revised 11/24/80

WILSON OKAMOTO & ASSOCIATES
ENGINEERS, ARCHITECTS AND PLANNERS

COMPUTED BY: EAJ
CHECKED BY: 10/16/80
DATE: 10/16/80

PROJECT: 2471-01
SHEET NO. OF SHEETS

AWAKEE RESORT

PROJECT: 2471-01
SHEET NO. OF SHEETS

AWAKEE RESORT

PUMP STATION 2

ASSUMPTIONS: AVE. FLOW BASED ON 16 HOUR DAY
MIN. PUMP CYCLE FROM START TO STOP FOR
150 ONE PUMP SHALL BE 5 MINUTES
MAX. RETENTION TIME IN WET WELLS SHALL
BE 30 MIN.
STANDBY PUMP SHALL BE EQUAL TO THE
LARGEST OF MAIN PUMPING UNITS.

PUMP STATION 2

DESIGN FLOW: 460280 gpm
AVE. FLOW: 460280 gpm
IF 479 gpm

ASSUME WET WELL 6' x 6' x 10' DEEP RETENTION STORAGE
360 CF = 2693 gal (6' x 6' x 10' DEEP TOTAL)

PEAK FLOW = 24225 = 1086 gpm

WITH 550 gpm PUMP, TIME REQ'D TO PUMP STORAGE
ASSUMING MINIMAL INFLOW = 2693/550 = 4.9 min

TIME REQ'D TO REFILL STORAGE = 2693/479 = 5.6 min

MIN. CYCLE 4.9 + 5.6 = 10.5 min. OK

USE 3 - 550 gpm PUMPS, TDH = 100 FT.

PUMP STATION 2

DESIGN FLOW: 606825 gpm
AVE. FLOW: 606825 gpm
IF 625 gpm

PEAK FLOW = 32108 = 1441 gpm

ASSUME WET WELL 6' x 6' x 10' DEEP STORAGE
360 CF = 2693 gal (6' x 6' x 10' DEEP TOTAL)

WITH 550 gpm PUMP, TIME REQ'D TO PUMP STORAGE
ASSUMING MINIMAL INFLOW = 2693/550 = 4.9 min

TIME REQ'D TO REFILL STORAGE = 2693/479 = 5.6 min

MIN. CYCLE 4.9 + 5.6 = 10.5 min. OK

USE 3 - 550 gpm PUMPS, TDH = 100 FT.

PUMP STATION 2

AVE. FLOW: 606825 gpm
IF 625 gpm

PEAK FLOW = 32108 = 1441 gpm

ASSUME WET WELL 6' x 6' x 10' DEEP STORAGE
360 CF = 2693 gal (6' x 6' x 10' DEEP TOTAL)

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TIME REQ'D TO REFILL STORAGE = 2693/479 = 5.6 min

MIN. CYCLE 4.9 + 5.6 = 10.5 min. OK

USE 3 - 550 gpm PUMPS, TDH = 100 FT.

APPENDIX D

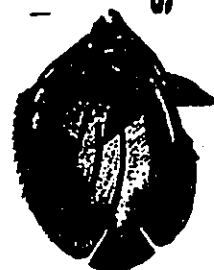
BASELINE ASSESSMENT OF THE MARINE ENVIRONMENT AND ANCHIALINE PONDS

**BASELINE ASSESSMENT OF THE
MARINE ENVIRONMENT AND ANCHIALINE
PONDS AT AWAKE'E, NORTH KONA, HAWAII**

PREPARED FOR:

HELBER, HASTERT, VAN HORN & KIMURA, PLANNERS

OCTOBER 1, 1986



STEVEN DOLLAR
Marine Research Consultants

44-1306 Maui Place / Kaneohe, Hawaii 96744 / BOB 247-2440

INTRODUCTION

Coral reefs and other marine environments are often some of the most valuable aesthetic and recreational features of coastal tropical and sub-tropical resort communities. In addition, brackish water pools separated from direct contact with the ocean, termed "anchialine ponds", constitute unique coastal features in Hawaii that are inhabited by rare organisms. The importance of these aquatic environments requires careful evaluation regarding the potential for degradation that might arise during construction, and the ensuing operation, of coastal resort developments.

On the Big Island of Hawaii, Kahala Capital Corporation is proposing to develop an intermediate resort on 349 acres of open land situated approximately 11 miles north of Kailua-Kona (see Figure 1). The development concept for the subject property, called "Awake'e", incorporates a variety of land uses comprising a resort community centered around one 750-room hotel, 750 resort condominiums and an 18-hole golf course. The western boundary of the property is composed of a pristine coastline that is presently unimpacted by any activities of man. At the extreme southwest corner of the property, a diverse assemblage of anchialine ponds occur. While the planned scenario for Awake'e does not include any direct alteration of the shoreline or the ponds, it is possible

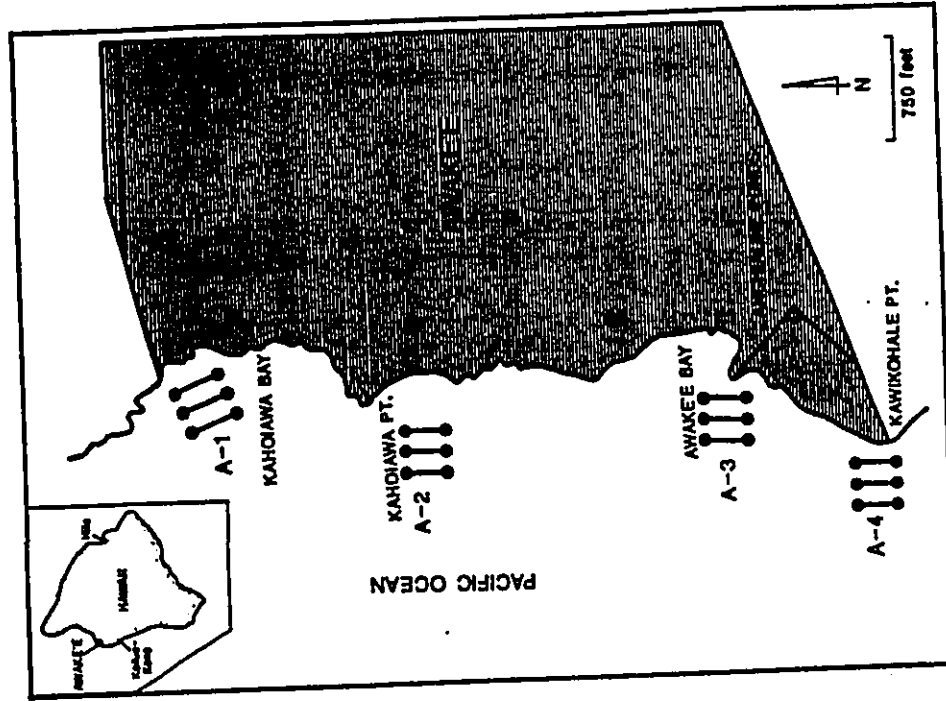


Figure 1. Map showing location of Awake'e on the west coast of Hawaii, and the location of the four marine transect sites. Area marked "anchialine" ponds is shown in detail in Figure 2.

that indirect factors resulting from development could impose the potential for environmental alteration.

Any potential environmental degradation processes may be minimized if the proper information is assembled early on in the development scheme. Environmental data can serve to identify areas that may be particularly susceptible to man-induced stresses, or conversely, particularly resistant to such stresses. Comparison of the magnitude of natural environmental impacts to anticipated anthropogenic (man-induced) stresses can serve to put into perspective the ultimate effects of the activities of man.

One objective of the baseline assessment is to gather information that describes the natural physico-chemical structure of the aquatic systems. Because land uses such as golf course irrigation and fertilization present a potential for alteration of natural chemical parameters, especially of coastal ponds, establishment of such a baseline is important.

Another objective of the environmental assessment is to establish quantitative baseline information to accurately depict the community structure of the indigenous populations inhabiting the areas offshore of Aiea, as well as the anchialine ponds. Marine community structure can be defined as the abundance, diversity, and distribution of stony and soft corals, other attached benthic fauna and flora such as algae and sponges, motile benthos such as echinoderms, molluscs, and crustacea, and

pelagic species such as reef fish and sea turtles. Pond biota is constituted mainly by fish, crustacea, mollusks, algae, and vascular plants. This information will serve to identify any living marine resources that may be of significant commercial or recreational value, or that represent rare or unique ecological features that may be especially susceptible to human-induced stress.

The emphasis of this report is not, however, directed at an extensive compilation of either lists of organisms inhabiting the area, or extensive tabulation of chemical measurements, as is often the case with environmental assessments. Rather, emphasis is placed on characterizing the aquatic environments as integrated communities that are under the influence of specific physio-chemical processes. Describing the cause and effect relationship of these processes in shaping biotic community structure is the major intent of the survey.

With these ideas in mind, permanent baseline stations or "benchmarks" were established in order to allow monitoring of the same stations in the future. This provision is in accordance with the State of Hawaii (Department of Health) Chapter 34 of Title 11, Administrative Rules entitled "Water Quality Standards", which specify that permanent benchmark stations be established for monitoring of marine biological communities. Water quality standards shall be deemed met if time-series surveys of benchmark stations indicate no

relative changes in the relevant biological communities, as noted by biological community indicator organisms which may be applicable to the specific site.

In the context of time-series surveys, the most useful biological communities for direct evaluation of environmental impacts to the offshore marine environment are benthic (bottom dwelling) communities. Because benthos are generally long-lived, immobile, and intimately affected by exogenous input of sediments and other potential pollutants, these organisms must either tolerate the surrounding conditions within the limits of adaptability or die. As members of the benthos, stony corals are of particular importance in nearshore Hawaiian environments. They contribute a large portion of the reef biomass and their skeletal structures are vital in providing a complex of habitat space, shelter, and food for other species. Since corals serve in such a keystone function, coral community structure is considered the most "relevant" group in the use of reef community structure as a means of evaluating past and potential impacts associated with land development. For this reason, and because alterations in coral communities are easy to identify, observable change in coral population parameters is a practical and direct method for obtaining the information that is required to meet existing environmental regulations.

METHODS

Coastal Reef Environment

All field work was carried out on September 5-8, 1986, and was conducted from a 19 foot boat. Several methods were employed in the collection of qualitative and quantitative data. Qualitative reconnaissance surveys covering the entire area fronting the development parcel were conducted by slowly towing a diver behind a small boat. These surveys were useful in making relative comparisons between areas, identifying any unique or unusual biotic resources, and providing a general picture of the physiographic structure and benthic assemblages occurring throughout the region of study.

Following the preliminary survey, four quantitative transect sites were selected offshore of the development area (see Figure 1). In addition, a control site was selected at a site protected from north swells. The control site was located approximately one mile north of Honolulu Harbor, and 6 miles north of Kailua-Kona. The control sites serve as a reference station for subsequent time-series surveys to identify if observed changes are the result of man-induced or natural environmental perturbations. Because the control site was protected from winter storm waves, it also serves as a reference from which it is possible to estimate the effects of natural disturbance at the development site.

All site locations were accurately determined and recorded using a hand-bearing compass and triangulation sightings of distinguishable landmarks. At each site, line transects were conducted at depths of approximately 20, 30, and 60 feet. These depths correspond to the three generalized major West Hawaii reef zones.

Transects were 200 feet long and were oriented parallel to the shoreline in areas deemed to be representative of community structure. The ends of each transect were permanently marked for possible future monitoring studies by pounding steel stakes into the substrate. A surveying tape was laid out over the reef surface parallel to depth contours between two marker stakes. An aluminum quadrat frame with dimensions of one meter by two-thirds meter was sequentially placed over ten random marks on the transect tape so that the tape bisected the long axis of the frame. At each quadrat location a color photograph recorded the segment of reef area enclosed by the quadrat frame. In addition, a diver with knowledge of the taxonomy of resident species visually estimated the percent cover and occurrence of organisms and substrata types within the quadrat frame. Only macrofaunal species greater in size than approximately 2 cm were noted; no attempt was made to identify or enumerate cryptic species dwelling within the reef framework, or nocturnal species that inhabit the reef surface only at night.

Following the period of field work, quadrat photographs

were projected onto a grid and units of bottom cover for each species and bottom type were calculated. This information was combined with the in-situ cover estimates and the combined assessment provided the data base for the benthic community structure analysis. Species diversity was calculated using the Shannon-Wiener index, and can be equated with the equitability, or dominance, of distribution of the species occurring on each transect.

The practical advantages of photo-transects are numerous: most species can be easily and accurately identified from transparencies, and the transparencies provide a permanent record for subsequent time-series comparisons. Also, photo-quadrat sampling is rapid and efficient with respect to time and data collected - an important consideration under conditions where underwater time is restricted by cost, depth and exposure.

Quantitative assessment of reef fish community structure was conducted in conjunction with the benthic surveys. As the transect tape was being laid along the bottom, all fishes observed within a band approximately six feet wide along the transect path were identified to species and enumerated. Care was taken to conduct the fish surveys so that the minimum disturbance by divers was created, ensuring the least possible dispersal of fish. Only readily visible individuals were included in the census. No attempt was made to seek out cryptic species or individuals sheltered within coral.

Anchialine Ponds

Location of all anchialine ponds was determined walking the shoreline and coastal zone. Each pond was numbered and classified according to pond type. A map of the ponds shows that all were located within the southwest corner of the property (see Figure 2.) In some instances where series of ponds were connected, the point of division into separate ponds was somewhat arbitrary.

The length and width of each pond was measured with a tape measure, and area was calculated based on the closest geometric shape. Pond depth (to rocky bottom) was measured with a yardstick. In ponds with substantial sediment accumulation, depth of sediment was measured by inserting the yardstick into the sediment until solid substratum was reached.

Several chemical parameters of pond water were measured in-situ. Dissolved oxygen was measured with a Yellow Springs Instruments Model 58 meter and polarographic probe, with a readability of 0.01 mg l^{-1} . pH was measured with a Cole-Parmer model 5985-00 meter (operated in the millivoltage mode) and a Sesorax S-200 electrode (precision - 0.3 mv, or 0.006 pH units). Temperature was measured with a thermistor operating in conjunction with the pH meter. Salinity was measured with a hand-held refractometer (American Optical Corp. Model 10419) readable to 1 part per thousand.

Water samples for nutrient analysis were taken in 125

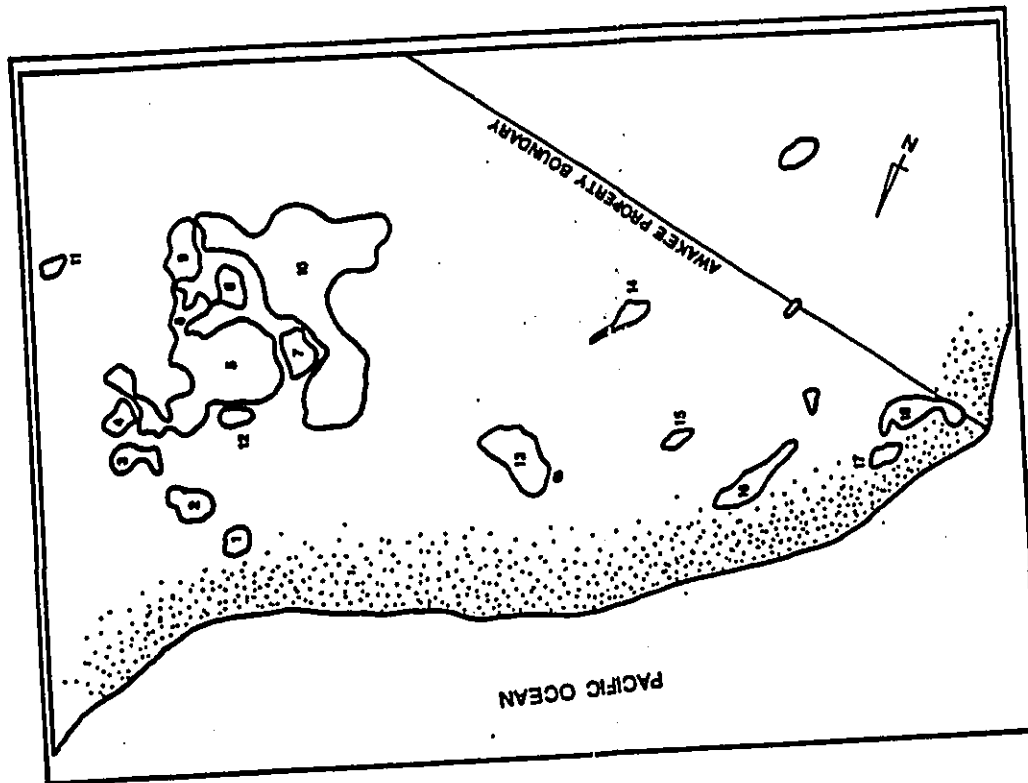


Figure 2. Map showing locations and numbered identification of anchialine ponds at Avake's. Location of area with respect to the entire development property can be seen in Figure 1.

ml. acid-washed polyethylene bottles. These samples were filtered through glass fiber filters and immediately placed on ice. Analysis for ammonium, nitrate plus nitrite, orthophosphate, and dissolved silica were conducted on a Technicon Autoanalyzer by AECOS Environmental Laboratory in Honolulu.

Pond biota was assessed by inspecting each pond and noting conspicuous fauna and flora. Representative organisms of unidentified species were collected and returned to Honolulu for identification. Ponds were disturbed as little as possible during collections so any organisms that inhabit the sediment column might have been overlooked. There were, however, indications that the ponds with deep sediment layers were anoxic (odor of reduced sulfides), thereby eliminating any macrofauna. All pond surveys were conducted during daylight hours, so organisms that are primarily visible only at night may have been underestimated.

RESULTS AND DISCUSSION

Shoreline Area

The main structural feature of the approximate one mile of shoreline of the Awake's property is a scalloped basaltic ledge interspersed with pocket beaches composed of rounded basaltic rocks and white coral rocks (see plate 1). The coral rocks have been apparently thrown up on the shoreline after being broken loose by storm action. The

most prominent beach of this type occurs along the margin of Awake's Bay (see Plate 2). At the southern end of the property (south of Awake's Bay), an intertidal platform of calcium carbonate beach rock lies between the reef bench and the shoreline (see plate 3). Shoreward of the beachrock platform, a berm of white coral rocks separates the ocean from a low-lying area where the anchialine pond complex occurs. North of Awake's Bay the shoreline is somewhat elevated, preventing the formation of tidepools and anchialine ponds.

Offshore Marine Environments

Water Quality

A comprehensive ocean water quality sampling program was not part of the present investigation. Such sampling during the short duration of field work would be relatively meaningless owing to the natural variability typical of the chemistry of surface ocean waters. There does exist, however, a very comprehensive data set of surface water chemical parameters, collected at Keshole Point located approximately 4 miles south of Awake's. The data set consists of weekly measurements spanning the last 4 years, and could serve as an excellent preliminary baseline to monitor changes in water chemistry resulting from development activities.

Because of the homogeneity of the coastline and the

lack of shoreline development between Keshole Point and Awake'e, it is reasonable to assume that the present water quality at the two sites is similar. Table 1 shows the means and standard deviation of 13 water chemistry parameters that represent the coastal waters of the Awake'e region.

Descriptively, the nearshore waters off Awake'e are classed by the State Department of Health as AA, and can be considered pristine. Lack of suspended material results in extreme water clarity. There are no streams entering the sea along the development frontage, but there is evidence of high volumes of ground water extrusion, as is typical of the region. Groundwater extrusion can cause variation in water quality parameters close to the shoreline in localized areas. Awake'e Bay showed definite effects of groundwater discharge in the form a visible surface lens of low salinity water and increased nutrient concentrations. Water samples collected below the surface of Awake'e Bay had dissolved Si concentrations of about 14 micromolar, and $\text{NO}_3^- + \text{NO}_2^-$ of 0.7 micromolar. Typical ground water from the Island of Hawaii has Si and $\text{NO}_3^- + \text{NO}_2^-$ concentrations of about 800 and 50 micromolar, respectively. Comparing the concentrations of these nutrients in Awake'e Bay to open ocean water (see Table 1) indicates that there is considerable ground water extrusion in the coastal region of Awake'e. Such groundwater discharge is sufficient to cause the pristine waters of Awake'e Bay to exceed the

Table 1. Water quality parameters (mean and 1 std deviation) for coastal surface waters off Keshole Pt., Hawaii and Awake'e Bay. Keshole Pt. data are based on weekly measurements for the past 4 years. Awake'e Bay values are based on replicate samples collected in the course of the present study. For comparison mean values of specific criteria specified by Department of Health water quality standards for "AA" waters are shown. Theoretically, pristine coastal waters should not exceed the specific criteria. Keshole Pt. data courtesy of Natural Energy Laboratory of Hawaii.

PARAMETER	SURFACE SEAWATER		DOH SPECIFIC CRITERIA
	KESHOLE PT.	AWAKE'E BAY	
Temperature °C	25.99 ± 0.93		
Temperature °F	78.79 ± 2.82		
Salinity (°/oo)	34.816 ± 0.172		
pH	8.227 ± 0.049		
Alkalinity (meq/l)	2.318 ± 0.020		
$\text{NO}_3^- + \text{NO}_2^-$ (micromolar)	0.20 ± 0.08	0.69 ± 0.08	0.36
PO_4^{3-} (micromolar)	0.16 ± 0.04	0.22 ± 0.01	0.23
Si (micromolar)	2.98 ± 1.53	14.46 ± 2.09	
NH_4^+ (micromolar)	0.36 ± 0.21	0.46 ± 0.12	0.25
Dissolved organic N (micromolar)	4.34 ± 0.71		
Dissolved organic P (micromolar)	0.24 ± 0.05		
Dissolved oxygen (mg/l)	6.98 ± 0.33		
Total organic C (mg/l)	0.77 ± 0.33		
Particulate organic C (micromolar)	2.88 ± 0.85		
Total suspended solids (micromolar)	0.61 ± 0.52		

geometric mean limits set forth by the Department of Health Water Quality Standards for open coastal waters (see Table 1).

Benthic Community Structure - Corals and Invertebrates

In general, the geologically young age of the Island of Hawaii limits the development of true "coral reefs". Rather, the majority of the offshore benthic (i. e. bottom) environment is a "coral community". The distinction is that, for the most part, corals are growing on substrata composed of basement rock, rather than on calcareous rock of organic (reef) origin.

The typical coral community structure of the west coast of Hawaii has been described in detail by Dollar (1975). Three zones, each characterized by a distinctive substratum type, depth range, range of physical conditions, and single dominant coral species make up the coral community. Figure 3 shows a diagrammatic representation of the west Hawaii coral community structure, while Figure 4 and Tables 2 and 3 summarize quantitatively the results of the benthic community transects off Awaiki and the control station. The community structure off Awaiki corresponds somewhat with the typical pattern presented in Figure 3, although there are some differences.

The most shoreward zone is comprised of the seaward continuation of the basaltic shoreline terrace, scattered with basaltic boulder, which receives most of the force of

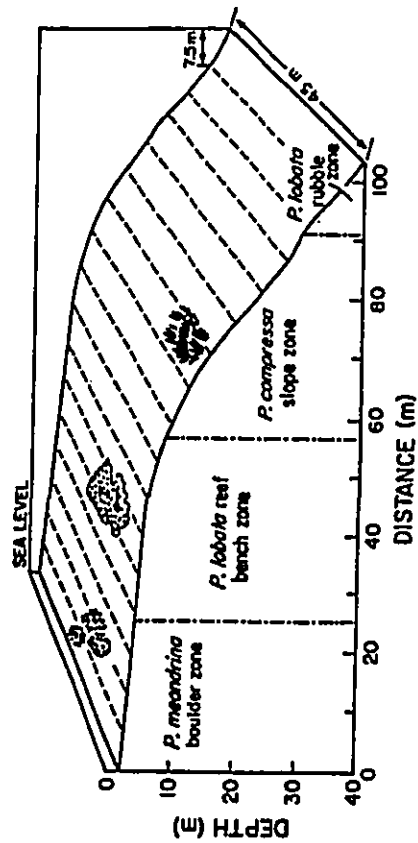


Figure 3. Schematic diagram of typical reef zonation pattern off the Kona coast of West Hawaii. At Awaiki, 15-20 ft. transects were surveyed in the *P. meandrina*-boulder zone, 30 ft. transects in the *P. lobata*-reef bench zone, and 60 ft. transects in the *P. compressa*-slope zone.

breaking waves and surge (see Plate 3). Pocillopora meandrina, a sturdy hemispherical branching species is the dominant coral colonizer of the near-shore terrace. This species rapidly colonizes newly cleared surface, has a small adult colony size of short densely packed branches, and is able to flourish in areas that are physically too harsh, particularly in terms of wave scour, for other species. The 20 ft. transects conducted in Kahoiwa Bay (A-1), and off Kahoiwa Point (A-2) traversed such a Pocillopora meandrina-boulder zone (see Plates 4 and 5).

The nearshore region at stations A-3 and A-4 differed somewhat from this typical pattern. Substrata at these stations, located in Awake's Bay and off Kwikohale Pt. was predominantly limestone (50-73%) rather than basalt (see Table 3). The limestone bench was characterized by high relief in the form of pits, ledges, and pinnacles (see Plates 6 and 7).

Coral cover on the nearshore limestone platform was higher than on the predominantly basaltic bench at stations A-1 and A-2. Coral cover consisted of small colonies of many species, and several species, such as Pavona duerdeni and P. varians, that do not normally inhabit shallow wave-swept areas were observed. As a result, species diversity was higher on the shallow transects at A-3 and A-4 than anywhere else surveyed (see Table 2). Other corals that were observed on the reef bench but did not occur in the transect quadrats were Cyphastrea ocellina, Pocillopora

Table 2. Coral species community structure on Awake's transects.

CORAL SPECIES	TRANSECT DEPTH (ft.)	TRANSECT STATION				CON
		A-1	A-2	A-3	A-4	
<u>Porites lobata</u>	15	7.5	3.5	8.4	7.9	23.0
	30	19.0	29.4	30.9	19.2	34.5
	60	30.5	31.5	27.6	10.6	0
<u>Porites compressa</u>	15	0	0	0	0	0
	30	10.8	25.4	10.2	0	0
	60	27.8	36.8	15.8	9.3	65.5
<u>Pocillopora meandrina</u>	20	3.9	6.6	6.0	4.9	3.0
	30	0.8	0.4	0.4	0.9	1.0
	60	0	2.1	2.0	9.3	0
<u>Montipora patula</u>	20	0	0.3	0.1	0	0.1
	30	0	0	0	0	0
	60	0	0	0.1	0	0.1
<u>Montipora verrucosa</u>	20	0.4	0	0.1	0.3	0
	30	0.7	0.4	0.3	1.1	0.1
	60	1.0	0	0.1	0.1	0
<u>Leptastrea purpurea</u>	20	0.1	0.9	0.2	0	0
	30	0	0	0	0	0
	60	0	0	0	0	0
<u>Pavona varians</u>	20	0	0	2.0	8.0	0.1
	30	0	0	0	0.9	0
	60	0.2	0	0	0	0
<u>Pocillopora eydouxi</u>	20	0	0	1.9	0	0
	30	0	0	0	0	0
	60	0	0	0	0	0
<u>Pavona duerdeni</u>	20	0	0	0	5.1	0
	30	0	0	0	0	0
	60	0	0	0	0	0
TOTAL % CORAL COVER	20	11.9	11.5	18.7	26.2	26.1
	30	31.3	55.6	41.8	22.1	35.6
	60	59.5	70.4	45.6	20.1	70.0
NUMBER OF CORAL SPECIES	20	4	4	6	5	4
	30	4	4	4	4	3
	60	4	3	4	4	3
CORAL SPECIES DIVERSITY	20	0.811	1.016	1.300	1.407	0.403
	30	0.849	0.766	0.647	0.451	0.147
	60	0.785	0.804	0.835	1.077	0.221

demicornis, Psammocora (Stephanaria) stellata, and Montipora flabellata.

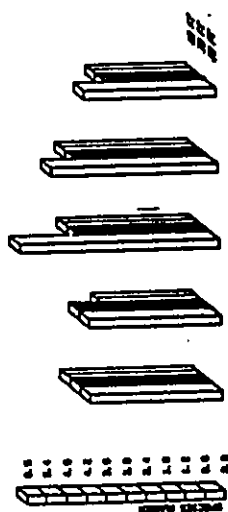
Besides corals, the dominant benthic organisms in the near-shore surge zone were encrusting coralline algae (Porolithon spp.), and the sea urchins Echinometra mathaei and Echinostrephus aciculatus. These urchins bore into the reef surface and dead coral colonies and give the substrata an irregular pitted appearance. In some areas of the limestone terrace densities of the urchins is on the order of 50 individuals per square meter. Very few other benthic invertebrates occur in the near shore zone owing to the frequent impact of breaking waves and high surge.

Seaward of the edge of the shallow surge zones, the bottom is predominantly a flat basaltic terrace, interspersed with lava extrusions and sand channels (see Plate 8). The reef terrace normally varies from about 200 to 400 feet wide, with a depth range of 15 to 50 feet. Porites lobata is the dominant coral in this area, occurring in a variety of growth forms. The species predominantly takes the shape of short, thick lobed colonies (see Plate 9). Because of increased water depth and distance offshore, reduced wave scour results in greater proportions of coral cover on the reef bench. It is in this zone that the most number of corals occur, and where early stages of "reef formation" are beginning. The 30 ft. Awake's transects represent typical Porites lobata-reef bench environments. The single exception is the 30

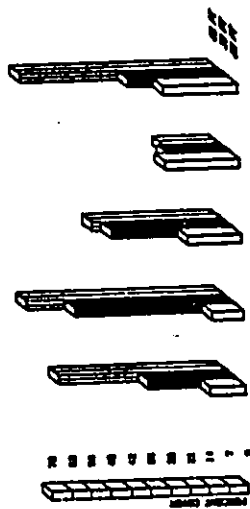
Table 3. Reef substrata composition on Awake's transects.

SUBSTRATA TYPE	TRANSECT DEPTH (ft)	A-1	A-2	A-3	A-4	CON
Sand	20	0	0	0.6	0	0
	30	8.0	1.2	7.2	0	9.5
	60	6.0	0	17.4	7.2	0
Limestone	20	1.0	3.6	73.1	50.1	14.3
	30	20.7	0	51.0	37.2	23.2
	60	10.7	0	7.0	5.0	0
Coral rubble	20	0	0	0	0	1.0
	30	0	27.4	0	15.8	13.6
	60	2.5	28.2	30.0	58.4	30.0
Basalt	20	87.1	84.9	7.6	23.7	58.6
	30	40.0	15.8	0	24.9	18.1
	60	21.3	1.4	0	9.3	0

AWAKE'E - NUMBER OF CORAL SPECIES



AWAKE'E CORAL COVER



AWAKE'E - CORAL SPECIES DIVERSITY

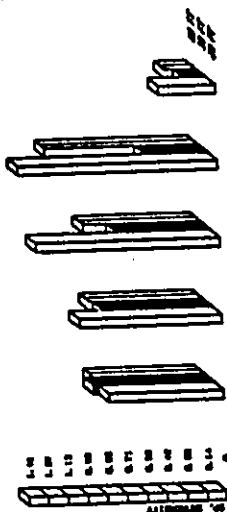


Figure 4. Bar graphs showing number of coral species, percent coral cover, and coral species diversity on Awake'e transects.

ft. transect off Kavihohale Pt. (A-4). Relatively low coral cover on this transect is the result of destruction of a large percentage of living coral cover, apparently by localized storm wave stress.

The major taxa of benthic organisms, other than corals, occurring on the Awake'e reef terrace are sea urchins (Echinoidea) and sea cucumbers (Holothuroidea). By far the most abundant urchins are the two species that bore into limestone surfaces, Echinometra mathaei and Echinostrephus aciculatus. In the reef bench zones, densities of these urchins is often of the order of 30 individuals per square meter. Less abundant, but ubiquitous across the entire reef, are the larger species of urchins, Triplaneustes gratilla, Echinothrix diadema, and Heterocentrotus mamillatus.

Most common of the sea cucumbers are the species Holothuria atra and H. mauritiana, which occur mainly in the P. lobata-reef terrace zone. Encrusting calcareous algae is abundant on bare limestone surfaces, and on the non-living parts of coral colonies.

Frondose benthic algae are conspicuously rare on the reefs of West Hawaii. Several plants were observed, however, off Awake'e. These included the brown algae Turbinaria ornata, and Padina spp.

None of the assemblages of these organisms constitutes any unusual or rare community. In addition, none of the algal communities associated with early successional stages

of recolonization following denudation of substrate by wave action were observed.

Typically, at the seaward edge of the reef bench, the slope of the bottom increases, and substratum consists primarily of unconsolidated rubble and sand. Porites compressa, commonly called "finger coral" covers the reef slope in the form of dense interconnected thickets that extend to a depth of approximately 90 ft. Below the lower limit of coral growth, bottom cover consists of white sand.

At Awake's, the slope of the deep reef is somewhat less than other parts of the Kona Coast. Submerged lava flows encountered along much of the deep reef zone caused the bottom to be relatively flat compared to the normal reef slope angle of about 40°. As a result, coral cover on the 60 ft. transects was dominated less by finger coral than in areas with steeper slopes, such as at the control site. Total coral cover, however, was relatively similar on the Awake's transects compared to the control as a result of high cover of Porites lobata (see Plate 10). Again, coral cover at station A-4 was low, apparently due to damage to living coral by storm waves.

The boring sea urchins found in the reef terrace zones are essentially absent from the slope zone owing to the lack of solid substrata. The sea urchins Echinothrix diadema, Heterocentrotus mammillatus, and Tridacna are found on the reef slope, although in reduced abundances compared to the shallow zones. Encrusting red

coralline algae, predominantly Porolithon spp. and Porolithon rubra, were commonly observed on the deeper reef slope on the Porites compressa reef framework.

The design of the reef survey was such that no cryptic organisms or species living within interstitial spaces of the reef surface were enumerated. Since this is the habitat of the majority of mollusks and crustaceans, detailed species counts were not included in the transecting scheme. No dominant communities of these classes of biota were observed during the reef surveys at any of the study stations.

In general, the lower diversities at the control site (selected on the basis of a protected exposure from waves) compared to the Awake's transects are the result of community domination by a single species within each zone. Storm damage preferentially reduces the cover of that species, resulting in a more equitable distribution, and hence higher diversity, following the storm damage. These storm events of moderate intensity seem to prevent dominance and resource monopolization by differentially affecting the most abundant species or the species highest in competitive ability. Infrequent storms of very high intensity wipe out all corals and return coral communities to a bare pioneering stage.

In this scheme, the reefs off Awake's can be characterized as subjected to moderate levels of natural stress, primarily in the form of wave energy. In general,

the offshore environment reflects the normal community structure found on the west coast of Hawaii.

Reef Fish Community Structure

Reef fish community structure was largely determined by the topography and composition of the benthos. Transect results are presented in Table 4 and Figure 5.

The reef fish community off Awake's is typical of that found along most of the Kona Coast (Hobson 1974, Walsh 1984), and can be grouped into six general categories: juveniles, planktivorous damselfishes, herbivores, rubble-dwelling fishes, swimming tetrodons, and surge-zone fishes.

Juvenile fishes belonged mostly to the family Acanthuridae (surgeon fishes), with representatives from the families Labridae (wrasses), Mullidae (goat fishes) and Chaetodontidae (butterfly fishes).

Juveniles were most abundant on the deepest transects of the reef slope zone (60 ft.) in areas dominated by finger coral (Porites compressa). The complex habitat created by the growth form of P. compressa provides shelter for small fish.

Apparent storm damage to the mats of finger coral in the deep slope zone at station A-4 appeared to lower substantially the percentage of living finger coral. It can be seen, however, that fish abundance and diversity does not reflect the decrease in coral cover (Figure 5).

Table 4. Reef fish community structure on Awake'e transects.

	A-1 45'	A-1 30'	A-1 15'	A-2 70'	A-2 30'	A-2 10'	A-3 60'	A-3 30'	A-3 10'	A-4 55'	A-4 30'	A-4 10'	CONT 70'	CONT 30'	CONT 20'
MURAENIDAE															
<i>Gymnothorax melegrus</i>					1						2				
AULOSTOMIDAE															
<i>Aulostomus chinensis</i>		1			1		3						1	1	1
HOLOCENTRIDAE															
<i>M. berndti</i>				23							20	6			4
CIRRHITIDAE															
<i>Cirrhites pinnulatus</i>		1						1			1	2	3	3	1
<i>Paracirrhites arcatus</i>	3	1			2						2	1		1	
<i>P. fosteri</i>					1										
MULLIDAE															
<i>Mulloidichthys flavolineatus</i>	15			440				3					60		5
<i>M. vanicolensis</i>						3		1							
<i>Parupeneus pleurostigma</i>															
<i>P. multifasciatus</i>	5	16	10	7	12	4	15	6	9	12	13	12	5	7	7
<i>P. cyclostomus</i>		1	1					1	1						2
SERRANIDAE															
<i>Cephalopholis argus</i>				3			3			2					
CARANGIDAE															
<i>Caranx melampygus</i>							1					1			
LUTJANIDAE															
<i>Lutjanus kasmira</i>				120	1										
CHAETODONTIDAE															
<i>Chaetodon lunula</i>				8				1		8					8
<i>C. quadrimaculatus</i>				3		4	1	1	2			4			
<i>C. milliaris</i>	3			2	2			1		1					3
<i>C. ornatissimus</i>		2		4	2			3		2					
<i>C. unimaculatus</i>	14	23	6	4	9	8	14	16		4	12	8	12	7	10
<i>C. multicinctus</i>				1											
<i>C. kleinii</i>					1	1									
<i>C. auriga</i>	6	2		7	13	1	8	3		3	1	1	2	4	3
<i>Forcipiger flavissimus</i>															
POMACANTHIDAE															
<i>Centropyge potteri</i>	4			3	8		11			1	4		3	3	4
POMACENTRIDAE															
<i>Abudefduf sordidus</i>								6			1			2	1
<i>Plectro. johnstonianus</i>						1							2		
<i>P. imparipennis</i>								3	2				3	1	
<i>Stegastes fasciolatus</i>				8			4								
<i>Dascyllus albisella</i>								21							
<i>Chromis agilis</i>				20	35		35	4		27			60	25	10
<i>C. hanui</i>	3	7		9	7		7			3			15	6	
<i>C. vanderbilti</i>					75	25				13			11	110	105
<i>C. ovalis</i>								1		22					
<i>C. verator</i>				25	20					3					

Table 4. Reef fish community structure on Awake'e transects.

(continued)

	A-1 45'	A-1 30'	A-1 15'	A-2 70'	A-2 30'	A-2 10'	A-3 60'	A-3 30'	A-3 10'	A-4 55'	A-4 30'	A-4 10'	CONT 70'	CONT 30'	CONT 20'
LABRIDAE															
<i>Cheilinus unifasciatus</i>				2	1		1							2	1
<i>Pseudocheilinus octotaenia</i>	3	3			2		3			1			3	3	
<i>P. tetrataenia</i>	1				1		1						3	5	
<i>Bodianus bilunulatus</i>				3	2		2			3	3				
<i>Coris gaimard</i>		3			5		5	3		7	5			2	2
<i>C. venusta</i>								1							
<i>Anampses chrysocephalus</i>		2			1					1			1		
<i>Thalassoma duperreyi</i>		9	32	12		22	21	9	22	9	10	11	9	1	12
<i>T. ballieui</i>								1							
<i>Gomphosus varius</i>			1	1				1			2	1		3	
<i>Labroides phthirophagus</i>								1		1					
<i>Macropharyngodon geoffroy</i>					5		1	1		2	1			1	1
<i>Pseudojulis carasinus</i>		3											2	1	
<i>Stethojulis balteata</i>	3	3			3		2	3	4					10	9
<i>Halichoeres ornatissimus</i>	3	4			2		2	6		1	2		4	1	3
SCARIDAE															
<i>Scarus sodidus</i>	1	3	8	4		7		12	1	4		3	2	3	
<i>S. perspicillatus</i>						1			1					1	
<i>S. psittacus</i>			2	1	1	3							1		
Juvenile <i>Scarus</i>		4	3		3	4		9	15	8	11	7			
ACANTHURIDAE															
<i>Zebrasoma flavescens</i>	47	32	29	35	51	11	42	25	4	68	9	7	37	36	51
<i>Acanthurus achilles</i>	2				7			1		2			2		4
<i>A. leucopareus</i>		1				2									11
<i>A. thompsoni</i>				8						3			80		
<i>A. olivaceus</i>					2	1				2					
<i>A. dussumieri</i>										3					
<i>A. neta</i>						12		1	2		1	3			
<i>A. nigrofasciatus</i>		17	78		18	79	2	24	52		47	74	12	18	12
<i>A. nigrorubrus</i>		2	4								2	2	1	2	2
<i>Ctenochaetus strigosus</i>	49	36	24	40	93		85	119		72	41		26	37	36
<i>Naso litteratus</i>	2		14	11	2	8	8	4		3	3	1	4	3	7
<i>N. unicornis</i>			3											1	
ZANCLIDAE															
<i>Zanclus canescens</i>		1	1	4	4	2	6	2	3	2	2		2	4	
MONACANTHIDAE															
<i>Pervagor spiloscus</i>	15	18	28	36	8	25	12	19	18	13	19	14	27	45	38
BALISTIDAE															
<i>Rhinacanthus rectangulus</i>						1			2			2			
<i>Sufflamen bursa</i>	2	2	2	4		2	2			2	4		2		2
<i>Melichthys vidua</i>											3			1	
<i>M. niger</i>			30	12		1		7	1	3	3	2		2	
<i>Xanthichthys aurimarginatus</i>														1	
TETRAODONTIDAE															
<i>Canthigaster jactator</i>					1			2		3	2	1	1		
SUMMARY															
NUMBER SPECIES	19	36	21	27	39	23	26	35	19	37	26	22	29	35	28
NUMBER INDIVIDUALS	191	194	300	905	425	201	310	300	147	342	204	182	376	355	352
SPECIES DIVERSITY	2.225	2.629	2.463	1.812	2.683	2.214	2.556	2.459	2.173	2.771	2.507	2.252	2.489	2.509	2.496

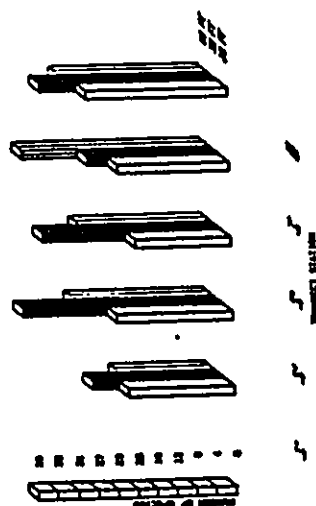
Table 4). Because the coral framework was not completely flattened, habitat complexity was partially maintained in the aftermath of the storm event(s). It is apparent that fish abundance is not related directly to composition of intact living coral, but rather to the degree of shelter afforded by coralline structures, whether alive or dead.

Planktivorous damselfishes, principally of the genus Chromis were extremely abundant in all areas surveyed, and often comprised more than a quarter of the total number of individuals encountered along a transect. Chromis gillii and C. varator predominated at the outer edge of the shelf and in deeper water, whereas C. vanderbilti was the primary shallow water species.

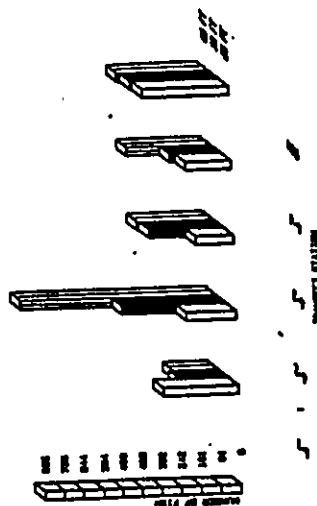
Herbivores, primarily the scanthuride Zebrasoma flavescens and Ctenochaetus strigosus were also abundant. On the shallower reef terrace, adult Acanthurus olivaceus, A. nigrofasciatus and scarids (parrot fishes) were also common. In areas where coral rubble was abundant, common fishes included the angelfish Centropyge potteri, and several species of wrasses, notably Pseudochilinus tetrataenia and P. octotaenia.

Surge zone fishes were not quantitatively assessed because of the difficulty in working on the wave-swept basalt terraces that these fish inhabit. Visual observations, however, revealed that this biotope supported a large number of fishes, principally herbivores of the genera Kyphosus, Acanthurus, and Naso. The wrasses

AVAKE'E - NUMBER OF FISH SPECIES



AVAKE'E - NUMBER OF FISH



AVAKE'E - FISH SPECIES DIVERSITY

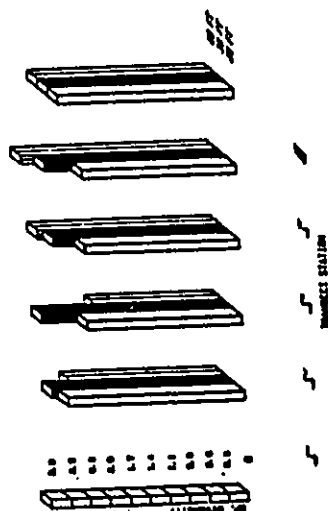


Figure 5. Bar graphs showing number of fish species, number of fish, and fish species diversity on Avake'e transects.

Thalassoma trilobatum and T. purpuraceum were also abundant in the surge zone. Few juvenile fishes were seen inhabiting the boulder zone environment. Triggerfish of the species Melanichthys niger and M. vidua were also observed congregating in the water column over the reef platform.

Several species of "food fishes" (taken by subsistence and/or commercial fishermen) were observed during the survey. A school of several dozen large milkfish (awa) (Chanos chanos), were seen congregating on the surface. Schools of several hundred individuals of goatfish (waka) (Mulloidichthys flavolineatus), opelu (Decapterus macarellus), and blue-lined snapper (kaepe) (Lutjanus kaimira) were observed while diving. A school of waka and kaepe were responsible for the very high numbers of fish encountered at the 60 ft. transect at station A-2 (see Table 4 and Figure 5).

Rocky ledges and large coral heads sheltered fair numbers of squirrelfish (u'u) (Myripristis murdjan). Other food fishes included parrotfishes (uhu) (Scarus spp.), goatfishes (moana kea) (Parupeneus cyclostomus), jacks (papio) (Caranx melampygus), grand-eyed porgeys (mu) (Monotaxis grandoculis), and grouper (Cephalopholis argus). None of these species were particularly abundant. Orange-eyed surgeonfish (kole) (Acanthurus strigosus), while abundant, were generally not large enough to be considered suitable for "food fish".

Overall, fish community structure at Awake's is fairly typical of the assemblages found in undisturbed Hawaiian reef environments. The presence of large schools of some food fishes indicates that the area has been subjected to only light to moderate amounts of fishing pressure, both by aquarium fish collectors or fishermen. The apparent low levels of fishing are undoubtedly a function of the remote location of the site with respect to shore access and the distance from the nearest harbor or boat launching facility.

Threatened or Endangered Species

Three species of marine animals that occur in Hawaiian waters have been declared threatened or endangered by Federal jurisdiction. The threatened green sea turtle (Chelonia mydas) occurs commonly along the Kona Coast, and is known to feed on selected species of macroalgae. The endangered hawksbill turtle (Eretmochelys imbricata) is known infrequently from waters off the Kona Coast. No turtles were observed at Awake's during the course of the present survey. George Balazs, Zoologist with the National Marine Fisheries Service, who specializes in the study of Hawaiian sea turtles, has indicated that while he has not personally visited Awake's, the area is not identified as a turtle nesting, breeding, or aggregating site.

Populations of endangered humpback whale (Megaptera

novaeangliae) are known to winter in the Hawaiian Islands, from December to April. In general, however, it is not common for whales to occupy the shallow reef areas that are the focus of this survey.

Anchialine Ponds

Pond Morphology and Classification

Anchialine ponds are shoreline pools without surface connection to the sea that contain water of measurable salinity, which oscillates with tidal rhythm owing to inland extension of the oceanic water table. Such ponds are known to occur around the world in lavas and elevated fossil reefs. In the Hawaiian Archipelago, anchialine ponds exist almost exclusively along the shorelines of Hawaii and southwest Maui. The term "anchialine" (from the Greek "anchialos" meaning near the sea) was coined by Holthuis (1973).

Until the relatively recent increase in coastal resort development, little work had been done on the biological and chemical structure of Hawaiian anchialine ponds. The first comprehensive survey was carried out by Maciolek and Brock (1974), in which 303 closed (no surface connection with the ocean) ponds on the Kona coast were inventoried with regard to location, environmental characteristics, biota, and historical relationships. More recently, ponds in the vicinity of several resort developments, including

the Awake's area have been surveyed (Ol Consultants, 1984).

At Awake's, a series of ponds is located at the southwestern corner of the property, between Awake's Bay and Kawikohale Pt. (see Figure 2). The pond system continues farther south on the adjacent property (Makelaena). Lack of ponds on the northern portion of Awake's appears to be due to relatively steep coastal topography. The area where the ponds occur lies in an area of low topography behind a coastal berm composed mainly of coral rock (see Plate 3).

Eighteen ponds were numbered and surveyed within the Awake's property. Several depressions smaller than 2 ft. in diameter containing water were encountered, but were not numbered. Low areas that appeared to be old ponds, evidenced by white calcareous precipitate on the rocks, were also not included in the inventory.

While the ponds are concentrated in a small geographical area, and can therefore be considered a single system that exchanges water above and below ground, they are surprisingly diverse in size and type. Table 5 shows the dimensions, approximate area, depth and type. Using the same size and depth classifications as Maciolek and Brock (1974), 4 of the Awake's ponds are large (>1000 sq. ft.), 11 ponds are medium (100-1000 sq. ft.), and 4 are small (<100 sq. ft.). Four of the Awake's ponds have "apparent" bottoms (depth to rock bottom) classified as shallow (<20 in.), 14 are moderate in depth (20-60 in.),

Table 5. Awake's pond type classifications and dimensions.

POND NUMBER	POND TYPE	LONG AXIS (ft.)	SHORT AXIS (ft.)	AREA (ft. ²)	MAX. DEPTH (in.)
1	A'A	15	14	165	16
2	ORANGE CRUST	24	18	339	25
3	A'A	12	8	75	13
4	A'A	33	27	448	27
5	ORANGE CRUST/SED.	70	30	1649	24
6	ORANGE CRUST	23	19	343	30
7	SEDIMENT	24	16	301	32
8	A'A	15	15	175	21
9	A'A	23	14	253	32
10	SEDIMENT SURFACE MAT	85	60	3000	47
11	A'A	7	5	27	14
12	MARSH	25	14	275	6
13	A'A	32	9	226	42
14	A'A	12	7	66	32
15	A'A	15	6	71	40
16	A'A	57	8	358	47
17	A'A	28	14	307	28
18	A'A	86	32	2161	29

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and none can be classified as deep (>60 in.).

Awake's ponds are classified by type according primarily to composition of the bottom. "A'a" ponds are depressions in lava rock with no growth of benthic macroalgae, and no sediment accumulation. A'a ponds are the most abundant type at Awake's (12 of 18). Ponds 13-18 all occurred in a relatively recent lava flow and all are very similar in structure (see Plates 11-16).

"Orange crust" ponds are similar to a'a ponds except that the bottom rock is covered, at least in part, by orange-brown mineralized crusts of the blue-green algae Schizothrix sp.. Maciolek and Brock (1974) reported that 20% of the ponds surveyed on the Kona coast contained such algal crusts (see Plates 16-19).

"Sediment" ponds contain bottom layers of unconsolidated muddy sediment up to 2 feet deep (see Plates 20-22). No compositional analyses were performed on Awake's sediments, although the material appears to be mainly the calcareous and organic residue of Schizothrix and other forms of algae. Deep sediments appeared to be anoxic owing to the odor of reduced sulfides, and ebullition of bubbles, possibly of methane.

It is somewhat perplexing why one pond contains a substantial sediment layer, while another pond, only several feet away, can be completely devoid of sediment. The best hypothesis is that shallow ponds are flushed so effectively by tidal action that detrital material

generated by the algal crusts cannot accumulate as sediments. Deeper ponds, however, with a somewhat longer residence time (slower turnover time), are not as effectively flushed, and can retain some of the algal detritus as sediment. Once initial sediment deposition takes place, porosity of the bottom rock is reduced and residence time is increased further, allowing sediment accumulation to increase. With this feed-back scheme, ponds may eventually become senescent and choked by sediment buildup.

One pond (no. 10) contained a surface mat of slimy green algae that appears to be an alternate growth form of Schizothrix (see Plate 24). A berm of dried algal mat ringed the pond, apparently from periodic cleaning of the water surface (see Plate 25). The reason for this cleaning activity is not known, but may have been to keep the pond functional as a fish enclosure.

Pond 12 occurred within a grove of milo (Thespesia populnea), and palm trees and had the characteristics of a marsh environment. Water depth is very shallow (6 in.) and the pond bottom consists of a mat of tree leaves, branches and other decaying plant material.

One common characteristic of all pond types is evidence of cultural modification. Many of the a's ponds contained walls that divided the ponds into sub-sectors, or modified pond boundaries. As mentioned above, the large pond with a surface mat appeared to be systematically cleaned.

Dating such cultural modification of ponds is not possible, although it is probable that much of the activity was conducted by populations of Hawaiians that inhabited the area in the early 1900's (P. Rosendahl, personal communication).

Water Characteristics

Table 6 shows nine chemical parameters for the 18 Awake's ponds. Measurements were made only once, so ranges in the values owing to daily or seasonal periodicity are not taken into account.

Salinity of all ponds is between 6 and 10 ‰, with a mean of 8.3 ‰. MacIsaac and Brock report that the average salinity for all Kona coast ponds is 7 ‰, close to the average for the Awake's system. There is a slight horizontal gradient in salinity, with the ponds closest to the shoreline (no. 17) having the highest salinity, while the pond farthest from the coastline (no. 11) had the lowest salinity. None of the ponds appeared to have vertical profiles in salinity. Salinity can be expected to oscillate with the tidal cycle; at high tide salinity will be maximized owing to greatest inland excursion of seawater.

Pond temperature averaged 24.8° C. and ranged from 23.3° to 26.5°. All measurements were made on an overcast day, so solar heating of ponds was minimized. Generally

Table 6. Awake's pond water chemistry parameters.

POND NUMBER	SALINITY (°/oo)	TEMP. (°C.)	O ₂ mg/l	O ₂ % Sat.	pH	PO ₄ ³⁻ (µM)	NO ₂ ⁻ +NO ₃ ⁻ (µM)	NH ₄ ⁺ (µM)	Si (µM)
1	9	24.5	7.37	89.8	8.21	6.11	52.23	0.37	809.31
2	8	24.5	7.19	85.8	8.22	6.17	52.49	0.61	814.16
3	8	24.3	7.70	92.6	8.24	-	-	-	-
4	8	24.8	7.35	91.0	8.23	6.24	55.33	0.21	823.86
5	8	25.0	8.91	110.0	8.23	5.94	48.65	1.09	814.16
6	7	24.9	6.60	80.3	8.27	6.26	54.09	0.55	814.16
7	8	25.8	10.34	125.0	8.26	5.49	42.23	1.00	794.77
8	8	25.0	7.80	95.6	8.22	6.43	55.89	0.35	833.55
9	8	23.3	7.79	93.7	8.23	6.56	54.09	0.32	833.00
10	8	26.5	15.07	189.0	8.43	6.62	17.19	1.07	765.68
11	6	23.4	7.75	93.0	8.18	6.33	53.61	0.37	833.55
12	8	25.3	2.35	31.0	7.99	6.65	32.75	2.58	814.16
13	9	25.6	7.46	93.0	8.33	5.81	47.90	0.39	751.13
14	9	24.9	7.61	93.0	8.28	6.17	51.33	1.17	794.77
15	9	24.5	7.85	96.2	8.34	5.98	53.24	0.70	785.05
16	9	25.2	7.93	97.9	8.37	5.56	52.71	0.34	746.28
17	10	25.1	8.12	101.0	8.35	4.79	52.94	0.42	741.43
18	9	24.6	8.10	100.0	8.35	5.85	53.35	0.39	755.98

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ponds farthest from the coastline, and ponds with no sediment, were cooler, apparently owing to higher rates of groundwater turnover.

All a's ponds were essentially saturated with dissolved oxygen. Sediment ponds were supersaturated with oxygen from 110 to 190% owing to photosynthetic activity of algae and vascular plants. The single marsh pond (no. 12) had oxygen concentrations well below saturation (31%); a result of oxidative decomposition of the detrital mat, and lack of benthic algal mat photosynthesis.

pH mirrored dissolved oxygen in that ponds with high rates of photosynthetic activity had more alkaline values, while the pond with active decomposition was more acidic owing to higher levels of CO₂. Average pH of all ponds was 8.26

Turbidity was not measured in the Awake's ponds. All ponds appeared clear and transparent, with no suspended particulate loads. Even ponds with thick sediment layers and surface algal mats had clear water columns. Turbid water columns are usually caused by dense populations of phytoplankton. The extensive and frequent exchange of water prevents suspended phytoplankton communities from developing in the Awake's ponds.

State of Hawaii Department of Health water quality standards (Chapter 54 of Title 11) exempt anchialine ponds from meeting specific water quality criteria, which include dissolved inorganic nutrient concentrations. However,

because nutrient levels may change as a result of development, a set of baseline data was collected from the Awake's ponds. It can be seen in Table 6 that pond waters contain very high levels of $\text{NO}_3^- + \text{NO}_2^-$, PO_4^{3-} and Si compared to open coastal ocean water, and water in Awake's Bay (Table 1). High nutrient levels found in the ponds reflect the dominance of groundwater composition.

Anchialine Pond Biota

Anchialine pond biotic communities are characterized by a rather unique assemblage of organisms of relatively low species diversity. Maciolek and Brock (1974) listed 55 species of closed pond organisms, and considered 27 species "common" in Kona coast ponds. Table 7 shows the occurrence of organisms in the Awake's ponds. Distributions of organisms identified in the Awake's ponds must be considered somewhat incomplete because the ponds were sampled only once during daylight hours. Therefore, species that appear periodically or are very scarce could have escaped detection. The organisms that were observed, however, appear to constitute the majority of pond biota and can be considered a valid representation of the overall community structure of the Awake's pond system.

The most ubiquitous plant groups are the orange algal crusts (*Schizothrix*) that occur in shallow, low salinity ponds, and dark green algal mats that occur in deeper, more

saline ponds (none of the green mats were observed at Awake's). The undersides of rocks from a's ponds contain small algal cells that constitute the only plant material in some ponds. Ponds with deep soft sediment layers often have surface films of grey-green material, possibly diatom mats.

Ponds with substantial sediments contained the vascular plant *Ruppia maritima*, commonly known as widgeon grass. *Ruppia* roots in the sediment, and forms clusters that may be exposed at low tide (see Plate 21).

Typically, the most abundant fauna of anchialine ponds are snails and shrimp. Maciolek and Brock (1974) classify four shrimp, three snails, and two native fish as being "representative" pond organisms. Two of the shrimp species, *Halocaridina rubra* (opae'ula) and *Metabetaeus lohena* are considered rare, found only in anchialine areas, but are normally the most common shrimp found in ponds. The other two shrimp species, *Palaeomon debilis* and *Macrobrachium grandimanus*, are found in estuaries and streams as well as anchialine ponds. Shrimp were extremely scarce at Awake's and only one species, *Halocaridina rubra*, was observed.

The three representative snails, *Assiminea* sp., *Melania* sp., and *Theodoxus cariosa*, typically found in tide pools and anchialine ponds, especially on the undersides of rocks, were ubiquitous in the Awake's system.

Representative pond fish, *Eleotris sandwicensis* and

Table 7. Occurrence of common organisms in Awake's ponds.

POND NUMBER	<i>Schizothorax</i> sp.	<i>Ruppia maritima</i>	<i>Helantia</i> sp.	<i>Astartinae</i> sp.	<i>Theodoxus carlesii</i>	<i>Halocartidium rubra</i>	<i>Metapleurostoma</i> sp.	<i>Pocillia</i> spp.	"Guppies"	<i>Thalassoma duperoyi</i>	<i>Abudefduf abdominalis</i>
1	X	-	X	X	-	-	-	X	X	-	-
2	X	-	X	X	X	-	-	X	X	-	-
3	-	-	X	X	-	-	-	-	-	-	-
4	X	-	X	X	X	-	X	X	X	-	-
5	X	X	X	X	X	-	-	X	X	-	-
6	X	-	X	X	X	-	-	X	X	-	-
7	X	X	X	X	X	-	-	X	X	-	-
8	X	-	X	X	-	-	-	-	X	-	-
9	X	-	X	X	-	-	-	X	X	-	-
10	X	X	X	X	X	-	-	X	X	-	-
11	X	-	X	X	X	-	-	X	X	-	-
12	-	-	X	X	X	X	-	X	X	-	-
13	-	-	X	X	-	-	-	X	X	X	X
14	-	-	X	X	-	-	-	-	X	-	-
15	-	-	X	X	-	-	-	-	X	-	-
16	-	-	X	X	-	-	-	-	X	-	-
17	-	-	X	X	-	-	-	-	X	-	-
18	-	-	X	X	-	-	-	-	X	-	-

Kuhlia sandvicensis, were not observed in any of the Awake's ponds.

The absence of many of the representative species indicates that the faunal makeup of the Awake's ponds was found to be somewhat atypical of pond ecosystems. The most obvious characteristic of the Awake's pond biota is the lack of shrimp and native fish species, and the overwhelming domination by introduced fish. The observed exotic fish, topminnows (*Pocillia* spp.) and guppies, occurred in all ponds. The other recognized introduced species *Tilapia* sp. were not found in the Awake's ponds. No attempt was made to enumerate the exotic fish, but it is estimated that densities were on the order of hundreds to thousands of fish per pond in the sediment, marsh, and older a's ponds (nos. 1-12, and tens of fish in the newer a's ponds (nos. 13-18). In contrast, only two shrimp (*Halocaridina rubra*) in pond 12 were observed during the course of the entire Awake's survey. The lack of shrimp, and extensive presence of exotic fish, in these ponds was also noted by OI Consultants (1984) and Brock (1985).

Maciolek and Brock (1974) found inverse relationships between fish and shrimp abundance, and native and exotic fish abundance, in anchialine ponds. Introduced species, which can complete their life cycle within the ponds, appear in much larger numbers compared to native fish which enter the ponds only as post-larval forms. As a result of the high densities, introduced species appear to be much

more effective predators of shrimp than native fish. The abundance of introduced fish and the lack of shrimp observed at Awake's fits the scheme of high predatory pressure on native shrimp species. As mentioned above, no attempt was made to census the Awake's fauna at night. In most ponds that have been inspected at night, the major difference in species composition is a higher abundance of shrimp, apparently because feeding by predatory fish is limited to daytime. It is possible that shrimp in the Awake's ponds were in hiding during the day, and may have been observed at night. However, 24 hour surveys of ponds at Makalawens showed only a slight increase in shrimp abundance at night (OI Consultants 1986). In any event, it is apparent that shrimp populations appear to be severely depressed at Awake's.

The long-term effects of changes in biotic composition of anchialine ponds owing to introduction of exotic fish is not clearly understood at present. It has been hypothesized that the elimination, or reduction, of shrimp may result in a change of dominant algal species, which in turn could permanently alter the structure of pond ecosystems (Brock 1985).

CONCLUSIONS

The ultimate purpose of the data collected during the baseline survey is to provide information on the degree of environmental impact that might occur as a result of

construction and operation of the Awake's development.

Implementation of the proposed action would involve grading, vegetation removal, new construction and other changes to the existing environment on several hundred acres of land. There are currently no plans, however, for direct modification of the shoreline for such purposes as marina or beach construction, or direct alteration (i.e. filling) of any of the anchialine ponds. Therefore, any potential impacts to the aquatic environments must be considered as indirect processes that come about as results of activities on land.

With regard to the aquatic resources, the major potential indirect impact parameters appear to be increased sedimentation from wind or runoff as a consequence of grading, and changes in groundwater discharge and surface runoff, especially with respect to nutrients from sewage effluent used for irrigation and golf course fertilization, as well as possible impacts from herbicides and pesticides used on the golf course.

Below, each of these factors is treated in turn followed by a summary section which addresses the potential for impacts to the Awake's environment as a whole.

Increased Sedimentation and Runoff

A potential cause of impact to the marine environment resulting from nearshore development is increased sediment

loading. While corals and other reef organisms are capable of removing sediment suspended by natural phenomena, there are threshold levels of deposition where cleaning mechanisms are overwhelmed and organisms become buried.

The offshore environment at Awake's does not appear to be especially susceptible to suspended loads. In addition, the reefs do not appear to be subjected to any substantial level of natural sedimentation from land runoff. Sediment could be transported as wind-borne dust or runoff during the period when ground cover is removed during grading. Increased sedimentation does not appear, however, to be a likely source of environmental alteration for the development scenario at Awake's. Ground cover to be graded is either barren lava that has not been weathered to any appreciable extent, or scrub brushland with a thin soil layer. When these materials are moved and crushed by bulldozers a smooth surface of cobbles 1 to 4 inches in size generally results. In addition, only a fraction of any wind-blown material generated would be carried in a westerly direction toward the ocean and ponds. As the size distribution of the wind-blown fraction would probably be in the silt-clay range, it would be expected that this material would remain in suspension for some time if it entered the water column, and therefore it is unlikely that any measurable settlement would occur anywhere in the nearshore marine environment.

Increased sedimentation also does not appear to be a

source of alteration for the pond systems. Most of the shallow ponds do not presently contain sediment of organic origin due to rapid flushing. An addition of a small fraction of sediment of inorganic material from wind-blown deposition would not appear to alter the flushing characteristics of the ponds. Several ponds that already contain substantial sediment layers would also show little effect from any incremental additions caused by deposition of fine material on the pond surface.

Likewise, for several reasons it is not expected that runoff during construction would increase oceanic sediment loads. The climate of the Awake's region is one of the driest in the Hawaiian Islands; therefore substantial rainfall during construction is rather unlikely. However, in the event of heavy rainfall, the porous nature of the lava and soil ground cover is such that sheet flow carrying suspended sediment toward the ocean is highly unlikely. Rather, most rainwater that enters the ocean as runoff appears to do so following percolation through the surface rock layers to the water table and subsequent groundwater extrusion at the shoreline. Such groundwater flow would not have the effect of transporting sediment to the ocean since the basal rock acts as a filter. Normal volumes of groundwater extrusion ranges in the neighborhood of 3-6 mgd per mile; the increase to this volume owing to direct rainfall and percolation is likely to be insignificant. For a similar development on the Kona coast at Waikoloa, it

was estimated that the annual discharge of stormwater runoff is roughly equivalent to the the amount of groundwater which enters the ocean each day (U. S. Army Corps of Engineers 1985). Therefore, a major effect of rain during the period of grading might be to significantly decrease the amount and distribution of airborne dust--a circumstance that would have to be considered a beneficial side effect.

At this time no estimates exist of how drainage patterns might be changed as a result of the development plans. There appear to be no areas offshore of the Awake's boundaries where marine systems have been adversely affected by runoff to date. It is expected that this would remain the case. However, if analyses indicate that the proposed changes in land use and drainage patterns might result in substantial changes in water quality, additional field surveys will be conducted to determine the best location for the discharge of drainage and to assess the significance of expected water quality with respect to marine community structure.

Several other scenarios around the Hawaiian Islands can also be drawn upon to estimate the potential for impact from sedimentation at Awake's. In particular, a study conducted at Princeville, Kauai (Grigg and Dollar, 1980) compared the reef environments off the completed phase of the resort with the environments off an area of pristine coastline. The hypothesis tested during this comparison

was that increased runoff during construction caused some modification of the coral reef environments offshore. Results of the survey showed that, if anything, the coral environments were better developed off of the existing Princeville development that was subjected to increased runoff than off the unperturbed parcel. Even though the resort construction might have temporarily increased suspended sediment loads, this increase would have been insignificant in comparison to the natural sediment loads to which the reef communities are already pre-adapted. Therefore, the hypothesis was rejected that developmental alteration of land for Princeville construction, and by inference for similar developments such as Awake's, could result in offshore impacts to the marine environment.

In addition, while it is generally accepted that sedimentation is a major source of impact on coral reefs throughout the world, several studies show that Hawaiian reefs may be significantly more resistant to heavy sediment loads than other reef areas. Results of surveys conducted at French Frigate Shoals (Dollar and Grigg, 1981) following the inadvertent grounding of a freighter and subsequent dumping of 2000 tons of a fine-grained mineral clay indicated that there was no damage to the reef corals and associated communities except where the organisms were actually buried by clay deposits for greater than a two week period. Another study, conducted in Hilo Bay where natural sediment loads are very high, resulting in

extremely turbid conditions, reported that the dominant bottom cover consisted of nearly solid living coral - a condition rarely found under even the most "optimal" conditions (Dollar 1985).

Increased Nutrient Loading From Irrigation and Fertilization

Because operation of the Awake's resort calls for construction of a golf course that will probably be irrigated and fertilized with treated sewage effluent, the potential for impacts to the aquatic ecosystems owing to high rates of nutrient loading must be considered. When subjected to substantial increases in nutrients, the response of marine and freshwater systems is termed "eutrophication", and consists of increased growth of a portion of the community that is able to directly utilize the nutrients (phytoplankton), generally at the expense of normal community integrity. The overall result of this process is usually a degradation of environmental quality. In the past, coral reefs in some areas of Hawaii, primarily Kaneohe Bay and off Sand Island on Oahu, have been severely damaged in this manner by sewage impacts.

At Awake's, it is not anticipated that such impacts will occur for several reasons. Most importantly, the unrestricted circulation of the offshore zone by tides, current, meso-scale eddies, wind, and wave action promotes rapid dilution and water exchange. Residence time of a

parcel of water fronting the development is probably on the order of hours, so buildup of any nutrient materials is unlikely. It was also concluded that resort development at Waikoloa would cause no changes in nutrient concentrations in the marine environment owing to rapid mixing and dilution (Corps of Engineers 1985).

Another reason that the marine environment will probably show no effects as a result of golf course irrigation is that much of the nutrient load is taken up by the vegetation on the golf course. Chang and Young (1977) report that on a golf course on Oahu irrigated with treated sewage effluent 98% of the total nitrogen and 100% of the total phosphorus was taken up by the soil-plant surface layer. Chemical processes that account for the uptake include incorporation into plant biomass, cation exchange, fixation and adsorption on the soil, biological oxidation and denitrification. The important aspect of the study conducted on the Oahu golf course is that essentially none of the nutrient load reaches the marine environment through groundwater runoff.

Another factor that accounts for the lack of potential for impact is the secondary level of sewage treatment planned for the development effluent. Studies done at several of the ocean discharges on Oahu that intentionally discharge much greater volumes of secondary sewage into marine environments indicate there is no detrimental effects whatsoever due to the discharge. In fact, the

impacts that have been reported all can be considered beneficial since they result in increased fish populations, apparently in response to increased particulate food and shelter due to the outfall structure. Based on these observations, it is probable that even if malfunctions in sewage plants cause discharge directly into the ocean, there will be little or no effect to water quality or biotic communities.

It is possible that resort development might cause alteration in anchialine pond water chemistry owing to changes in groundwater discharge. OI consultants surveyed ponds at Anahoomalu in 1977 and 1984, before and after construction of the Waikoloa Beach Resort. Comparison of the salinity, temperature, and nutrient levels suggested that there were effects to the ponds. In the post-development survey ponds were approximately 1.5° C cooler, and 1.5 ‰ less saline. Average concentrations of NO_3^- , PO_4^{3-} , and NH_4^+ in 1984 exceeded the 1977 averages by 98%, 55% and 134%, respectively. These increases are attributed to runoff from the golf course because the nutrient concentrations were also higher than contained in groundwater from the area.

It appears that the increased nutrients and decreased salinities were the result of increased input to the groundwater from resort activities. The amount of brackish water used daily by the resort is of a similar magnitude to the amount of natural groundwater flux through the system.

indicating that effects could be detectable. Such increases would decrease the contribution of sea water to the ponds, resulting in the observed changes. It is somewhat puzzling, however, that the Awake's pond nutrient concentrations are closer to the post-development Waikoloa ponds than the pre-development, because there are no golf courses presently in the vicinity of Awake's.

OI Consultants emphasize, however, that the measured differences in water quality conditions did not have a negative impact on pond biota. Ambient pre-development nutrient concentrations were higher than concentrations which generally limit or control plant growth, which can control the character of an aquatic system. Ponds cannot be viewed as nutrient limited systems. An additional supply of nutrients to a plant community that is not nutrient limited does not result in any growth response. Rather than nutrient levels, it appears that it is rapid flushing characteristics that limit the development of planktonic communities in the ponds. Because development activities does not affect water exchange, elevated nutrient levels apparently do not affect biological structure.

The results of the before-and-after Waikoloa studies suggests that such land use is nearby areas is not necessarily inconsistent with the persistence of these aquatic environments. Besides the Waikoloa study, Brock (1984a) reports no negative impacts to anchialine ponds that are surrounded by the Mauna Lani Bay Hotel, several

condominium complexes, and a golf course. Although the chemical character of the ponds might be altered, as long as water exchange rates are not affected, there appears to be no substantive effects on the biological communities inhabiting these environments.

Pesticides and Herbicides

Potential for negative alteration to marine ecosystems owing to pesticides and herbicides also seems to be nil. It has not been found necessary to utilize substantial quantities of pesticides on golf courses in Hawaii, and only very small applications of herbicides are periodically made to the greens (N. Bustamante, Mauna Lanai Resort, personal communication). Such small quantities do not appear to be of a magnitude great enough to leach through the soil and lava, be carried to the ocean via groundwater extrusions, and then bioaccumulate to the point of producing a noticeable effect.

Potential Effects to Protected Species

As mentioned in the Results, there are several protected marine species that may inhabit the offshore environment. Because there are no plans for modification of the shoreline, potential impacts to marine mammals and turtles are negligible. Heavy equipment used in construction might produce noise that could be heard by

whales. A literature review conducted by Derby-Ebner & Associates (1984) for the Waikoloa Beach Resort EIS indicated that this kind of low-level noise would have no apparent adverse effects on major marine animals, and would not cause avoidance of the area.

Short term changes in water quality resulting from construction would also not be of a magnitude to affect the behavior of sea turtles that might inhabit the reefs off Awake's. Increased access to the shoreline, once the development is constructed, might affect resident turtles because these animals often do not remain in areas frequented by humans. This potential impact must be considered very slight, however, owing to the lack of observed turtles in the area, and the abundant habitat space along the Kona coast.

The U. S. Fish and Wildlife Service recently classified five anchialine pond organisms as Category 2 for purposes of the Endangered Species Act (3 shrimp, 1 hydroid, 1 snail). Category 2 reflects that the organisms probably should be listed as endangered or threatened, but insufficient data prevents an assessment of their status for listing on the Federal List of Threatened and Endangered Species. These organisms are considered rare, but are not listed, and are not proposed for listing. None of the five species were observed in the Awake's pond system. It is possible that the three shrimp, as well as the more common shrimp species that inhabit ponds, are

limited in number because of the introduction, and dominance, of exotic fish species. Thus, the Awake's ponds may be considered "impacted" in their present state. Because there are no plans to fill, or otherwise physically change, the ponds at Awake's the only potential changes that might occur are alteration in the chemical character of pond waters. As discussed above, such alteration presents little danger biological communities, because these communities are pre-adapted to high nutrient loads and fluctuating salinity.

Restoring the Awake's ponds to their "natural" condition will require total removal of exotic fish species; a task that may be possible but would require a great deal of effort. Until such changes are made in the community structure of the anchialine ponds at Awake's, it appears that introduced species represent a greater threat to the continued existence of pond ecosystems than resort development.

Summary

The aquatic environments at Awake's appear to be representative of the north Kona coast of Hawaii. Offshore coral community development corresponds generally to a three-zone pattern influenced primarily by the degree of destructive force of wave impact. Reef fish communities appear to be relatively unimpacted by fishing pressure or environmental factors. The region does not represent an

unusual commercial or recreational resource, and does not appear to be the habitat of rare, endangered or protected species.

Anchialine ponds, while diverse in physical character, appear to be greatly impacted by the activities in man. Ponds show signs of extensive physical alteration, and changes in community structure resulting from the introduction of exotic species.

The potential for direct impact as a result of development of the Awake's project to the aquatic communities appears to be very small. None of the developmental activities appear to have the potential to induce changes in physio-chemical water quality parameters of a magnitude sufficient to cause in community structure. Marine environments are routinely subjected to stresses of massive proportions that are much more influential (or destructive) than the incremental changes that could result from any development activity. Pond communities are not nutrient limited, so increased nutrient level resulting from resort activities would probably have no adverse affect.

If some unexpected event related to development activities does occur, the resulting alterations to marine community structure would probably be reversible, and recovery rapid once the stress factor is mitigated. Tolerance to such changes appears to already be part of the physiological range of the community.

It can be concluded that as long as the normal reasonable steps are taken in construction practices, and operational procedures for the golf course and sewage treatment systems are carefully maintained, there should be no adverse impacts to the marine environments. However, the baseline marine biological studies were implemented in such a way that replicate surveys conducted in subsequent years can show actual changes in marine and pond community structure. Regardless of how unlikely, there is always the potential for an unexpected event. If any development practices cause changes in physical-chemical parameters which lead to changes in environmental integrity, these effects could be quantified through time-series surveys. Therefore, it is recommended that the planners of Awake's utilize the bench-mark stations to the fullest by incorporating into their long-range plans subsequent marine surveys. If, and when, development construction near the shoreline commences, it would appear to be a prudent action to initiate a monitoring program at that site during the activity. With such an ongoing program, it would be possible to quickly pinpoint any detrimental processes as they happen and remedy the situation before significant or irreversible environmental damage occurs.

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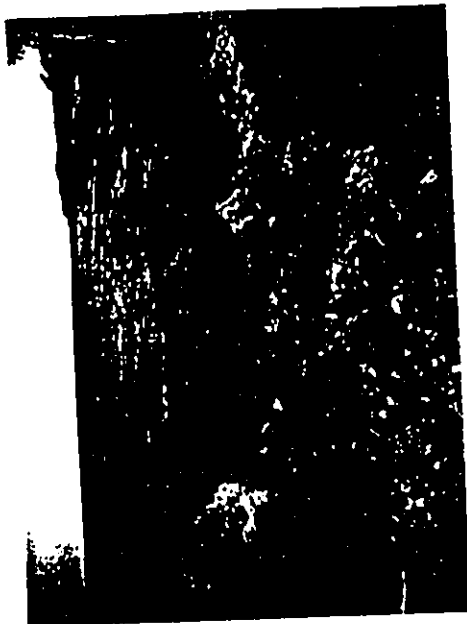


Plate 1. Awake's Bay looking north. The scalloped nature of the lava bench shoreline that extends for most of the Awake's shoreline can be seen in the upper left.



Plate 2. Coral beach berm at extreme southern end of the Awake's property (Kawikohale Pt.). Anchialine ponds lie directly behind the berm. White rocks composing beach are the remnants of coral colonies broken from the reef by storm waves that are tossed on the shoreline.

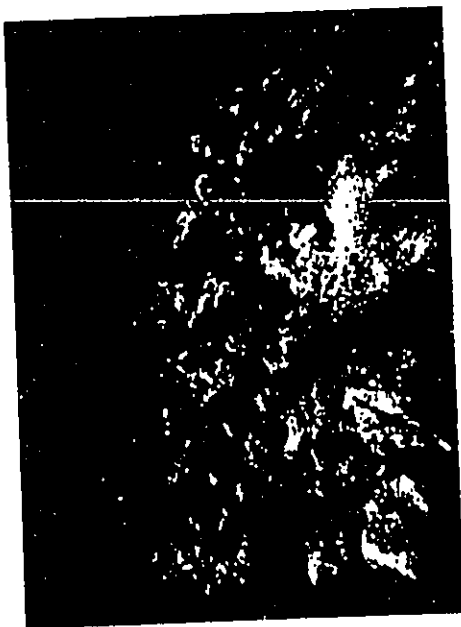


Plate 3. Basalt bottom typical of the shallow reef terrace. Boulders and basalt terrace are covered with a fine layer of sediment, and are devoid of most organisms. Water depth is approximately 3 ft.

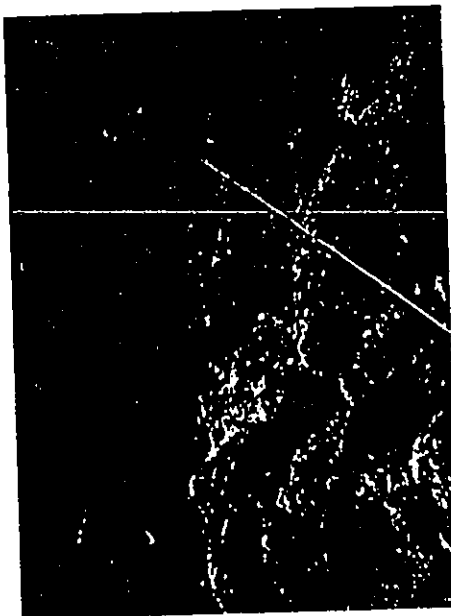


Plate 4. Diver laying transect line in P. meandrina boulder zone at Awake's station A-1. Water depth is approximately 15 ft.



Plate 5. Typical quadrat photograph in P. meandrina boulder zone. Whitish hemispherical branched corals are P. meandrina, black sea urchins are Tridacna.



Plate 6. Limestone bottom in inner Awake's Bay. Water depth is approximately 1.5 ft.

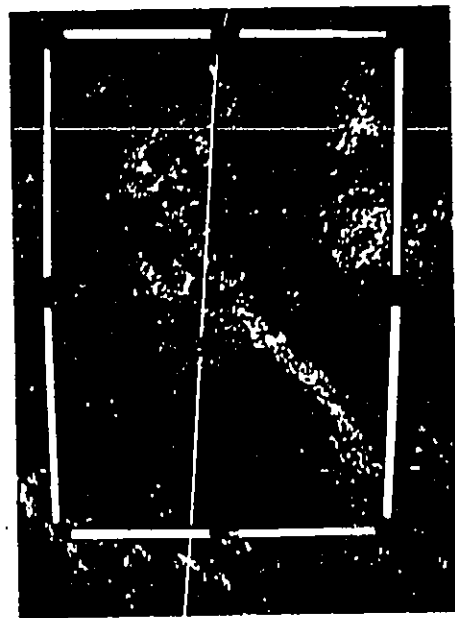


Plate 7. Typical quadrat photograph in pitted limestone reef terrace at 15 ft. transect station A-3. Pits are made by several species of boring sea urchins.

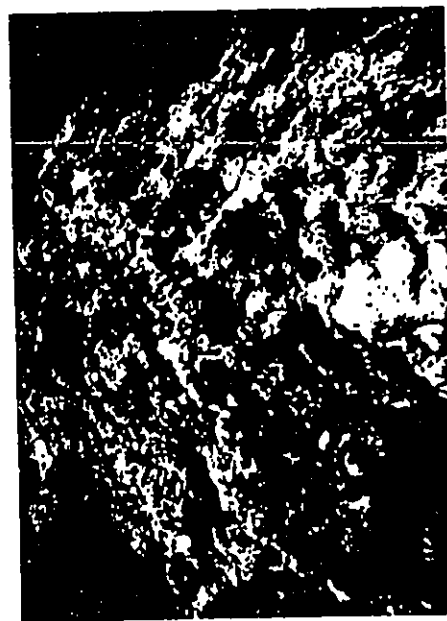


Plate 8. Coral growth in inner Awake'e Bay.

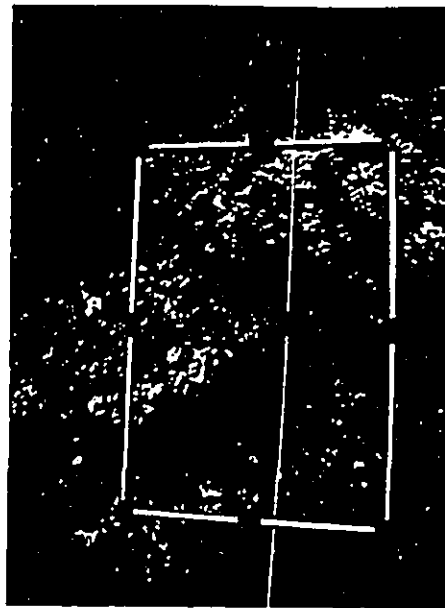


Plate 9. Typical quadrat photograph in the *P. lobata* reef building zone at the 30 ft. transect of station A-3.

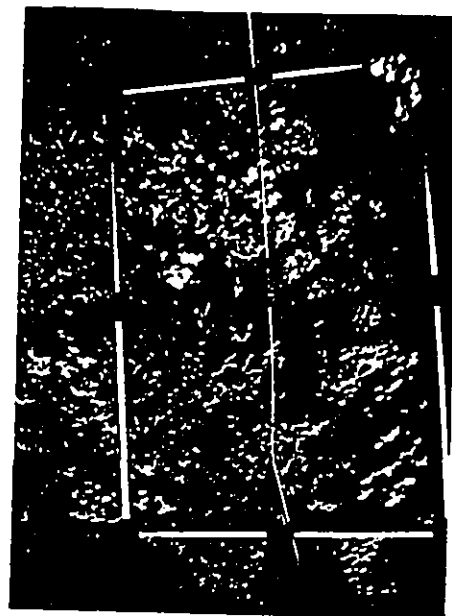


Plate 10. Typical quadrat photograph of the *P. compressa* slope zone at the 60 ft. transect of station A-3. Finger coral can be seen interspersed with lobed growths of *P. lobata*.

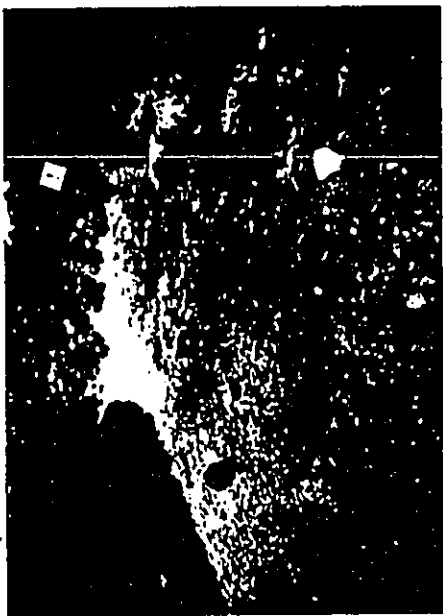


Plate 11. Awake's "a's" anchialine pond no. 1. Bottom substrata contains no growth of macroalgae.



Plate 12. Awake's "a's" pond no. 11. White material on rocks is precipitate of calcium carbonate.

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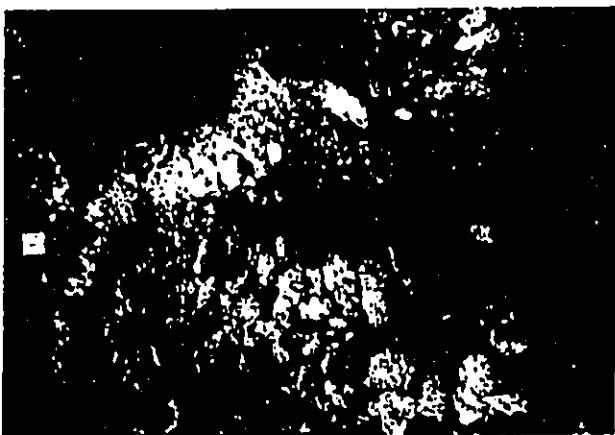


Plate 13. Awake's "a's" pond no. 14.



Plate 14. Awake's "a's" pond no. 18. Coral rock berm shown in Plate 2 can be seen in the background.



Plate 15. Surveyors measuring a's pond no. 17.



Plate 16. Awake's "orange crust" pond no. 8. Orange material covering deeper portions of pond bottom is encrusting blue-green alga Schizothrix.



Plate 17. Awake's orange crust pond no. 6.



Plate 18. Awake's orange crust pond no. 2.



Plate 19. rock wall constructed by humans divides pond no. 6 into 2 sectors.



Plate 20. Sediment pond no 8. Depth of sediment is approximately 22 inches.



Plate 21. Clump of vascular plant Ruppia maritima in pond no. 5. Orange crust algae and tan colored sediment can also be seen.



Plate 22. Sediment pond no. 5.

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Plate 25. Berm of dried algal mat ringing pond no. 10. It appears that algal mat is skimmed from the pond surface periodically by humans.

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Plate 23. Sediment pond 10. This pond was the largest in the Avake'e system.

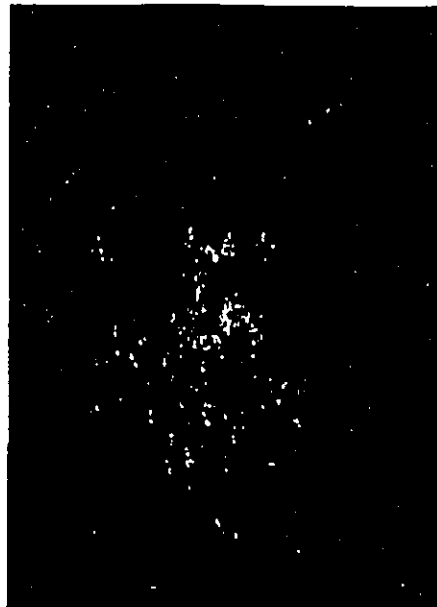


Plate 24. Surface sediment mat of Schizothrix in pond 10. Dried portion of the mat on the pond bottom can be seen in lower right.

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APPENDIX E
BOTANICAL SURVEY

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BOTANICAL SURVEY
AWAKE'E RESORT DEVELOPMENT
NORTH KONA, ISLAND OF HAWAII

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INTRODUCTION

The proposed Awaiki'e Resort Development project site consists of approximately 345.05 acres, located in the North Kona Judicial District, Awaiki'e ahupua'a. State-owned lands which include the ahupua'a of Manini-'o'uali, Kuki'o 2, and the mauka portion of Awaiki'e surround the project site on all three sides, while the Pacific Ocean forms the western boundary. The Makala-vena ahupua'a lies to the south of the project site.

The Awaiki'e site is presently designated Conservation and Open. The applicant, Kahala Capital Corporation, proposes to change the General Plan designation to Resort, Medium density Urban and Open. An Environmental Impact Statement is required for the proposed resort development and land use change.

A botanical survey to describe the major vegetation types, inventory the flora, search for rare, threatened, or endangered species, and identify areas of potential environmental problems or concerns was conducted on 12 September 1986. A team of two botanists was employed to gather the technical data contained in this report.

SURVEY METHODS

A search was made of the pertinent literature prior to the field work to familiarize the investigators with previous biological studies conducted in the general area.

Existing topographic maps and an aerial photograph of the project area were examined to determine access, terrain characteristics, boundaries and reference points, and potential logistical and technical problems which might be encountered during the field survey. A four-wheel drive road (jeep road) provided access onto the project site. The road begins from the Queen Ka'ahumanu Highway and traverses State-owned land until it enters the project site near Pu'u Kuli. The road continues makai (seaward) through the project area where it forks. One portion of the road continues makai to Kahoia Bay, while the other portion winds its way through roughly the middle portion of the project area and then makai and along Awaiki'e Bay to Kawikohale Point.

In the field a walk-through survey method was used. Tentative vegetation types delineated from the recent aerial photograph were ground-checked. Criteria such as structure, composition, and associated plant species were used in identifying and describing each vegetation type. Observations were also made on substrate types and vegetation distribution.

Notes were made of the species present in each of the major vegetation types. Species which could not be positively identified were collected for later determination in the herbarium and laboratory. The species recorded are indicative of the season and environmental conditions under which the survey was conducted. A survey made at a different time and under varying environmental conditions would no doubt yield slight variations in the abundance and kinds of species present, especially of the annual species.

DESCRIPTION OF VEGETATION

The distribution of vegetation types on the project area is strongly influenced by the substrate type. Both pahoehoe and 'a'a lava are present on the project site. These lava flows are prehistoric flows from the Kilauea volcanic series (Macdonald and Abbott 1979). The older, weathered pahoehoe and 'a'a flows support a more or less dense cover of fountaingrass (Pennisetum setaceum) and kiawe trees (Prosopis pallida). The younger 'a'a flow which lies on the southern boundary is almost devoid of vegetation. The loose cinder-pumice-ash substrate of Pu'u Kuli supports a grassland with scattered trees.

The vegetation on the project area is dominated by introduced (or exotic) species. The introduced fountaingrass and kiawe make up the bulk of the biomass on the project area. Of a total of 45 plant species inventoried, 26 (58%) are introduced. Native species account for 17 or 38% of the species inventoried and occur primarily in the strand and pond vegetation types. None of the native species on the project area are rare, threatened, or endangered.

A. Vegetation Types

Five major vegetation types are found on the project area and are discussed below.

1. Strand vegetation—The coastal portion of the project area is predominantly rocky with large basalt boulders. Vegetation is sparse on the rocky shoreline with only a few scattered plants such as fountaingrass (Pennisetum setaceum), Sagina sp., nettle-leaved goosefoot (Chenopodium

murele), pa'u-o-Hi'i-'aka (Jacquemontia sandwicensis), and low, windswept plucked shrubs (Pluchea odorata) and kiawe trees (Prosopis pallida).

Scattered along the rocky shoreline are areas where high storm-waves have thrown up coral rubble. The rubble is composed of rounded to irregularly shaped pieces of coral 8 to 10 inches in diameter. Small patches of the silver-leaved hinahina-ka-kahakai (Heliotropium anomalum var. argenteum) are occasionally found.

Along Kahoia Bay is a small beach with very coarse sand. A small grove of tree heliotrope (Messerschmidia argentea), up to 18 feet tall, is found here. Mats of pohuahu or beach morning-glory (Ipomoea brasiliensis) and 'aki'aki or beach dropseed grass (Sporobolus virginicus) are scattered here and there on the coarse sand.

By Awahe's Bay, near the largest anchialine pond, is a sand/coralline rubble beach. Beach morning-glory forms scattered patches in this area. A grove of mulo (Thespesia populnea) and coconut (Cocos nucifera) is found between the strand and pond areas.

2. Pond vegetation—A number of anchialine ponds are found behind the beach by Awahe's Bay. These ponds are part of the larger Makala-vena - Awahe's pond complex. The pond complex was surveyed by MacIolek and Brock (1974) in their studies of Kona coast ponds and have been categorized as Class B ponds—ponds which have significant aquatic value, whose importance is increased because of anthropological or waterbird habitat values. The ponds support a number of rare, endemic crustaceans and are also utilized

by the endangered Hawaiian stilt (Himantopus mexicanus knudseni) for feeding. The U. S. Fish and Wildlife Service considers the pond habitats at Auke's and Makale-rena as Resource Category 1. The pond is considered of high value and is unique and irreplaceable on both a national basis and an ecoregion basis.

Anchialine ponds undergo several successional stages, ranging from young, rocky-bottomed ponds with little or no vegetation around their edges to older ponds which have sediment-laden bottoms and support an emergent vegetation of various sedges and other wetland plant species.

On the Auke's project area, the anchialine ponds found on the 'a'a lava flow generally have sparse or no vegetation around their edges. Larger ponds, located by a grove of nilo (Thespesia populnea) and coconut (Cocos nucifera) trees, support a growth of makaloa or 'ehu'ava (Cyperus laevigatus), water hyacinth (Eichhornia crassipes), 'ohelo-kai (Lythrum sandwicense), pohuehue or beach morning-glory (Ipomoea brasilensis), and a few kiawe (Prosopis pallida) trees. However, the vegetation occurs as scattered patches and bare 'a'a predominates. Nilo seedlings are abundant on the edge of the pond abutting the grove of nilo and coconut trees.

The larger sediment-laden ponds support orange-colored algal crusts (Schizothrix sp.) and floating mats of filamentous algae. Widgeon grass (Ruppia maritima var. pacifica), an aquatic flowering plant, was observed in only one of these ponds.

3. Closed Prosopis forest—This vegetation type is found on the lower portion of the project area, behind the coast. The closed Prosopis forest occurs on pahoehoe bedrock covered by a thin layer of reddish-brown soil material, 6 to 8 inches deep.

Kiawe trees (Prosopis pallida) form a closed canopy forest with the crowns of the trees touching and interlocking. The trees are from 18 to 25 feet tall. There are only a few, smaller kiawe saplings present and no subcanopy layer or dense ground cover because of the heavy shade from the tree canopy, thus making surveying beneath the forest relatively easy.

Roughly 90 to 95% of the ground is made up of bare soil, rocky outcrops, and leaf and branch litter from the kiawe trees. A few, scattered plants found in this forest include false mallow (Malvastrum coromandelianum), hoary abutilon (Abutilon incanum), lantana (Lantana camara), fountaingrass (Pennisetum setaceum), and 'uhaloa (Ualtheria indica var. americana). In areas where the canopy is thinner, hoary abutilon and 'ilima (Sida aff. fallax) may form small, localized clumps.

4. Open Prosopis forest—This vegetation type occurs on the pahoehoe and smaller areas of very weathered 'a'a lava flows found on the project area. There is very little soil in these areas. The surface of the pahoehoe flows is often rough and broken with numerous hummocks and domes.

Kiawe trees (Prosopis pallida) form an open canopy forest with the trees scattered and the crowns not touching. Tree canopy cover varies from 30 to 40 to as much as 50% in some places. Ground cover is very dense and dominated

by the introduced fountaingrass (Pennisetum setaceum), which is so thick in places that it is often difficult to see the numerous cracks, depressions, and broken pahoehoe slabs beneath.

Other grasses found in this vegetation type include buffelgrass (Cenchrus ciliaris), lovegrass (Eragrostis tenella), and piggrass (Echinochloa polystachya), which is locally common in the upper portions of the project area. Other species found occasionally in the open kiawe forest include 'ihi (Portulaca cyanosperma), 'uhaloa (Waltheria indica var. americana), garden spurge (Euphorbia hirta), indigo (Indigofera suffruticosa), and hairy abutilon (Abutilon grandifolium). 'Ilima (Sida aff. fallax) is quite common throughout this vegetation type.

Goat (Capra hircus) droppings and signs of browsing were observed in this vegetation type.

5. Grassland—The grassland vegetation type is restricted to the loose, reddish-brown colored, bedded cinder-ash-pumice material (U. S. Soil Conservation Service 1973) of Pu'u Kuli. Kuli cinder cone is found on the northwest portion of the project area and reaches a height of 342 feet.

Fountaingrass (Pennisetum setaceum) is the dominant species, forming a 90 to 95% cover in most places. Locally common are patches of 'ilima (Sida aff. fallax) shrubs. Near the top of the cone, the grass cover is reduced and more surface rock and cinder are present. In these areas 'ihi (Portulaca cyanosperma), 'uhaloa (Waltheria indica var. americana), and pa'u-o-Hi'i-aka (Jacquemontia sandwicensis) become more numerous.

The 3- to 12-foot tall kiawe trees (Prosopis pallida) found in the grassland occur as very scattered individuals. However, very large depressions or pits on the cinder cone may support a small kiawe forest (up to 25 feet tall) on their bottoms.

A few koa-halo shrubs (Leucaena leucocephala) are found alongside the jeep trail which goes to the top of the pu'u and to a U. S. G. S. marker. The koa-halo plants are heavily browsed, and fresh goat droppings are occasionally found on the cinder cone.

B. Rare, Threatened, or Endangered Species
No plant species considered rare, threatened, or endangered (Yonberg and Herbst 1975; U. S. Fish and Wildlife Service 1980) by Federal and/or State governments were found on the project area during the course of this survey.

Similarly, in the recent flora survey (Char 1986) of the nearby 353 acre Makala-wena parcel proposed for resort development, no rare, threatened, or endangered species were found. Elliott and Hall (1977), who inventoried the wetland plants of 'Opae'ula Pond on the Makala-wena property, also reported no threatened or endangered species.

DISCUSSION AND RECOMMENDATIONS

Five vegetation types are recognized on the project area. Open and closed Prosopis (or kiawe) forests cover more than 70% of the project site. The grassland vegetation, dominated by the introduced fountaingrass, is restricted to the loose cinder-pumice-ash substrate of Pu'u Kuli. Scattered along

the coast are patches of strand vegetation; however, bare, boulder-strewn areas predominate along the coast. Behind the beach at Awahe's Bay are a number of anchialine ponds. Generally, the larger, sediment-laden ponds support a few emergent pond species.

A total of 45 plant species were found on the project area. Of these 26 (58%) are introduced species, 17 (38%) are native--14 are found in the Hawaiian Islands and elsewhere, 3 are restricted to the Hawaiian Islands--and 2 (4%) are of Polynesian origin. None of these species is considered rare, threatened, or endangered.

The 45 species recorded represent a relatively small number of plant species for such an area. Flora surveys conducted on the makai portions of Kuki'o 1 (Char 1984) and Ka'upulehu (Char 1985) have recorded twice as many species. The smaller number of species found on the project area is probably a reflection of the past and present goat herds found on the project area and nearby Makala-vena. In a similar flora survey (Char 1986) of the Makala-vena parcel for Bishop Estate, a total of 39 species was recorded, and browsing damage was noted in all vegetation types. A large herd of about 30 goats was seen on the Makala-vena parcel during the fauna survey (Bruner 1986). Goats were raised by the residents of the now abandoned village of Makala-vena.

The anchialine ponds are the most sensitive area on the project site. Although no rare, threatened, or endangered plant species are found here, the Makala-vena and Awahe's ponds do support a number of rare, endemic crustaceans and snails (Macirolek and Brock 1974; Brewer 1986). The ponds

may also serve as a feeding area for at least three endemic waterbird species found at the nearby 'Opae-'ula Pond (Bruner 1986). These species are the black-necked stilt or aa'o (Himantopus mexicanus knudseni), the American coot or 'alae-ka'oke'o (Fulica americana alai), and the Hawaiian duck or kolow-moili (Anas wyvilliana).

A pond management plan for long-term protection and maintenance should be developed through consultation with the U. S. Fish and Wildlife Service and the State Department of Land and Natural Resources. Perhaps a larger Makala-vena - Awahe's wildlife refuge should be set up, as the ponds on both properties all belong to the same complex.

It is recommended that as much of the existing vegetation around the ponds be retained.

A golf course is planned for the area south of the anchialine ponds. A sufficient buffer zone with a vegetation screen should be planned for this area.

The ponds abutting the beach are highly visible and easily accessible by foot. A low fence, about four feet high, should be placed in this area. A hedge of beach naupaka (Scaevola taccada) can be planted on the outside of the fence.

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APPENDIX I. PLANT SPECIES LIST, AWAKE'E, ISLAND OF HAWAII

In the plant species list, families are arranged alphabetically within each of two groups: Monocotyledons and Dicotyledons. Taxonomy and nomenclature of the flowering plants (Monocotyledons and Dicotyledons) follow St. John (1973) except where more recently accepted names are used. Hawaiian names used are in accordance with Porter (1972) or St. John (1973). The following information is given:

1. Botanical name with author citation.
2. Common English or Hawaiian name, when known.
3. Biogeographic status of the species. The following symbols are used:

E = endemic = native only to the Hawaiian Islands

I = indigenous = native to the Hawaiian Islands and also to one or more other geographic areas

P = Polynesian = plants of Polynesian introduction; all those plants brought by the Polynesian immigrants prior to contact with the Western world

X = introduced or exotic = not native to the Hawaiian Islands; brought here intentionally or accidentally after Western contact.

4. Vegetation types. Five vegetation types are recognized on the project area and are discussed in detail in the text. The abbreviations heading each of the columns refers to the following vegetation types:

s = strand vegetation

p = pond vegetation

cP = closed Prosopis forest

oP = open Prosopis forest

gr = grassland

5. Within each of the vegetation types, the relative abundance of each species or its absence (-) is given. These ratings reflect the abundance of the particular species within the project area and are not applicable to areas outside the project. The following symbols are used:

A = abundant = the major or dominant species in a given vegetation type

C = common = distributed throughout a given vegetation type in large numbers

Lc = locally common = found in localized patches where it may occur in large numbers in a given vegetation type

O = occasional = distributed throughout a given vegetation type in moderate numbers

U = uncommon = observed infrequently but not more than 10 times in a given vegetation type

R = rare = observed 1 to 10 times in a given vegetation type.

Scientific name	Common name	Status	s	p	cp	op	rt
CACTACEAE (Cactus Family)	Opuntia ficus-indica (L.) P. Mill.	X	-	-	-	R	R
CARYOPHYLLACEAE (Carnation Family)	Sagina sp.	X	U	-	-	O	O
CHEMOPODIACEAE (Goosefoot Family)	Chenopodium carolinense R. Br.	X	-	-	-	U	-
	Chenopodium murale L.	X	-	-	-	U	-
COMPOSITAE (Daisy Family)	Lipochne latifolia (L.) DC.	E	-	-	-	U	U
	Pluchea odorata (L.) Cass.	X	-	-	-	U	U
	Vernonia cinerea (L.) Less.	X	-	-	-	U	O/LC
CORVOLUACEAE (Morning-glory Family)	Ipomoea brasiliensis (L.) Sweet	I	Lc	-	-	-	-
	Ipomoea indica (Burm.) Merr.	I	Lc	-	-	U	-
	Jacquemontia sandwicensis Gray	E	-	-	-	O	O
EUPHORBIACEAE (Spurge Family)	Euphorbia hirta L.	X	-	-	-	O	O
CENTRACEAE (Centian Family)	Centaurium erythraea Ravn.	X	-	-	-	O	O
	Centaurium herb., European	X	-	-	-	O	O
	bitter herb, European	X	-	-	-	O	O
	garden spurge, koko-kahiki	X	-	-	-	O	O
	beach morning-glory,	I	Lc	-	-	-	-
	koala-ava	I	-	-	-	U	-
	pa-u-o-Hi'-aka	E	-	-	-	O	O
	nehe	E	-	-	-	U	U
	pluchea, shrubby cleburne	X	-	-	-	U	U
	ironweed	X	-	-	-	U	O/LC
	keeled goosefoot	X	-	-	-	U	-
	nettle-leaved goosefoot	X	-	-	-	U	-
	panini	X	-	-	-	R	R
	klave	X	-	-	-	R	R
	comb hyssop	X	-	-	-	R	R
	wild basil	X	-	-	-	R	R
	ku, kolu	X	-	-	-	R	R
	indigo, ink	X	-	-	-	O	U
	koa-halo, ekow	X	-	-	-	-	U
	klave	X	-	-	-	A	O

MONOCOTYLEDONS	Scientific name	Common name	Status	s	p	cp	op	rt
AMARYLLIDACEAE (Amaryllis Family)	Purpurea foetida (L.) Haw.	X	-	-	-	-	R	
CYPERACEAE (Sedge Family)	Cyperus laevigatus L.	I	-	-	-	-	-	
GRAMINEAE (Grass Family)	Cenchrus ciliaris L.	X	-	-	-	-	O	
	Eragrostis tenella (L.) Beauv. ex R. & S.	X	-	-	-	-	O	
	Pennisetum setaceum (Forst.) Chiov.	X	-	-	-	-	O	
	Sporobolus virginicus (L.) Kunth	I	-	-	-	-	O	
POACEAE (Palm Family)	Coccothrinax L.	P	-	-	-	-	-	
RUPPIACEAE (Ruppia Family)	Ruppia maritima var. pacifica St. John	I	-	-	-	-	-	
	Ruppia maritima var. pacifica St. John	I	-	-	-	-	-	
AMARANTHACEAE (Amaranth Family)	Amaranthus viridis L.	X	-	-	-	-	R	
BORAGINACEAE (Heliotrope Family)	Heliotropium anomalum var. argenteum Gray	I	-	-	-	-	-	
	Heliotropium curassavicum L.	I	-	-	-	-	-	
	Messerschmidia argentea (L. f.) Johnston	X	-	-	-	-	-	
	slender amaranth, pakel	X	-	-	-	-	R	
	hina-hina-ka-kahiki	I	-	-	-	-	-	
	hina-hina-ka-kahiki	I	-	-	-	-	-	
	tree heliotrope	X	-	-	-	-	-	
	beach dropseed, 'aki'aki	I	-	-	-	-	-	
	buffelgrass	X	-	-	-	-	-	
	lovegrass	X	-	-	-	-	-	
	pill, pillgrass	I	-	-	-	-	-	
	mountain grass	X	-	-	-	-	-	
	coconut, niu	P	-	-	-	-	-	
	wild onion grass, ruppia	I	-	-	-	-	-	
	slender amaranth, pakel	X	-	-	-	-	R	
	hina-hina-ka-kahiki	I	-	-	-	-	-	
	tree heliotrope	X	-	-	-	-	-	

Scientific name	Common name	Status	s	p	cP	oP	gr
<u>MONOCOTYLEDONS</u>							
AMARYLLIDACEAE (Amaryllis Family)							
Furcraea foetida (L.) Haw.	Mauritus hemp	X	-	-	-	-	R
CYPERACEAE (Sedge Family)							
Cyperus laevigatus L.	'ehu'awa	I	-	Lc	-	-	-
GRAMINEAE (Grass Family)							
Cenchrus ciliaris L.	buffelgrass	X	-	-	-	O	O
Eragrostis tenella (L.) Beauv. ex R. & S.	lovegrass	X	-	-	U	O	O
Festuca aff. dertonensis (All.) Aschers. & Graebn.		X	-	-	-	R	-
Heteropogon contortus (L.) Beauv. ex R. & S.	pili, piligrass	I	-	-	-	O/LC	O
Pennisetum setaceum (Forsk.) Chiov.	fountaingrass	X	O	R	O	A	A
Sporobolus virginicus (L.) Kunth	beach dropseed, 'aki'aki	I	U	-	-	-	-
PALMAE (Palm Family)							
Cocos nucifera L.	coconut, niu	P	R	-	-	-	-
RUPPIACEAE (Ruppia Family)							
Ruppia maritima var. pacifica St. John & Fosb.	widgeon grass, ruppia	I	-	U	-	-	-
<u>DICOTYLEDONS</u>							
AMARANTHACEAE (Amaranth Family)							
Amaranthus viridis L.	slender amaranth, pakai	X	-	-	R/Lc	R	-
BORAGINACEAE (Heliotrope Family)							
Heliotropium anomalum var. argenteum Gray	hinahina-ka-kahakai	I	U	-	-	-	-
Heliotropium curassavicum L.	nena, kipukai	I	R	-	-	-	-
Messerschmidia argentea (L. f.) Johnston	tree heliotrope	X	R/Lc	-	-	-	-

Scientific name	Common name	Status	s	p	cP	oP	gr
CACTACEAE (Cactus Family)							
Opuntia ficus-indica (L.) P. Mill.	panini	X	-	-	-	R	R
CARYOPHYLLACEAE (Carnation Family)							
Sagina sp.		X	U	-	-	O	O
CHEENOPODIACEAE (Goosefoot Family)							
Chenopodium carinatum R. Br.	keeled goosefoot	X	-	-	-	U	-
Chenopodium murale L.	nettle-leaved goosefoot	X	U	-	R	-	-
COMPOSITAE (Daisy Family)							
Lipochaeta lavarum (Gaud.) DC.	nehe	E	-	-	-	U	U
Pluchea odorata (L.) Cass.	pluchea, shrubby fleabane	X	R	R	-	U	U
Vernonia cinerea (L.) Less.	ironweed	X	-	-	U	O	O/LC
CONVOLVULACEAE (Morning-glory Family)							
Ipomoea brasiliensis (L.) Sweet	beach morning-glory, pohuahue	I	Lc	Lc	-	-	-
Ipomoea indica (Burm.) Merr.	koali-'avana	I	-	-	-	U	-
Jacquemontia sandwicensis Gray	pa'u-o-Hi'i-'aka	E	R	-	-	O	O
EUPHORBIACEAE (Spurge Family)							
Euphorbia hirta L.	garden spurge, koko-kahiki	X	-	-	U	O	O
GENTIANACEAE (Gentian Family)							
Centaurium erythraea Rafn.	bitter herb, European centaury	X	-	-	-	O	O
LABIATAE (Mint Family)							
Hyptis pectinata (L.) Poit.	comb hyptis	X	-	-	-	R	-
Ocimum gratissimum L.	wild basil	X	-	-	-	R	R
LEGUMINOSAE (Pea Family)							
Acacia farnesiana (L.) Willd.	klu, kolu	X	-	-	-	R	-
Indigofera suffruticosa Mill.	indigo, iniko	X	-	-	U	O	U
Leucaena leucocephala (Lam.) de Wit.	koa-haole, ekoa	X	-	-	-	-	U
Prosopis pallida (Humb. & Bonpl. ex Willd.) HBK.	kiawe	X	C	R/Lc	A	A	O

Scientific name	Common name	Status	s	p	cP	oP	gr
MALVACEAE (Mallov Family)							
<i>Abutilon grandifolium</i> (Willd.) Sweet	hairy abutilon, ma'o	X	-	-	-	O/Lc	U
<i>Abutilon incanum</i> (Link) Sweet	hoary abutilon	I	-	-	U	U	-
<i>Malvastrum coromandelianum</i> (L.) Garcke	false mallow, hauuci	X	-	-	O	U	R
<i>Sida fallax</i> Walp.	'ilima	I	-	-	O/Lc	C	C
<i>Thespesia populnea</i> (L.) Soland. ex Correa	milo	P	-	Lc	-	-	-
NYCTAGINACEAE (Four o'clock Family)							
<i>Boerhavia coccinea</i> Mill.		X	R	-	-	-	-
<i>Boerhavia diffusa</i> L.	alena	I	-	-	-	R	-
PORTULACACEAE (Purslane Family)							
<i>Portulaca cyanosperma</i> Egler	'ihi	E	-	-	-	O/Lc	O/Lc
<i>Portulaca oleracea</i> L.	pigweed, 'ihi	X	-	-	-	R	-
SCROPHULARIACEAE (Figwort Family)							
<i>Bacopa monniera</i> (L.) Wettst.	water hyssop, herpestis	I	-	Lc	-	-	-
SOLANACEAE (Nightshade Family)							
<i>Lycium sandwicense</i> Gray	'ohelo-kai, 'ae'ae	I	-	R	-	-	-
STERCULIACEAE (Cocoa Family)							
<i>Waltheria indica</i> var. <i>americana</i> (L.) R. Brown ex Hosaka	hi'aloa, 'uhaloa	I	-	-	U	O	O
VERBENACEAE (Verbena Family)							
<i>Lantana camara</i> L.	lantana, lakana	X	-	-	R	-	-

APPENDIX F
FAUNA SURVEY

PAUMAL SURVEY FOR THE PROPOSED RESORT COMPLEX
AT AWAKE'E, NORTH KOHA, ISLAND OF HAWAII

by
Maile S. Kjarguard

(Prepared by: CHAR & ASSOCIATES)

Prepared for:
HELBERT, HASTERT, VAN BORN & KIMURA
October 1986

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INTRODUCTION

Survey Objectives

This survey was undertaken to provide detailed information on the bird and mammal populations within an area proposed for resort development at Auauke's, North Kona, Hawaii. The study objectives were as follows:

1. To provide a description of the vertebrate communities present in the study area.
2. To provide an annotated checklist of the vertebrate species in or near the study area.
3. To identify sighting locations for species that are candidate, proposed, or listed under the Endangered Species Act.
4. To identify and discuss areas of potential environmental concern, including probable impacts of the project on vertebrate communities in the study area.
5. To discuss appropriate mitigating measures.

Description of the Study Area

The study site consists of a 350 acre coastal parcel located about 5.5 miles north of Keahole Point, between Kauhale Point and Kahoia Bay. The southern boundary of the parcel abuts Bishop Estate land at Makala-vena, close to the critical waterbird habitat of 'Opae'ula Pond. Most of the area is flat or gently sloping with a substrate of a'a or pahoehoe lavas of various ages.

The northeastern corner of the parcel is dominated by Pu'u Kuli, an ash and cinder cone that rises to a height of 342 feet above sea level. A complete description of the faunal habitats in the study area is provided in the results section below.

Previous Surveys

Although there have been no faunal surveys of the study area itself, some nearby sites have been surveyed. Bruner (1985) prepared a faunal survey of Ka'upulehu, about 2.5 miles northeast of Awa'ele. The avifauna of the Makala-wena area (immediately south of the study area) has been documented in some detail. This pond has been identified in the Hawaiian Waterbird Recovery Plan as one of only two on the island of Hawai'i and 17 ponds statewide that are considered essential waterbird habitat (Walker et al. 1977). Information relating to the birdlife of the 'Opae'ula area comes from a number of sources. Foremost of these are the Hawaii Division of Forestry and Wildlife waterbird censuses, which have been conducted annually since the 1950's and twice a year since 1968 (unpublished data on file, Hilo and Honolulu). In addition, a recent survey of the waterbirds of Hawai'i Island (Paton and Scott 1985) provides an informational baseline of the waterbird records of 'Opae'ula which goes back to the early part of the present century. Individual sightings of interest from this area also appear in the Journal of the Hawaii Audubon Society (e.g., see Pyle 1977a, 1977b, 1978, 1979, 1981). Table 2 provides a summary of the species records for the 'Opae'ula area taken from these sources. A more recent survey has recently been prepared by Bruner of the birds of Makala-wena in conjunction with future development of the area (Bruner 1986).

METHODS

Bird Survey

The survey was conducted on September 23, 1986. Approximately nine and a half hours were spent at the study site. Although it was not possible to

include an early morning census period in the study, some census work was performed in the later afternoon (after 1630) in order to take advantage of the late afternoon peak in avian activity and the crepuscular habits of the Hawaiian Hoary Bat (*Lasiurus cinereus semotus*).

Birds were censused by two methods during the survey. General observations of bird species presence, activity, and habitat preferences were made using informational transect counts along roads and trails in the study area, as well as along the coastal strand. During such counts, birds were detected both by listening for vocalizations and by direct visual identification. More formal censuses were performed in each of the major habitat types to supplement the transect counts. These counts consisted of eight-minute census periods during which all birds heard or seen were recorded, following the methods of Palen (1971).

In addition, presence of bird species were also determined by such indirect means as by the observation of tracks, droppings, and pellets. This sort of information was particularly important for species with sparse population densities, secretive habits, or nocturnal activity cycles.

Mammal Survey

Mammalian presence and distributional data were primarily collected by indirect means, especially presence of droppings or skeletal material. No attempt was made to trap mammals in order to obtain more concrete data on density or distribution. Late afternoon surveys were performed in coastal areas in order to detect the presence of the Hawaiian Hoary Bat.

RESULTS

Faunal Habitats

Six major faunal habitats were present in the study area. These approximately correspond to the major vegetation types in the study area but are less finely defined. More complete descriptions of the area's vegetation types may be found in the botanical report prepared concurrently with this one.

The most common of these habitat types was that composed of Kiawe (Prosopis pallida) forest which extends inland from the strand and covers much of the study area south of Pu'u Kuli. Around Kahoia and Awa'e's Bays, this forest is composed of closed stands of large Kiawe. Elsewhere in the study site, trees are smaller and more scattered, forming an open Kiawe forest. Although both of these forest types are dominated by non-native bird and mammal species, the closed Kiawe forest supports a more diverse and more densely populated community than does the open Kiawe forest. Common bird and mammal species in this habitat type include Gray Francolin (Francolinus pondicerianus), Black Francolin (Francolinus francolinus), Japanese White-eye (Zosterops japonicus), Yellow-billed Cardinal (Paroaria capitata), and Northern Cardinal (Cardinalis cardinalis).

In the vicinity of Pu'u Kuli, the Kiawe forest is replaced by the second habitat type in the study area, the grassland. This habitat is dominated by the introduced fountaingrass (Pennisetum setaceum), and supports very few animals, primarily feral cats (Felis catus) and feral goats (Capra hircus).

The third faunal habitat type in the study area is the coastal strand; this habitat consists of a narrow band immediately inland of the high water mark and is greatly affected by its proximity to the ocean. Much of the strand habitat in the study area is rocky and has a very low cover of plant species except for the Kiawe immediately adjacent to the coast. Areas with sandy beaches such as at Awa'e's Bay and Kahoia Point have some (but by no means all) of the vegetation typical of sandy coastal areas on the Kona coast. Tree heliotrope (Messerschmidia argentea) present in low numbers in these areas is especially favored by bird species in the strand. Low numbers of more typical native plant species in the strand may be the result of intense grazing pressure from feral goats and feral donkeys in the recent past. No live feral ungulates were found in these areas, but skeletal remains (particularly of goats) were quite common in the strand. Common bird species in the strand are the Common Myna (Acridothera tristis) and Zebra Dove (Geopelia striata).

Rocky coastline and beaches on the seaward edge of the strand vegetation comprise an important habitat for migratory shorebirds, particularly Pacific Golden Plover (Pluvialis fulva), Wandering Tattler (Heteroscelus incanous), Sanderling (Calidris alba), and Ruddy Turnstone (Arenaria interpres). Neither of the latter two species were found during the survey, but both are likely to occur in the study site since suitable habitat is present.

Anchialine ponds in the southern portion of the study site are known habitat for several native wetland bird species, such as the Black-crowned Night Heron (Nycticorax nycticorax boactli) and the endangered Hawaiian Stilt (Himantopus mexicanus knudseni). These birds feed on small fish, the

endemic crustacean Halocaridina rubra, and other invertebrates. Because of the presence of campers adjacent to one of the largest ponds at the time of the survey, I did not see any native wetland bird species in the area. However, fecal remains on rocks adjacent to the ponds confirm previous observations of avian activity there and indicate that the area is currently being used as a foraging site. These ponds comprise one of the last remaining undisturbed anchialine pond complexes in Kona, one that extends across the parcel boundaries into neighboring Makala-rena. The management ramifications of this will be discussed in the recommendations portion of this report (See below).

The last habitat type in the study area is barren a'a lava. This covers much of the southern part of the study area and is largely unused by birds except for the occasional Pacific Golden Plover.

Annotated Species List

The following list includes those species found in the study area during the course of the survey. Following the common and scientific names of the species is a symbol indicating the status of the species in the Hawaiian Islands (following Pyle 1983). A summary of this information is provided in Table 1.

A. Birds (Aves)

1. Black-crowned Night Heron, Aukuu (Nycticorax nycticorax boactli); RI
One Black-crowned Night Heron was observed flying along the shoreline by the botanists. No other Heron were seen, although droppings in the vicinity of some of the larger anchialine ponds indicated that Heron had been in the vicinity.

2. Gray Francolin (Francolinus francolinus); Fh

Gray Francolin or evidence of their activity were present in much of the study area, particularly in the Kiawe forest habitat. Large numbers of birds were found in the closed Kiawe forest immediately behind Awahe'e Bay. This species is well-adapted to the dry scrub and grassland habitats found in the study area and are known to be common in other parts of the Kona coast as well (Brumer 1985).

3. Black Francolin (Francolinus pondicerianus); Fh

Black Francolin were far less common in the study area than the Gray Francolin. One bird was heard in open Kiawe forest between Kahoiaua Point and Awahe'e Bay, and Black Francolin feathers were found at about 120 feet elevation in the central portion of the study area.

4. Pacific Golden Plover, Koles (Pluvialis fulva); Vr

Six Plover were seen at the largest of the anchialine ponds near Awahe'e Bay. None was seen in other areas of suitable habitat along the coast at the time of the survey, probably because of the presence of fishermen and swimmers in these areas. Small numbers of plover also utilize some of the more barren portions of the study area such as the fountaingrass dominated habitats near Pu'u Kuli, the very open Kiawe forest in the mauka part of the study area, and on the a'a flow.

Plover are familiar winter visitors to the Hawaiian Islands and are found from sea-level to treeline in suitable open habitats (Hawaii Audubon Society 1984). In developed areas, they are known to be partial to lawns, parks, and golf courses.

5. Wandering Tattler, Ullia (Heteroscelus incanus); F1

The Wandering Tattler is another regular winter migrant to the Hawaiian Islands. Its habitat preferences are less catholic than those of the Pacific Golden Plover: favored foraging sites are along rocky shorelines, in streambeds, and in mudflats. Three wandering Tattler were seen along the coastline in the study area, two between Kahaloa Bay and Awahe'e Bay, and one on the Awahe'e side of Kavihihale Point.

6. Spotted Dove (Streptopelia chinensis); F1

Spotted doves were rare in the Kiawe forest habitat: one bird was seen near the base of Pu'u Kuli, and feathers and tracks were present in the same area.

7. Zebra Dove (Geopelia striata); F1

Zebra Doves were present in small numbers in some parts of the strand habitat (in association with Messerschmidia), as well as in the closed Kiawe forests in the vicinity of Awahe'e Bay. They were not particularly abundant anywhere in the study area.

8. Japanese White-eye (Zosterops japonicus); F1

Japanese White-eye were surprisingly uncommon in the study area. They were found only in the Awahe'e Bay area, where the Kiawe forest was fairly dense, and where there were other tree species present, such as Milo (Thespesia) and Coconut (Cocos).

9. Common Myna (Acridothera tristis); F1

A small population of Myna were utilizing the area around Awahe'e Bay as a roosting site, and birds were seen foraging in the closed Kiawe forest during the daytime hours.

10. Warbling Silverbill (Lonchura malabarica); F1

On the island of Hawaii, this species was first found in the wild in 1974, when a breeding population was discovered at Kawaihae (Berger 1977a, 1977b, 1981). It is now much more widely distributed on Hawaii and has dispersed to other of the main Hawaiian Islands as well. Two individuals were seen in the Kiawe forest adjacent to the strand between Awahe'e Bay and Kahaloa Point. This species is known from similar habitats on the Kona coast (Hawaii Audubon Society 1984) but appears to have a spotty distribution in this part of Kona, since it was not found in a survey of nearby Ka'upulehu (Bruner 1985).

11. Yellow-billed Cardinal (Paroaria capitata); F1

This species was introduced to the Kona area in the 1930's but was not documented in the region until the 1970's. It is very abundant in the Honokohau area and throughout most of Kailua-Kona proper. In the study site this species was found in closed Kiawe forest in moderate numbers and was very rarely seen in the strand habitat. It was far less frequently seen in this study area than in areas such as Kohala-iki that are closer to Honokohau (Kjargaard 1986).

12. Northern Cardinal (Cardinalis cardinalis); F1

This species was present both along the strand and in Kiave forest habitats. It was most frequently seen in closed Kiave forests and was less common in the more shrubby Kiave forests further inland from the coast.

13. Yellow-fronted Canary (Serinus mozambicus); Fh

Two individuals were seen between Kavikohale Point and Awahe'e Bay and appeared to be part of a population that was utilizing the large grove of Ironwood trees (Casuarina spp.) at Kavikohale Point, Makala-veva. No other individuals were found in the study area.

B. Mammals (Mammalia)

1. House Mouse (Mus musculus); F1

One mouse was seen in open Kiave forest by the botanists, and it is likely that other rodent species are present here as well. Mice are generally diurnal, and daylight observations of this species may indicate high population densities (Tomich, pers. comm.).

2. Mongoose (Herpestes erpunctatus); F1

Mongoose were abundant in the study area, particularly in the strand and Kiave habitats. Animals were seen at both Awahe'e and Kaholeva Bays; in the former locality they were apparently attracted to a large pile of refuse that had accumulated near the bay. This species is an opportunistic feeder and will feed on many different items, including birds and diurnal rodents.

3. Other mammal species

Scat, tracks, and mammalian skeletal material were abundant in the study site. The following species were represented by such indirect evidence but were not seen during the course of the survey.

Feral Cat (Felis catus); F1

Cat scat was abundant on the top of Pu'u Kuli. Although little of the scat was recent, it is likely that this species is very common in the study area.

Feral Goat (Capra hircus); F1

From the density of goat bones and droppings in the study area, it is clear that this species was once very abundant. Although no live animals were seen, one fairly recent skeleton was found near the strand in closed Kiave forest, and fresh droppings were found on Pu'u Kuli. The rest of the skeletal material and the droppings were not recent. Goats apparently use all habitat types in the study area, although the density of their scat and skeletal material indicates that they prefer the grassland habitat and open Kiave forests.

Feral Donkey (Equus asinus); F1

Donkey skeletal material was found in the open Kiave forest, and scat was found on Pu'u Kuli. Neither was recent. Bruner (1985) recently observed scat, tracks, and skeletal remains of donkeys at Ka'upulehu that indicated regular occurrence at that locality. This general part of Kona may be the last area in Kona where the once abundant feral donkey now occurs (Van Riper and Van Riper 1982).

4. Hawaiian Hoary Bat (*Lasiurus cinereus semotus*); En

The native and endangered Hawaiian Hoary Bat is found sporadically along the Kona coast (Tomich 1969 and pers. comm.; Krumer 1971; Bruner 1985). It is a crepuscular species, becoming active at dusk, and feeding over ponds, bays, and open surf. Although I observed no bats on the day of the survey, fishermen who frequent the area and the caretaker at Makala-vena both report seeing them regularly at Awake'e Bay (Hulihoe, pers. comm.). Because the occurrence of bats in any one area tends to be unpredictable on a day-to-day basis, a one-day survey could easily miss detecting this species.

DISCUSSION AND RECOMMENDATIONS

A total of 13 bird species and two mammal species were found in the study site. Of the bird species, three (27%) occur naturally in the Hawaiian Islands, while the rest are introduced. One of these three species is indigenous, and the other two are regular winter migrants to the Hawaiian Islands. None of the mammal species sighted was native.

Because no native bird or mammal species occur on most of the study site, development of a large portion of the project area will not have a significant impact on the native fauna. In fact, landscaped areas will probably increase the value of the project area as a habitat for introduced passerine bird species. The anchialine pond habitats, however, are unique and sensitive ecosystems and should not be disturbed if at all possible. While none of the endemic species thought to occur in this part of the study area (the Hawaiian Stilt, the Hawaiian Owl (*Asio flammeus sandvicensis*), and the Hawaiian Bat) were actually detected during this survey, those familiar

with the area have indicated that all three species are present, particularly when the level of human disturbance from campers and the like is low (Hulihoe, pers. comm.). The area around the anchialine ponds is especially subject to disturbance since it is a favored camping area, with people using the ponds for a number of purposes. At the time of the survey, the area adjacent to the pond providing the best bird habitat was being used as a campground, thus virtually insuring that no significant sightings would take place.

The U. S. Fish and Wildlife Service considers the anchialine pond habitats at Awake'e and Makala-vena as Resource Category 1 (Federal Register 1981). Such habitats are considered to be unique and irreplaceable on a national basis and are of high value to the evaluation species. It should be stressed that these ponds form a natural complex and would be best managed as such, regardless of the intervening property boundaries. The ideal situation would involve an extension of the boundary of the proposed 'Opae'ula Pond National Wildlife Refuge to include the anchialine pond at Awake'e. If this is not a feasible option, then all efforts should be made to prevent any degradation of the Awake'e ponds as wildlife habitat. Consultation with the U. S. Fish and Wildlife Service by the developer about development plans and progress is essential in this regard (See also points 3 and 4 below.).

Possible impacts on these sensitive pond areas by construction include habitat degradation due to increased human disturbance, modified groundwater conditions from nearby construction and/or filling, and runoff from adjacent developed areas. Some of the impacts may be mitigated as follows:

1. Site usage in the pond areas should follow the preliminary land use plan as outlined in the E. I. S. Preparation Notice. Care must be taken in the construction of nearby golf course areas to prevent indirect destruction of the ponds through increased runoff or modification of groundwater conditions.

2. Aside from the destruction of anchialine pond communities during construction, one of the greatest dangers to their integrity and to their potential as wildlife habitat is human disturbance. One such example is the ponds at Kinole Cove in Ka'u. Once habitat for several species of birds, they ceased being used as such when the surrounding area was developed, in spite of the fact that none of the development took place in the immediate vicinity of the ponds and the surrounding areas remained unlandscaped. This sort of effect is simply the result of an increase in accessibility by human beings, and a similar problem may be expected in Avake'e. A barrier around the pond areas would limit accessibility and improve their habitat value. The combination of a fence with plantings of Beach Naupaka (*Scaevola taccada*), for example, would be both aesthetically pleasing and functional as a buffer.

3. More detailed information is needed on the use of the ponds at Avake'e by wildlife. Quarterly surveys conducted in September (to document pond usage by migrant shorebirds and endemic waterbirds), December (for migratory waterfowl and endemic waterbirds), March (for spring migrants and endemic waterbirds), and June (for endemic waterbirds) would provide a much clearer picture of the use of this habitat by wildlife. In addition to bird surveys, current basic information about the state of these ponds as wildlife habitat

would be a valuable source of baseline data. Such data would include water quality measurements, diurnal and nocturnal sampling of pond biota, and a description of pond algae and substrates. Collection of these data could be coordinated with similar surveys at Makala-Keena's 'Opae'ula Pond.

4. The anchialine ponds at Avake'e should be included in any management plan for the wildlife refuge at 'Opae'ula Pond. This necessitates consultation with the U. S. Fish and Wildlife Service and the Hawaii State Department of Land and Natural Resources (Division of Forestry and Wildlife) on the part of the developer. Such a plan would include management recommendations regarding fencing, predator control, and management responsibilities.

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Table 1. Survey of bird species in the Auwahi's study area by habitat.

Species	K*	G*	St*	Sh*	An*	L*
Black-crowned Night-heron	-	-	-	1	+	-
Gray Francolin	4	+	+	-	-	-
Black Francolin	1	-	-	-	-	-
Pacific Golden-plover	1	2	-	-	6	1
Wandering Tattler	-	-	-	3	-	-
Spotted Dove	1	-	-	-	-	-
Zebra Dove	1	-	1	-	-	-
Common Myna	9	-	-	-	-	-
Japanese White-eye	2	-	-	-	-	-
Warbling Silverbill	-	-	2	-	-	-
Yellow-billed Cardinal	8	-	2	-	-	-
Northern Cardinal	2	-	4	-	-	-
Yellow-fronted Canary	-	-	2	-	-	-

* K = Kavae scrub
 G = Arid grassland
 St = Strand vegetation
 Sh = Shoreline
 An = Anchialine ponds
 L = Lave flow

Table 2. List of waterbirds reported from 'Opae'ula Pond, North Kona, Hawaii'. For species that do not regularly migrate to the Hawaiian Islands, dates are indicated after the scientific name.

Great Blue Heron (<i>Ardea herodias</i>)	1981
Black-crowned Night-heron (<i>Nycticorax nycticorax boactli</i>)	
Green-winged Teal (<i>Anas crecca</i>)	1960's, 1972, 1977
Mallard (<i>Anas platyrhynchos</i>)	
Hawaiian Duck (<i>Anas wyvilliana</i>)	
Blue-winged Teal (<i>Anas discors</i>)	1977, 1978, 1981, 1982, 1983, 1984
Northern Shoveler (<i>Anas clypeata</i>)	
American Wigeon (<i>Anas americana</i>)	
Lesser Scaup (<i>Arthya affinis</i>)	
Hawaiian Moorhen (<i>Gallinula chloropus sandvicensis</i>)	
Hawaiian Coot (<i>Fulica americana alai</i>)	
Pacific Golden-plover (<i>Pluvialis dominica</i>)	
Semipalmated Plover (<i>Charadrius semipalmatus</i>)	1976, 1977
Hawaiian Stilt (<i>Himantopus mexicanus knudseni</i>)	
Greater Yellowlegs (<i>Tringa melanoleuca</i>)	1977
Lesser Yellowlegs (<i>Tringa flavipes</i>)	1977, 1981, 1982
Wandering Tattler (<i>Heteroscelus incanus</i>)	
Ruddy Turnstone (<i>Arenaria interpres</i>)	
Red Knot (<i>Calidris canutus</i>)	1975, 1982
Sanderling (<i>Calidris alba</i>)	
Western Sandpiper (<i>Calidris mauri</i>)	1977
Least Sandpiper (<i>Calidris minutilla</i>)	1977
Pectoral Sandpiper (<i>Calidris melanotos</i>)	1976, 1980
Sharp-tailed Sandpiper (<i>Calidris acuminata</i>)	1976
Long-billed Dowitcher (<i>Limnodromus scolopaceus</i>)	1980
Short-billed Dowitcher (<i>Limnodromus griseus</i>)	1976

APPENDIX G

ARCHAEOLOGICAL RECONNAISSANCE SURVEY

PAUL H. ROSENDAHL, Ph.D., Inc.
Consulting Archaeologist

Report 265-011387

**ARCHAEOLOGICAL RECONNAISSANCE SURVEY
PROPOSED AWAKEE RESORT
DEVELOPMENT PROJECT AREA**

**Land of Awakee
North Kona, Island of Hawaii**



January 1987

305 Muihoul Street • Hilo, Hawaii 96720 • (808) 969-1763 or 966-8038

PAUL H. ROSENDAHL, Ph.D., Inc.
Consulting Archaeologist

Report 265-011387

265-011387

ii

SUMMARY

An archaeological reconnaissance survey of the Proposed Awakee Resort Development project area was conducted by Paul H. Rosendahl, Ph.D., Inc., during the period September 22-October 1, 1986, under agreement with Helbert, Hastert, Van Horn & Kimura, Planners. The area surveyed consists of 350 acres located at the seaward (western) end of the Land of Awakee, North Kona District, Island of Hawaii (TMK:3-7-2-04:3).

ARCHAEOLOGICAL RECONNAISSANCE SURVEY PROPOSED AWAKEE RESORT DEVELOPMENT PROJECT AREA

Land of Awakee
North Kona, Island of Hawaii
(TMK:3-7-2-04:3)

The project area includes a coastal sand and coral beach zone, coastal anchialine ponds, rough sea lava, rough to smooth pahoehoe lava, and the slopes of the Puu Kuli cinder cone. All portions of the project area were surveyed by aerial reconnaissance and by three intensity levels of pedestrian reconnaissance. In all, 84 sites were identified within the project area; this number includes sites previously identified by Soehren (1963) and by Rainsack in 1930 (Ms).

The majority (75%) of sites located occur within the immediate coastal zone, which is defined as an area up to 300 m inland from the shoreline (c. 125 ac). Sites reflecting permanent habitation (prehistoric and historic period), short-term occupation, agricultural activities, transportation, recreation, burial and possibly religious activities occur in the coastal zone. Sites occurring in the inland zone principally are short-term shelters, footpaths, cairns, and animal pens. Possible burial, ceremonial, and agricultural features were also located inland.

At this time, additional archaeological work is recommended for 42 of the 84 identified sites. Twenty-eight of these sites are significant only for their information content, the loss of which can be mitigated by further data recovery. Fourteen sites have research value, but are also significant as excellent examples of a site type or as culturally valued resources. Further archaeological work in the form of data recovery is recommended, in addition to interpretive development or preservation and protection, for these sites. For the remaining 37 sites, which were significant solely for their information content, sufficient data have already been collected, and no further archaeological work appears to be necessary at this time.

by
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Cover: Site T-101, Feature A, North Wall. View to east.
(PHRI Neg.525-27)

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INTRODUCTION

BACKGROUND

An archaeological reconnaissance survey of the Proposed Awakee Resort Development project area was conducted by Paul H. Rosendahl, Ph.D., Inc. (PHRI) under agreement with Halber, Hartart, Van Horn & Kimura, Planners (HHVK), for their client, Kahala Capital Corporation. The objective of this survey was to provide information appropriate to, and sufficient for, preparation of the Environmental Impact Statement (EIS) that is being prepared in conjunction with a General Plan Amendment (GPA) application made to the County of Hawaii, as required by Chapter 343 of the Hawaii Revised Statutes. The 350 acre area surveyed includes most of the seaward portion of the Land of Awakee, North Kona District, Island of Hawaii (TK13-7-2-04:3). Field investigations were conducted September 22-October 1, 1986, by a crew of four to seven persons under the supervision of PHRI Supervisory Archaeologists Theresa K. Donham and Alan T. Walker and under the overall direction of Principal Archaeologist Dr. Paul H. Rosendahl.

Eighty-four archaeological sites were identified within the project area during reconnaissance. This total includes four sites that were previously identified by Soehren (1963) and several features within four sites previously identified by Reinecke in 1930 (Ma). Complete verbal descriptions, locational data, and significance assessments of these sites are presented here. Also included is background information pertaining to the environmental and cultural-historical setting of the project area, a summary of previous investigations, discussion of research problems, and a description of field procedures. The conclusion presents site significance evaluation criteria and specific research, interpretive, and cultural values reflected in the cultural resources of Awakee. Recommended general treatment is offered for each site. Appended to this report are findings of preliminary historical documentary research (Silva, Appendix A) and an ethnographic background and local informant interview report (Springer, Appendix B). These reports are summarized in the introductory section, and the findings have been synthesized with the archaeological data.

SCOPE OF WORK

The basic purpose of an archaeological reconnaissance survey is to identify and accurately locate sites or features of archaeological or historical significance. A reconnaissance survey comprises the initial level of archaeological investigation within a specified area. It is extensive rather than intensive in scope and is conducted in order to determine the presence or absence of archaeological resources within a specified project area. A reconnaissance survey indicates the general nature and variety of archaeological remains present, as well as the

general distribution and density of such remains. Such a survey permits preliminary significance assessment of archaeological resources and facilitates formulation of realistic recommendations and estimates for such further work as might be necessary or appropriate. Such work could include intensive survey--selected test excavations and data collection involving detailed recording of sites and features; and possibly subsequent mitigation--data recovery research excavations, construction monitoring, interpretive planning and development, and/or preservation of sites and features with significant scientific research, interpretive, and/or cultural values.

An outline of reconnaissance survey tasks was prepared by PHRI prior to the initiation of field work (PHRI Proposal No. 265-082386). This scope of work was based on a review of available background literature and on discussions with Ms. Virginia Goldstein--staff planner and historic sites specialist in the Hawaii County Planning Department, and with Dr. Ross Cordy--staff archaeologist in the Hawaii State Department of Land and Natural Resources (DLNR). The following specific tasks were determined to constitute an adequate scope of work for the reconnaissance survey of the Proposed Awakee Resort Development project area:

1. Review available archaeological and historical literature relevant to the immediate project area;
2. Conduct 100% coverage, low-level (c. 30-50 ft altitude) aerial reconnaissance (helicopter) of the entire c. 350 ac project area, with special emphasis upon: (a) following out any foot trails present and plotting them on aerial photographs and/or maps, (b) identifying all sites observed, and (c) identifying areas devoid of sites (e.g., recent lava lands);
3. Conduct 100% coverage, high-intensity (30 ft field crew intervals) ground reconnaissance of the immediate coastal zone (area of c. 125 ac, extending to approximately 1,000 ft inland);
4. Conduct 100% coverage, variable-intensity (30 to 90 ft intervals) ground reconnaissance of the remainder of the project area (c. 225 ac), giving relatively higher intensity coverage to the older pahoehoe lava lands and relatively lower intensity coverage to the more recent aa lava lands;
5. Conduct limited historical documentary research (emphasis on readily available literature and documentary sources) and interviews with any appropriate and available local informant sources; and
6. Analyze field and historical research data, and prepare appropriate reports.

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4. Conduct 100% coverage, variable-intensity (30 to 90 ft intervals) ground reconnaissance of the remainder of the project area (c. 225 ac), giving relatively higher intensity coverage to the older pahoehoe lava lands and relatively lower intensity coverage to the more recent aa lava lands;
5. Conduct limited historical documentary research (emphasis on readily available literature and documentary sources) and interviews with any appropriate and available local informant sources; and
6. Analyze field and historical research data, and prepare appropriate reports.

In summary, the principal objectives of the reconnaissance survey of the Proposed Awakee Resort Development project area were four-fold: (a) to identify (find and locate) all sites and site complexes present within the project area; (b) to evaluate the potential general significance of all identified archaeological remains (within relevant contexts of research, interpretive, or cultural values), using criteria consistent with those established for the National Register of Historic Places and the Hawaii State Register of Historic Places; (c) to determine the possible impacts of proposed development upon the identified remains; and (d) to define the general scope of any subsequent data collection and/or mitigation work that might be necessary or appropriate.

The reconnaissance survey was carried out in accordance with the minimum requirements for reconnaissance-level survey recommended as standards by the Society for Hawaiian Archaeology (SHA). These standards are currently being used by the Hawaii County Planning Department as guidelines for the review and evaluation of archaeological reconnaissance survey reports submitted in conjunction with various development permit applications.

PROJECT AREA DESCRIPTION

The Proposed Awakee Resort Development project area includes c. 350 ac located within the western (seaward) portion of Awakee ahupua'a, North Kona District (Figure 1). The project area is bounded on the north by Maninowai ahupua'a and on the west by the Pacific Ocean. Hawaii State lands within Awakee border the project area to the south and east. Makalewena ahupua'a is immediately to the south of Awakee and borders the project area only at the western end, within c. 250 m from the shoreline.

The general climatological patterns affecting Awakee are those characteristic of Kona, the dry, barren portion of North Kona noted for its harsh lava-covered terrain and its excellent offshore marine resources (Kelly 1973, Springer 1986). Rainfall along the coastal areas of Kona rarely exceeds 20 inches per year, because of mountains that block the moisture-laden northeast trade winds (Armstrong 1973:57). Upland portions of Awakee receive an average of 39 inches of rainfall annually, with monthly averages as low as 2.2 inches (July) and occasional monthly highs of 18 to 22 inches in January and December (Hawaii Department of Land and Natural Resources [DLNR] 1970:58-59). Mean temperatures along the coast range from 70 to 76 degrees F (DLNR 1970:81).

Awakee is situated on the lower western slope of Hualalai Volcano, which is the source of the prehistoric pahoehoe and as lava flows that form the present land surface. Prehistoric pahoehoe, with pockets of rough, scaly pahoehoe and aa, covers most of the project area (c. 240 ac). Elevation of this substrate zone ranges from 20 to 120 ft, and a relatively major escarpment occurs at about the 80 ft contour, 300 to 500 m inland from the shoreline. The pahoehoe rockland zone is vegetated with a thick growth of fountain grass (*Pennisetum setaceum* [Forst.])

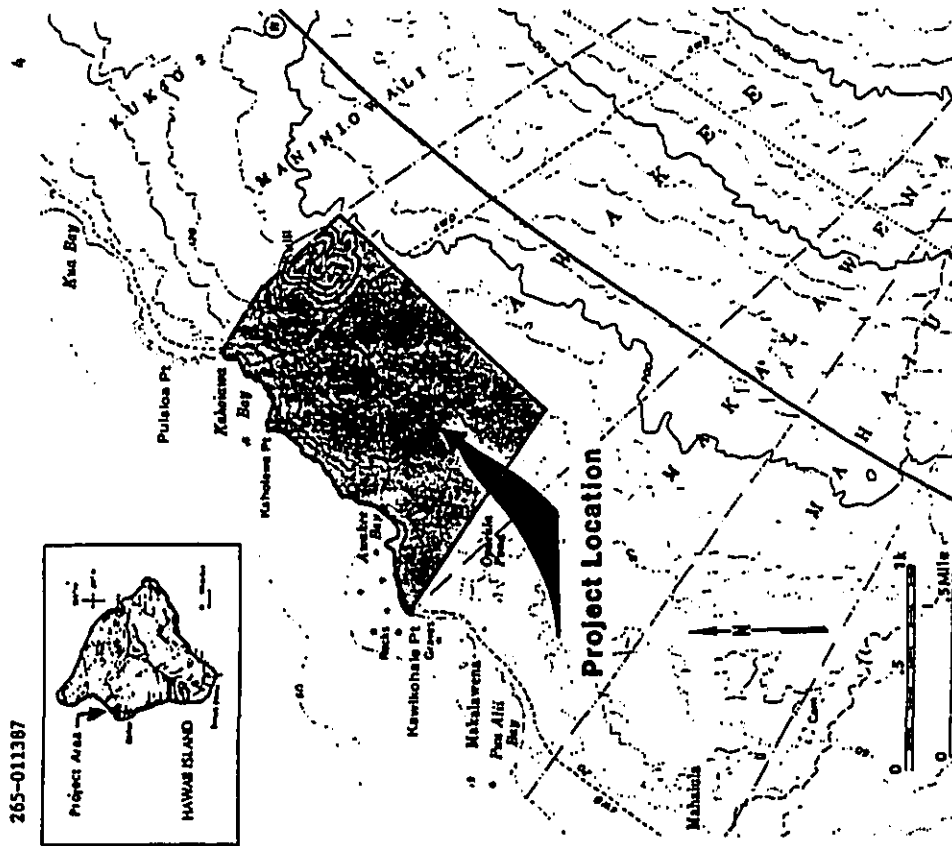


Figure 1. PROJECT AREA LOCATION MAP
Archaeological Reconnaissance Survey
Proposed Awakee Resort Development Project Area
Land of Awakee, North Kona
Island of Hawaii (TMK:3-7-2-04:3)

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within Awakee; however, several additional sites that were not assigned numbers are mentioned in his manuscript. He inspected only the most immediate shoreline area—no more than a few hundred feet inland—and his site records are limited to brief verbal descriptions. In most cases, individual features cannot be specifically correlated with his descriptions; however, general site areas can be matched. Rainecke surveyed the Awakee coastline from south to north and recorded the following sites, which were also plotted on a small-scale topographic map:

Site 100. Ruins at the head of Awakee Bay: (a) Pools and pond of brackish but potable water. (b) Modern house site with cistern. (c) House platform. (d) Yard with indications of recent occupation but no house site; a house platform a few feet mauka, however. (e) House platform over 200' mauka. (f) Several small remains, possibly two or three house sites overlooked in the kieve or a little mauka. This must have been a hamlet of 30-40 people fairly recently.

Site 101. Group of house sites: the first two or more are obscured in the sand; then comes a large lot with house sites indistinct, probably three in number; a house platform; three (?) house sites in the sand. North a considerable distance is a tiny shelter.

Site 102. At Kahoieva: The sand may hide some sites. Four shelter or small hut sites. Then four hut sites on the slope, only one distinct. Still farther along are three hut sites, and there seem to be traces of more mauka.

Site 103: On the thin earth slopes of Puu Kuli just north: a wall and fourteen or more shelter or hut sites. A pen or possibly walled house site on a point overlooking the slope (Ms:19-20).

According to Rainecke's observations, there were 15 to 16 identifiable house sites along the Awakee coastline. These were concentrated along the shoreline at Awakee Bay and were scattered along the coast south of Kahoieva Point. About half of these features could be associated with features located during reconnaissance (Table 1). The numerous features described by Rainecke as being in the sand are probably no longer extant; however, at least five stone-washed structural remnants were located.

Rainecke's sites were later included in an inventory of Hawaii Island sites prepared by B.P. Bishop Museum in 1970 for the Hawaii County Planning Department (Emory 1970). That inventory was based entirely on existing records in the museum's Department of Anthropology and did not involve any field work. Emory's overview included only those sites identified by Rainecke and failed to include subsequent information collected by Soehren (1963).

In 1963, Lloyd J. Soehren of the anthropology department at B.P. Bishop Museum, conducted historical research and an archaeological survey

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Chiov.), and an overstory of kieve (*Prosopis pallida* (Humb. and Bonpl. ex Willd.)). *Lantana* (*Lantana camara* L.) and native *ilima* (*Sida fallax* Walp.) also occur in this zone, but they are less common than fountain grass. Kieve is generally scattered within the inland portions of the project area and is densely concentrated along the coast. Pockets of reddish-brown windblown sand or colluvial soil occur in a few low areas within the pahoehoe zone. Most of the soil occurring in this area originated from the Puu Kuli cinder cone.

The northern portion of the project area (c. 55 ac) consists of cinderland (Sato et al. 1973) and exhibits soil development from the crest to the lower slopes of the Puu Kuli cinder cone. Elevation within this soil zone ranges from 10 ft to 342 ft, within a relatively short distance of 490 m. The upper slopes of Puu Kuli (above 200 ft) are quite steep and are subjected to considerable erosion, which has deposited a relatively thick mantle of reddish-brown soil along the west-facing lower slopes. Such a soil mantle is unique along the coastal portion of South Kona and is more characteristic of the coastal terrain in North Kohala. The upper slopes of Puu Kuli are vegetated with sparse fountain grass, and a kieve thicket is present in the crater at its crest.

The southern portion of the project area (c. 55 ac) consists of rough as land and, with the exception of several kipuka (areas of preserved vegetation surrounded by levee), contains virtually no vegetation. Three major kipuka occur within the area, all of which are older pahoehoe surfaces with thick fountain grass growth. A cluster of about 35 small anchialine ponds is present on the as flow near the coast, immediately inland of Kahoieva Point (MacIock and Brock 1974:72). These ponds are of various sizes and shapes and, with one exception, have unsilted as bottoms. The largest of the anchialine ponds, described by Emerson as the Awakee fishpond in his 1882 survey field log, has a silt deposit and is quite shallow (J.S. Emerson Field Log 1882).

The immediate coastal zone consists of rocky pahoehoe and as points, coral storm beaches and terraces, and intermittent sand pockets. Coral and sand deposits are broadest at the southern end of Awakee Bay, between the large anchialine pond and the shoreline. A broad coral and sand beach also occurs along Kahoieva Point. Vegetation in the immediate coastal zone is principally kieve. Tree heliotrope (*Hesperaloe parviflora* [L.f.] Johnston), *lehalog* (*Valtheria americana* L.), *niu* (*Cocos nucifera* L.), and *milo* (*Thespesia populnea* L.) also occur along the coast. Milo and other vascular plants are most concentrated on the relatively low storm beach that fronts the large anchialine pond.

PREVIOUS ARCHAEOLOGICAL WORK

The earliest archaeological field work at Awakee, and specifically within the project area, was conducted in 1910 by John E. Rainecke (Ms); he located coastal sites in the Districts of North and South Kona for the Bernice P. Bishop Museum. Rainecke recorded four sites (Nos. 100 thru 103)

Table 1.
CORRELATION OF SITE NUMBERS FOR PHRI (1986),
SOEHREN (1963), AND REINECKE (1930) SURVEYS

PHRI (1986) Site Number	Soehren (1963) Site Number	Reinecke (1930) Site Number
T-101 (A)	2	100 (b)
T-101 (B,C)	3 (a)	100 (c)
T-103	3 (b)	100 (a)
T-115	-	101
T-123	-	101
T-130	-	101
T-137	3 (c)	102
T-140	3 (c)	102
T-149 thru -160	-	103
T-179 thru -181	1	100 (a)

at Kaupulehu and Makalewena for B.P. Bishop Estate (Soehren 1963). A review of his Makalewena field notes indicates Soehren visited several sites within Awakee (Temporary Field Nos. 1 thru 3), which he briefly described in a summer similar to Reinecke. BPEM site numbers D20-10 thru -13 were added to the field log at a later date. Unfortunately, site designation D20-13 was assigned twice in Soehren's field notebook, and site designations D20-10 and -12 were also subsequently assigned to distinct sites in the adjacent land of Makalewena during subsequent field projects by Kirth (1974), McKidney (1977), and Rosendahl (1973). It seems unlikely that the BPEM numbers entered anonymously in Soehren's field log were actually registered on the permanent museum files. These numbers were therefore not used to mark or identify sites in the field. Soehren's original temporary numbers are used here in correlating his sites (Table 1). Since Awakee was beyond the specified project area of Soehren's study, no discussion of these sites is included in his 1963 report to the Bishop Estate.

Between June-October 1970, the Parks Division of the State Department of Land and Natural Resources conducted a surface survey of the Kaiulani-Kawaihae road corridor for the State Department of Transportation (Ching 1971). Three sites were identified within the Awakee ahupua'a, and one site (1170) was later included in salvage work conducted by Rosendahl along the highway corridor. This small cave shelter site was within the construction right-of-way and was well east of the present project area (Rosendahl 1973:5,16).

B.P. Bishop Museum (BPEM) site designation system: all two-digit site numbers prefixed by 50-Ha-D20- (50=State of Hawaii, Hanalei of Hawaii, D=North Kona District, 20=Lands of Awakee and Makalewena).

In July and August of 1986, PHRI conducted limited historical documentary research and a reconnaissance survey of the coastal portion of Makalewena for The Kamehameha Schools/Bishop Estate (Donham 1986). Donham identified a total of 49 sites, including two coastal trails (Sites T-4 and T-6) that merge and continue north into Awakee as one trail (Site T-182). Based on the findings of the reconnaissance survey and on limited historical research, Donham evaluated the trails as having moderate to high significance in terms of cultural and interpretive values. Preservation, with some level of interpretive development, was recommended for the trail sections, which are associated with modified anchialine ponds north of Opasula Pond and with the Makalewena Cemetery in Makalewena. The findings of the Makalewena survey are used for comparative purposes in this study.

SUMMARY OF HISTORICAL DOCUMENTARY RESEARCH

The following discussion is excerpted primarily from the appended report prepared by Historical Researcher Carol L. Silva. Additional details and references for much of this information are provided in Appendix A. Environmental and traditional data are taken from Hannah K. Springer's "Notes on Kakaha" (1986).

Regional and Traditional Context

Awakee is located near the geographic center of the region traditionally known as Kakaha. This region includes all North Kona ahupua'a north of Honokahau; its northern boundary co-occurs with the North Kona/South Kohala District boundary between the Lands of Puanahulu and Anahoumalu. Due to its location along the principal rift zone of Hualalai, central Kakaha is landscaped with a number of cinder and spatter cones. Among these are Puu Wawaa, Puu, Akahipu, Puhapele and Puu Kuli. These cones occur primarily in the uplands, with the exception of Puu Kuli, which is quite prominent along the flat coastal lowlands of Kakaha. Puu Kuli and Akahipu are the subject of a well-known folktale, which relates how Menehune attempted to remove the top of Akahipu and transport it to Puu Kuli, thereby capping its crater. This folktale, as recorded by Maguire (1926), is reproduced in Appendix A.

At least two volcanic eruptions have altered central Kakaha's landscape since contact. The earliest known historical eruption occurred in 1801, during the reign of Kamehameha I. This flow originated from a Hualalai vent at Puhapele in the uplands of Kaupulehu and covered a portion of upland Awakee, as it made its course to the sea. The lava destroyed breadfruit orchards owned by Kamehameha and filled a major coastal fishpond (Paiaia) that was reportedly three miles long, with its northern edge at Mahiula (Maguire 1926:4). An account of Kamehameha's reaction and response to this lava flow is given in Appendix A. A second major flow from Mauna Loa occurred in 1859, when the coastal village of Wainanali was destroyed, and the fishpond at Kiholo was filled (Kelly 1973).

In addition to its lava terrain, Kakaha has a desert-like climate with less than 20 inches of rainfall annually. Traditional means of acquiring water in this region include tapping fresh water seeps near sea level and collecting surface seepage in lava tubes and caves (Appendix B). A regional legend collected by Maguire relates the story of a water-collecting cave (Makalei) near Akahipuu (Appendix A). This cave provided a reliable water supply for the Huehue ranch throughout the 1920s (Appendix B).

Anchialine ponds and pools along the coastline of Kakaha provide water, with varying amounts of salt-water admixture. By modern standards, few of these ponds are potable (Maciuleck and Brock 1974:7). However, as noted by Maciuleck and Brock, standards of potability vary with cultural systems. The ponds with lower proportions of salt water tend to occur farthest from the shoreline; they were used well into the historic period. Pump remains were observed at two fresh-water ponds during a recent reconnaissance survey at Makalevua. One of these ponds occurs at the community church and school site (Donham 1986:40). Ponds located behind the beach at Makalevua were a reliable source of cooking and drinking water. Ponds behind Opeulua Pond, just south of the Awakee border, were used to provide water for gardens (Springer 1986:126).

There are traditional and historical references to coastal horticulture in Kakaha, despite its dry climate and its near-absence of soil. Springer discusses a few of these references (Appendix B) and offers the following observation:

Personal experience indicates that even taro will grow well by the shore, given a good water supply and rich mulch as provided by *Hau* (*Hibiscus tiliaceus*), *miho* (*Thespesia populnea*), or *kiawe* leaves (Springer 1986:126).

A primary economic and subsistence resource for Kakaha is the abundant inshore and offshore marine fauna. Historically, the fishing grounds of various *shupua*'s were regulated by the chiefly landowner, who placed restrictions on the species or size of fish that could be collected. Traditional *kupu* (restrictions), which were observed by fishermen, generally aided in maintaining an equilibrium within fish populations. Marine resources, such as littoral zone shellfish and anchialine pond shrimp, were consistently exploited in coastal Kakaha. The most commonly collected shellfish, as indicated in archaeological deposits, were *Merita picea* (*pipipi*), *Merita polita* (*lupele*), *Callinix* spp. (*opipi*), *Cyprina* spp. (*leho*) and *Thaididea* (*pupua*). Where available, *Brachiodontes*, *Isognomonidae*, and *Theodorus* sp. were collected.

Small fish (*opelu*) and shrimp (*opalele*) were collected from anchialine ponds and were dried for trade, as well as for bait and consumption (Appendix B). Numerous anchialine ponds along the coast were cleared and deepened in order to facilitate the growth and collection of these shrimp. Ponds in Makalevua and Awakee were carefully walled to help maintain a productive water level. Anchialine ponds also provided cool, clear water for bathing purposes, particularly after ocean swimming.

Land Tenure

Kakaha was traditionally known to be an area designated for the *kahuna* (priestly class), particularly the lines of Kauihi and Mahulu. Noted individual members of this group are discussed in Appendix A; no specific references to *kahuna* overlordship of Awakee have been located to date. The earliest recorded overlord of Awakee is Kamehameha I, who acquired this *shupua*'s and other North Kona lands as a result of his victory over Kilauea in the battle of Mokuohai, c. 1782 (Appendix A).

Awakee was transferred to the chief, Nuku Nasaun, during the *muhelu*, when Kamehameha divided his crown lands among his chiefs and the newly formed government. Nuku Nasaun died shortly after receiving his grant of 401 acres, and control of the land was passed to his widow, Kapoli. Kapoli later requested that Nasaun's cousin and heir, the Chief Maralo Kekunaoa, be appointed as a joint administrator. The inland portion of Awakee was transferred to Kekunaoa as Land Commission Award (L.C.A.) 10474. In 1850, Kekunaoa transferred Awakee to the government. The government assessed the coastal portion of the Land of Awakee as "poor land, goat pasture" (Appendix A), worth 25 cents an acre. It was sold to Kahialii (or Kuaialii), who acquired a 345.5-acre parcel in 1856, as Grant 2023.

For some unknown reason, a wedge-shaped section along the southern side of the coastal area was not included in Kahialii's grant. Perhaps he did not wish to purchase the area that covers this wedge; it is still owned by the state. The project area boundaries correspond with those of Kahialii's grant parcel.

In 1888, John Maguire purchased a portion of upland Awakee for his ranch; he later attempted to buy additional acreage above the government road. This later attempt was foiled by the establishment of homesteads in upland Awakee in 1895. That portion of Awakee immediately inland of the coastal parcel is still state-owned. This land may have been included in a 1,498-acre parcel offered at auction by the government in 1889. If so, there is no record of its transfer to private ownership.

Cartographic History

To date, the earliest geographic descriptions of Awakee are testimonies, recorded at Boundary Commission hearings in 1873, concerning the Awakee/Makalevua boundary. Two verbal descriptions of the boundary were offered by residents of Makalevua, in order to clarify an apparent dispute over boundary location. Testimony by Kahialii (k.) describes the boundary from the upland government road as follows:

...at the Government road, thence makai, to a place, on the North side of an old *kihapai* *ai* [cultivated area] called Haleoku, thence makai to Hehapaevai, a small water hole in a small patch of pahoehoe bound up on the north side; thence to the prickly pears growing on the sea, and from thence the

boundary strikes across the sea, to Nukuinapulehu, aa, thence makai to Pohakunaiapo, a large round stone, thence to Hokuohaku, on Kaiwihohola, a large rock in the surf (Boundary Commission Vol. A:373-5, as quoted in Appendix A).

Locations of the places called Nukuinapulehu and Pohakunaiapo have not been determined to date. The former place name translates literally to mean "tip of cinder cones" or "entrance to the cinder cones". A second version of this same place is given in the testimonial by Hamae (t.), where it is referred to as Nukuinapulehu. Kukui is an older version of kukui, and the place name is literally translated as "roasting oven for kukui nuts". The variance in place names for apparently the same place is probably related to transcriber error; it is uncertain at this time which is the correct designation. There is no mention of an old trail or footpath in the descriptions of the southern boundary of Awakee; however, an old trail is described along the southern boundary of Makalaweia.

The earliest map of Awakee located to date is a sketch map completed in 1882 by Perryman, with annotations by Emerson (Appendix A). Two views of the Awakee coast are sketched in Perryman's field book. Perryman indicates a coconut grove and pond along the south shore of Awakee Bay. This pond corresponds with the location of Site T-181, a large pond complex with modified sections; it was identified by Emerson as Awakee fishpond (Appendix A). Perryman identified a second coconut grove, and the junction of the coastal trail with a trail to Puu Kuili, at the head of Awakee Bay. This area corresponds with the location of Site T-101, a major historic residential site. Perryman plots a coastal trail along the shoreline of Awakee that is quite close to the shoreline and probably crossed storm beaches. The only area where it does not follow the shore is at Kaholewa Point.

Emerson identifies a grave site on the Awakee/Maniniowali boundary as that of Leauui, a former owner of the land of Awakee. Leauui was interred in 1879, according to Emerson. His ownership of Awakee is not recorded in the land records reviewed to date; however, the entire sequence of land transfer has not been fully reviewed. Features which may correspond to this historic burial occur at Sites T-152 and T-153.

Emerson's first official survey map of Awakee was completed using data collected during the 1882 survey. The land of Awakee, as shown on this map, includes the area that is now called Maniniowali (Appendix A). Two survey datums are plotted on the top of Puu Kuili and are designated "Kuii" and "S.Kuii". The Kuii survey point is still in use and has been redesignated by the Coastal Geodetic Survey. Remnants of what appear to be the old survey marker have been identified at Site T-175. The location of the South Kuii survey marker is uncertain; it may correspond with Site T-176, a rubble pile on the crest of the southern lobe of the cinder cone. The Awakee boundaries, as they exist today, were plotted by Emerson on an 1888 survey map (Fig. 1449).

RESEARCH PROBLEMS AND APPROACHES

Research issues of importance in furthering archaeological and historical knowledge of Awakee and North Kona are discussed here, in order to provide a context for assessing the potential of site information for contributing to history or prehistory. These issues cannot be substantively addressed with information obtained from a reconnaissance-level investigation. However, information generated by this survey should aid in determining which research issues can be addressed most productively by future work, given the nature of the remains present at Awakee. Various approaches to archaeological interpretation, such as culture history, settlement pattern analysis, human ecology, and culture process, are briefly discussed here. Specific research topics are considered, and general data requirements needed to address these topics are described.

An important research concern for archaeological studies is to develop a local chronology that can be synthesized with data from other localities to derive a regional or interregional culture history. Once formulated, a culture history model provides the temporal framework necessary for more complex studies in human adaptation and culture change. In order to develop a reliable chronology for a given area, materials must be present that can be dated through absolute or relative dating procedures. One goal of reconnaissance-level field investigations is to identify archaeological sites that contain or potentially contain datable materials such as volcanic glass, wood charcoal, or temporally diagnostic artifacts and architectural features.

Local chronologies have been proposed by Cordy (1981) for a number of North Kona ahupua'a, based on volcanic glass hydration rim age determinations. For this work, Cordy broke the time between initial settlement and contact in AD 1780 into 50-year time units. From volcanic glass he collected at a variety of feature types at coastal sites, Cordy predicted the number of permanent households present at each ahupua'a during each of the 50-year periods. The ahupua'a of Maniniowali, which is immediately north of Awakee, is among the areas used in Cordy's study. Fifty volcanic glass specimens from 11 coastal features (eight sites) at Maniniowali were dated; all were within a calendrical range of AD 1487-1942 (Cordy 1981: 250,215). The earliest dates determined from Maniniowali are consistent with the general range of early dates from several other North Kona ahupua'a, and it has been suggested by Cordy (1981:173) that large expanses of the district were without population until c. AD 1450. Earlier settlements occur at Kaloko, south of Meshole Point, and at Anaeohomalu, just across the North Kona/South Kohala boundary.

The highest number of dated specimens collected at Maniniowali, and the highest number of features dated by association, occur between AD 1600 and 1650 (Cordy 1981:167). All seven of the dated households used in Cordy's analysis were determined to have been occupied during this period, which correlates with a peak period for the total estimated population of West Hawaii, as determined by Kirch (1985:288). Kirch (1985:288) and Hommon (1976:223) further suggest that after AD 1650, the coastal areas of

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or two medium-sized (17-66 sq m) structures, with possibly associated smaller structures. One or possibly two complexes might also include a large structure, but not in association with more than four other structures (small structures included). If this pattern is not exhibited in the current reconnaissance-level data, alternative interpretive models will have to be considered for future work.

An ecological approach to archaeological interpretation attempts to identify and account for various aspects of the interrelationship between human populations and the environment. Within the context of this approach, the environment of *Awakee* is expected to have an effect on, and to be affected by, human occupants of the *ahupua'a*. In order to examine specific issues in human ecology, it is necessary to reconstruct the local environment and the subsistence strategies for various historic periods. Principal environmental constraints identified for the coastal North Kona area are a chronic lack of rainfall and an absence of soil. These factors, along with excellent marine resources available offshore, can be used to argue for a relatively specialized fisherman population (pre-contact) that acquired produce through trade with upland agriculturalists (cf. Cordy 1976:15).

Preliminary analysis of environmental data for coastal *Awakee* suggests it is not a typical North Kona *ahupua'a*. Much of the project area is covered with old *paohoe* that supports more vegetation than do lowlands in many other North Kona *ahupua'a*. In addition, erosion from the slopes of *Puu Kuli* has deposited a relatively fine cinder soil over the northern half of the coastal zone. This soil is not rich in organic material, but it does contain varying amounts of humic matter and, by mulching, it could certainly have been improved for greater productivity. In addition, there are a number of anchialine ponds at *Awakee* that could have provided the water needed for dryland agriculture.

Given these natural features, it would be premature to assume that *Awakee* residents were specialized fishermen dependent on trade for other food resources. One of the concerns of field investigations, therefore, was to ensure that small, nonresidential features that represent possibly marginal modifications or energy expenditure were systematically recorded. If agricultural features were present at *Awakee*, they could include such formal categories as low, rough terraces, low mounds, cleared and walled depressions, cleared and/or excavated lava blisters, or modified rock outcrops. Similar features have been associated with dryland agriculture at *Lepakahi*, North Kohala (Rosendahl 1972:86-93). A second concern during field work was to identify sites containing subsistence remains, portable artifacts and deposits of soil. If agriculture was practiced in the coastal area with any degree of regularity, it should be indicated in these data sets, as well as in formal attributes of nonresidential features.

The culture process approach in archaeology examines the mechanisms and causes of variability in culture systems. This approach is largely synthetic; it requires a reliable culture history, an understanding of environmental and social constraints, and a conjunctive use of ethno-

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West Hawaii and North Kona experienced relatively rapid population declines. This postulated decline is indicated for certain North Kona *ahupua'a*, including *Maniniowali*, where the number of occupied households apparently decreased by two between AD 1600-1700 (Cordy 1981:167).

Existing chronological data for North Kona, as interpreted by Cordy (1981), indicate that few, if any, permanent habitation sites predating AD 1400 can be expected to occur at *Awakee*. Likewise, most of the habitation sites should reflect occupation during the period AD 1500-1700. Temporary shelter sites should also reflect this pattern; however, an increase in inland shelter use might be expected to occur after AD 1650, reflecting an increase in upland settlement and coastal-upland mobility. It is expected that a number of sites in *Awakee* will contain datable materials, and that hypotheses concerning initial settlement and general demographic trends through time can be addressed through future work.

Settlement pattern analysis generally is an integral component of archaeological studies and is interrelated with culture history, human ecology, and culture process. Settlement pattern analysis requires reliable temporal control as well as development and application of an accurate functional typology of sites and features. Data sets necessary for functional classification include consistently applied formal descriptors for natural and architectural features; quantitative information concerning size, shape and orientation of features; and associative information concerning portable remains, adjacent features and setting.

The most relevant settlement pattern study conducted to date is Cordy's analysis of North Kona coastal sites. In developing his settlement model, Cordy utilized two principal data sets--form and size--to differentiate various functional types within the immediate coastal zone. Four types were identified: sleeping houses, men's houses, special purpose houses and canoe houses. The first three types were differentiated solely on the basis of size: sleeping houses ranged from 17-66 sq m in surface area, men's houses ranged from 72-144 sq m in surface area, and special purpose houses ranged below 17 sq m. Each of the three types could consist of a platform, a pavement and/or a low enclosure (Cordy 1981:82). Ceves were included in the special-purpose category.

Among the 22 features recorded by Cordy at *Maniniowali*, ten were classified as sleeping houses, nine were classified as special purpose houses (or features), and three were classified as combination men's/canoe houses (Cordy 1981:162). These latter features are long, narrow, open ended enclosures that range from 52-84 sq m in surface area. Complexes interpreted by Cordy as chiefly residences consist of five or more houses enclosed by a stone (or wood) wall. Such sites were not identified at *Maniniowali*. According to Cordy's model, the only occurrence of a chiefly residence in North Kona is at *Kaloko* (Cordy et al. 1975). Cordy's data imply that all North Kona *ahupua'a* other than *Kaloko* are expected to have been occupied only by commoners, and that all land ownership and political control (particularly after AD 1400) was by absentee overlords. According to this model, *Awakee* should exhibit a pattern of sites consisting of one

historic data. A prominent processual problem in Hawaiian archaeology is concerned with the evolution of traditional land units as social and political territories. This problem has been approached generally on the regional (Cordy 1981) or state (Homon 1976) level, but it has rarely been examined in depth at the local level. Ahupua'a are traditionally named land units that have been attributed varying degrees of social (Handy and Fukui 1972) and political (cf. Kirch 1983:294-295) importance in ethnographic and archaeological literature.

Archaeological correlates for ahupua'a units and their boundaries have been identified; they include boundary ahu or shrines (Barrere 1971), hypothesized buffer zones (Cordy 1981), and inland trails (Cordy and Kaschko 1980). Cordy et al. (1975) also indicated that the coastal settlement pattern within an ahupua'a should be expected to reflect a community of politically uniform (autonomous or controlled by the same overlord), socially interactive, kin-based groups. They suggest this relationship might be exhibited in the patterning of residences and trails, in architectural style (homogeneity), and through religious features such as the presence or absence of a large shrine or heiau (Cordy et al. 1975:4-6).

If such correlates are applicable for North Kona ahupua'a other than Kaloko, they should be most readily indicated through comparisons of adjacent land units such as Awakee, Maniowali and Makalewena. Reconnaissance-level archaeological data are available from Makalewena southward (Donham 1986), and selectively recorded data are available from Maniowali to the north of Awakee (Cordy 1981). Preliminary comparisons between Makalewena and Awakee have indicated environmental and archaeological contrasts between the two ahupua'a (Donham 1986:78-80). A more detailed examination of these contrasts is warranted and may provide insight into this problem area.

In the conclusion section of this report, these issues are integrated with survey findings. This brief and generally undeveloped research design is not considered to be exhaustive in scope; additional research applications could also be productive, using archaeological data from Awakee.

FIELD METHODS AND PROCEDURES

A 100% coverage, low-level aerial reconnaissance of the project area was conducted by PHRI Supervisory Archaeologist Victoria K. Kai and Alan T. Walker on September 23, 1986, by means of a helicopter piloted by Mr. Kalani Ching of Kona Helicopters. After initially flying the boundaries of the project area for orientation purposes, the entire project area was examined from the air. A series of overlapping north-south transects (average altitude of 50 ft above ground surface) was used, enabling recognition of archaeological features in areas of sparse ground cover. Footpaths identified from the air, or on an aerial photograph (1"=400') provided by HHVH&K, were followed closely from the air in order to

identify sites associated with these features. Identified features were photographed from the air and, whenever possible, the features were tagged to facilitate location during pedestrian reconnaissance. All sites and features identified during aerial and ground reconnaissance were plotted on an aerial photograph (1"=400') provided by HHVH&K.

Pedestrian reconnaissance field work began September 22 and was concluded October 1, 1986. The seven-person field crew was supervised from September 22-25 by Alan T. Walker and from September 26-October 1 by Theresa K. Donham. The project was conducted under the overall supervision of Principal Archaeologist Dr. Paul H. Rosendahl. In all, 360 labor hours were expended during field work.

The project area was covered using two survey intensity levels, as specified in the scope of work. The coastal zone (shoreline to 1,000 ft inland, c. 125 ac) was surveyed at a high intensity level, with surveyors spaced at 10.0 m intervals. Survey transects were oriented east-west, perpendicular to the coastline and progressed north along the coast. The northernmost transect and the eastern (inland) 1,000 ft boundary of each sweep were well-marked with surveyor's flagging tape, and these locations were used to guide subsequent sweeps.

With the exception of the rough as flow near the southern boundary of the project area, the inland zone (c. 225 ac) was surveyed at a medium level of intensity, using 30.0 m intervals between crew members. All survey transects were oriented north-south, parallel to the coastline, and each progressed eastward (inland) from the coast. The easternmost transect of each sweep was well-marked with surveyor's flagging tape; these locations were used to guide subsequent sweeps. The slopes of Puu Kuli were surveyed by contouring the cinder cone, rather than by utilizing straight north-south transects. The aerial reconnaissance provided excellent 100% visibility of the open, treeless as flow; this area was only briefly inspected, with the exception of previously identified aerial reconnaissance sites, transects along the sides of footpaths, and vegetated kipuka, which were included in the pedestrian survey.

A standard PHRI site survey record form was completed for each site, with descriptive data and feature dimensions recorded on-site. Selected features of each site were photographed in 35 mm black-and-white (PHRI Roll No. 523-528). Each site was marked with pink and blue flagging tape and with an aluminum tag denoting temporary site number, PHRI project number (86-265), and date. All identified sites, beginning with Site T-101, were assigned sequential, three-digit temporary field numbers prefixed with "T-". As an aid to future site reidentification, site data were also written on a separate piece of flagging tape that was wrapped around a cobble-sized stone and placed in a protected, but conspicuous, location at the site.

FINDINGS

In all, 84 archaeological sites with 239 component features have been identified within the Proposed Awakee Resort Development project area (Figure 2). These sites and component features are summarized in Table 2 (at end), which includes preliminary significance evaluations and specific tasks determined to be sufficient and necessary for adequate data recovery. Each site is described below, in numerical order. Information included in each description includes overall site size, feature dimensions, general environmental zone and distance from the shoreline, portable remains observed, and tentative functional category (if determinable). In the discussion, these data are summarized and compared with data from other North Kona ahupua'a.

SITE DESCRIPTIONS

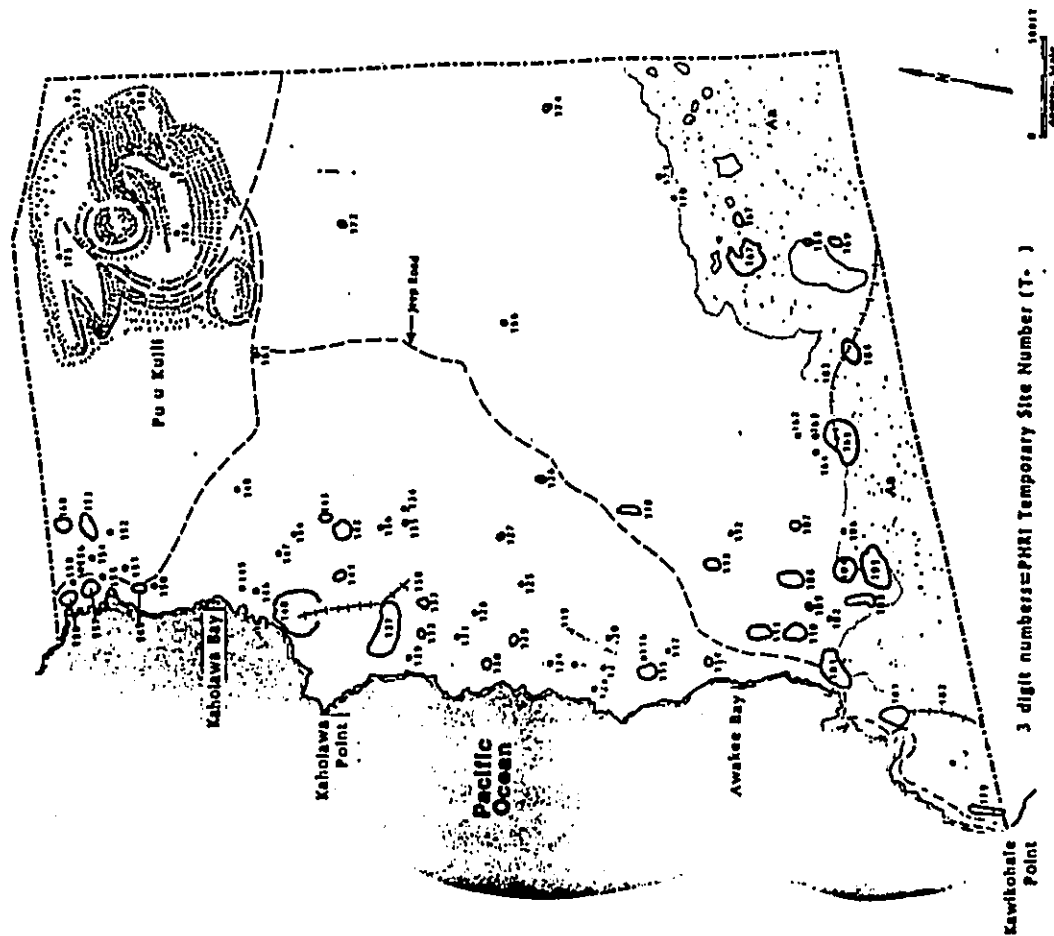
T-101 Complex

This historical habitation complex was described by Reinecke as a "modern house site with cistern" (Ms:19) and was recorded as Feature B of his Site 100 complex at Awakee Bay. It was later described by Soehren, who noted additional features:

#2 Fine kahua [foundation] and pond crossed by road, overlooks SW corner Awakee Bay; thick 'ilili all over, lime and stone cistern SE corner; small cook house at SW corner with *kepuhi* [fireplace] against gaults [inland] wall; smoke hole above small square pan ? broken down S side, makai [seaward] yard enclosure gone - washed out (Soehren Field Log 33).

Four major features were identified at this site, including two enclosed terraces (Features A and B), a small platform (Feature C), and a disturbed terrace (Feature D). Soehren's description (above) refers to Feature A. The remaining three features adjoin one another and are located to the east of Feature A.

Feature A is situated on an exposed as point at the southern edge of Awakee Bay, with the north side facing the ocean. The north and west sides of the enclosure have been affected by storm wash, and the entire feature has been affected by the coastal jeep road, which passes through the east and west enclosure walls and crosses the northern half of the terrace. The terrace has a surface area of c. 135 sq m, and is raised on the northern side. This side was originally vertical and was constructed from as boulders; it is presently sloping and is collapsed in places due to storm wash. Currently the shoreline is less than 20.0 m from this side of the terrace, and it is c. 5.0 m lower in elevation. The north side protrudes onto the slope of the cliff and is raised 0.8 to 1.0 m above a narrow natural terrace which occurs downslope (Figure 3).



3 digit numbers=PHRI Temporary Site Number (T-)

Figure 2. Site Location Map

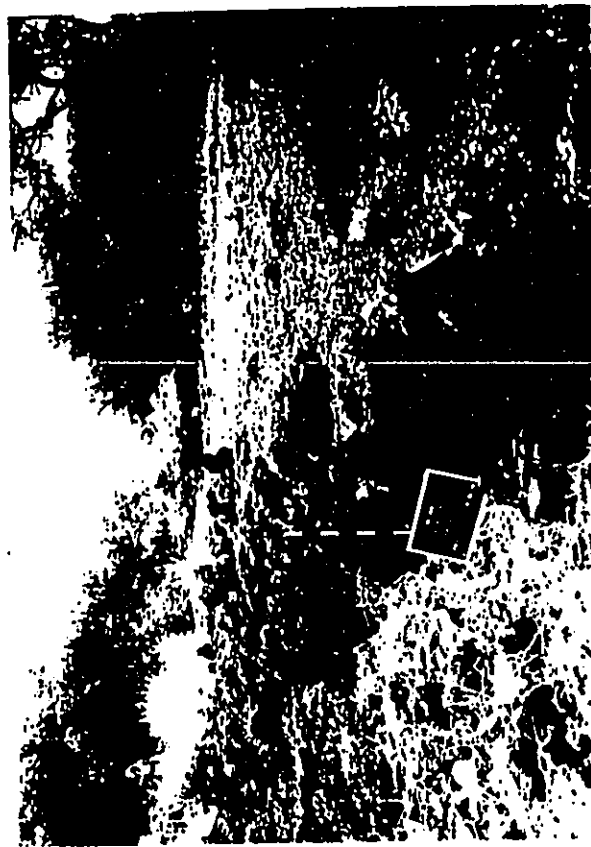


Figure 3. SITE T-101, FEATURE A, NORTH WALL. View to east.
(PHRI Neg. 525-27)

The terrace is paved with a thick deposit of small waterworn basalt pebbles (fill) intermixed with coral pebbles. All other material on the terrace is modern rubbish. A low enclosure wall defines the north, south and east sides of the terrace.

The enclosure walls are constructed from as boulders stacked up to six courses high; they are faced on both the interior and exterior sides. The 0.9-m-wide wall is core-filled with small as gravel. A few waterworn basalt and sand conglomerate boulders are interspersed in the wall, and waterworn pebbles occur in the core filling. Maximum intact height of the wall is 1.1 m along the south side. The southeast corner appears to be at the original height, which is 0.87 m on the interior side. The north and east walls are 23.0 m long, measuring from the interior of the corners. The west wall, if formerly present along that side of the terrace, is completely down. The south wall continues to the west beyond the edge of the terrace for a distance of 13.7 m. This extension is in poor preservation and no corner could be identified at the west end. The north wall also extends beyond the west edge of the terrace; it is identifiable for a distance of 2.3 m. A small ramp occurs along the inside of the wall, beginning at the terrace surface and continuing for the entire length of the wall remnant. It was apparently an access path to the shoreline.

A small compartment occurs inside the southeastern corner of the enclosure, formed by a 5.0-m-long linear wall that parallels the south wall. A compartment 5.0 m long by 3.0 m wide (N/S) was formed by this interior wall; the compartment is open to the west. A small enclosure is attached to the exterior side of the south wall, near the center of the enclosure. This attached structure appears to correlate with Soehren's "small square pen." The walls of the small enclosure are 0.55 m high and 1.0 m wide, and the interior surface area is 13.65 m (3.9 m N/S by 3.5 m E/W).

A walled cistern occurs on the terrace, 1.0 m from the inside of the east wall and 6.7 m from the inside of the north wall. It is constructed from as and waterworn basalt boulders that have been joined with lime-based mortar. The interior surfaces of the cistern walls appear to have been completely mortared. The cistern walls rise 1.0 m from the present terrace surface (also a road bed). Exterior diameter is 2.7 m at ground surface and 2.1 m at the opening. The wall is stepped inward 0.23 m below the rim of the cistern, and the smaller upper section of the wall is comprised primarily of waterworn boulders, with a considerable amount of lime mortar applied to the exterior sides. This upper section may be a later addition to the cistern. The interior diameter at the opening is 1.3 m. The cistern was filled with rubbish at the time of survey and it was not possible to view the interior. The rubbish has since been removed; however, it is now filled with boulders, and a small cairn has been constructed on top.

Feature B is a badly disturbed terrace located 25.0 m east (100 degrees Az) from the northeast corner of Feature A. It is slightly upslope of Feature A and is in a generally more protected location along gradually sloping terrain, facing the northwest. The feature has been affected by large live trees and by the coastal jeep road. The terrace

appears to have been enclosed by a low wall, which is now partially intact along the southwest, southeast, and northeast sides. It was apparently irregular in shape and followed the contours of the bedrock slope. The western corner was possibly square; however, the north and east corners were rounded. The northwest side was stepped along the slope, with an upper level wall 0.5 to 0.6 m above a lower level wall. This side is disrupted by large trees and by the jeep road, and no traces of an enclosure wall could be located.

Overall length of the terrace (NW/SE) is 14.5 m; width varies from 9.4 to 9.8 m. It is paved with small waterworn basalt pebbles intermixed with coral pebbles and cobbles. A few *Oprasinidae* shell fragments are present, and a considerable amount of dark gray soil occurs on the terrace.

The remaining portions of the enclosure wall around Feature B are constructed from aa boulders and slabs, some of which have been positioned upright along the base of the interior side. The wall is faced on two sides and is core-filled with smaller aa boulders and cobbles. Average width is 0.8 m; present height varies from 0.6 to 0.9 m. A 1.1-m-wide faced opening occurs in the southwest wall, providing access to the adjacent terrace (Feature D).

Feature C is a poorly defined platform centrally located at the southeast edge of Feature B. The platform has a surface area of 27.0 sq m (5.4 m NW/SW by 5.0 m NW/SE) and is raised 0.3 to 0.4 m above the Feature C terrace surface. The perimeter is defined by a partially buried wall which extends one course above the platform surface and the west and north corners. The wall is faced along the northwest side and is 0.4 m above the terrace surface. The platform is paved with a thick deposit of waterworn basalt and coral pebbles; a number of coral cobbles also occur on this platform and are aligned along the perimeter wall in places.

Feature D is a disturbed terrace located in a relatively low area between Features A and B. The northeast side of Feature D is defined by the southwest wall of Feature B; the northwest side has been disrupted by the jeep road. The terrace is raised 0.2 to 0.3 m along the southwest side and was probably raised somewhat higher along the northwest side. Approximate surface area is 50.0 sq m. Length is 8.2 m (NW/SE) and width varies from 7.0 (NW half) to 3.5 m (SE half). Intact portions of the terrace perimeter are defined with large aa boulders and occasional upright slabs. It is surfaced with aa cobbles and pebbles. No waterworn basalt or coral pebbles are present on the terrace. A single piece of a large *Conidae* shell was observed; all other material present is recent rubbish (paper).

All features identified at Site T-101 appear to reflect a permanent habitation site. Feature A is of apparent historic-period construction, or at least modification. Features B and C may represent a distinct house site, given the presence of a low enclosure wall around these features. Feature D is of unique construction relative to the two adjacent terraces; it may be of prehistoric-period construction.

T-102 Walled Depression

This site consists of a low wall constructed across the opening of a small pahoehoe depression and shallow overhang. It is located 85.0 m from the shoreline and 24.0 m north from the edge of the Site T-103 complex. The wall is constructed from roughly piled subangular basalt boulders and has no faced sides. Average width of the wall is 1.0 m, length is 2.65 m, and height varies from 0.4 m on the interior side to 0.3 m on the exterior side.

The shallow bedrock depression is surrounded on three sides by sloping bedrock, with the southern side enclosed by the wall. Maximum depth of the depression is 0.75 m against the northern side of the bedrock slope. Total enclosed area is 5.1 sq m (2.3 m N/S by 2.2 m E/W). A low, shallow overhang (0.5 m ceiling height) occurs along the eastern wall of the depression. The area sheltered by the overhang is 1.7 m wide at the opening and 0.8 m deep. This small overhang appears to have been too small for use as a temporary shelter.

A very sparse amount of *Oprasinidae* shell fragments is scattered inside the depression, in addition to small mammal bone fragments and a shallow deposit of loose, brown loam. The specific function of this feature is indeterminate; it may have functioned as a small animal pen or as a plant bed.

T-103 Complex

This site is located in rough pahoehoe intermixed with aa, 50.0 m west of the major aa flow escarpment; it extends 97.0 to 160 m from the shoreline. Sites T-104 and T-105 are c. 30.0 m east of T-103, along the edge of the aa. Two features were identified here: a long, narrow boulder causeway (Feature A) and an enclosure (Feature B).

Feature A is constructed primarily along the crest of a narrow finger of pahoehoe that is elevated 0.2 to 0.5 m above the surrounding ground surface. It consists of a boulder-fill deposit of varied thickness and density that extends north-south (343 degrees Az) for a distance of 75.0 m (Figure 4). Width of the boulder fill varies from 2.5 m at the southern end to 4.0 m near the center. The northern end is disturbed; fill stones are currently scattered along the south side of a metal fence. The sides of the causeway are defined in areas by large pahoehoe boulders and upright slabs. These perimeter stones are stacked and faced over depressions in the pahoehoe surface. Areas of elevated bedrock within the limits of the feature are free of boulder fill.

Height of the fill surface above the bedrock averages 0.5 m and ranges from 0.2 m at the southern end to 0.7 m over a surface depression. The west side of the feature is generally higher above ground surface than the east side; however, both sides are relatively level, with the center slightly lower.

Feature B, a nearly square enclosure, is located on an elevated knoll at the southern end of the causeway. The southeast corner of Feature B is located 1.5 m east from the southeast corner of Feature A. This enclosure is constructed from as boulders and cobbles intermixed with waterworn basalt boulders. The interior has a surface area of 6.9 sq m (2.3 by 3.0 m), and the overall dimensions of the enclosure are 5.3 m N/S by 4.1 m E/W. Wall height varies from 0.8 m on the exterior of the southeast corner to 0.3 m on the interior of the west wall. Average interior wall height is 0.55 m, and average exterior wall height is 0.60 m. Wall width varies from 1.1 to 0.7 m, with the widest sections near the northeast corner. No formal opening occurs in the wall. The interior surface of the enclosure is principally exposed as bedrock, with scattered wall fall, waterworn beach pebbles (labeled 'iii'iii), coral pebbles, and sparse shell midden. No soil was observed in or around the enclosure, and no internal structural features are present.

Shell midden occurs inside the enclosure and on the site surface, at the south end of Feature A, along the west side. Shellfish families observed include Cypraeidae, Conidae, Neritidae, and Thaididae. Fish and animal bone and some branch coral are also present. The surface material is localized in an area 4.0 m long (N/S) and 0.5 m wide, just off the edge of Feature A.

The function of Feature A cannot be reliably determined at this time. It has been disturbed by large trees and by storm wash, and it was probably longer than presently indicated. Possible uses of the feature include a trail causeway or a small holus slide. The causeway is not, however, located along markedly sloped terrain.

T-104 Complex

Site T-104 is located c. 30.0 m east from Site T-103 and 210 m from the shoreline, just east of the major as flow escarpment. The features are situated on daterolated as, which is the principal construction material. Four features were identified, including a platform (Feature A), two stone mounds (Features B and C) and a cairn (Feature D). These features occur within a 750 sq m area. Feature D is within 15.0 m from Feature L of Site T-103.

Feature A is large rectangular platform with a surface area of c. 60.0 sq m (9.2 m N/S by 6.5 m E/W). It is erected on a raised as knoll that has been artificially terraced along the west and north slopes and leveled to the south of the platform (Figure 5). The faced platform walls are constructed from as boulders and are raised to a maximum height of 0.9 m along the exterior side (southeast corner). Exterior wall height averages 0.6 m. The central portion of the eastern wall has collapsed, but all other walls are in relatively good preservation. The platform surface is paved with waterworn beach pebbles (labeled 'iii'iii) intermixed with coral pebbles.

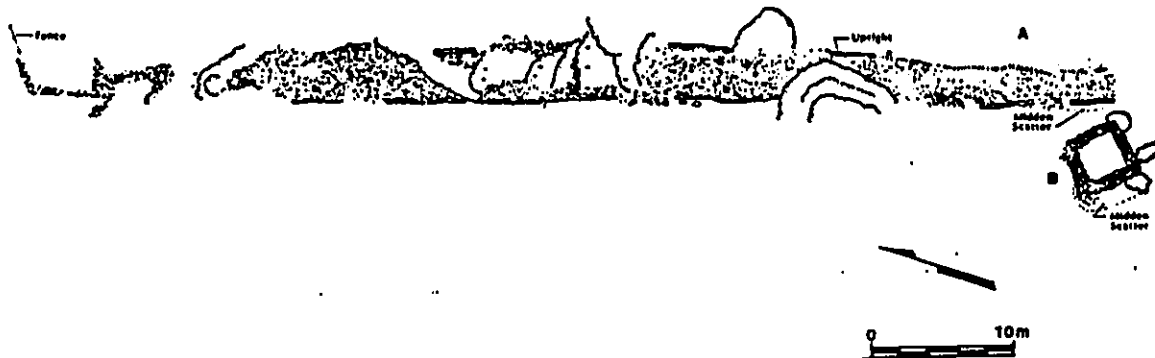


Figure 4. Site T-103, Features A-B

A small coral-paved extension is located off the southeastern corner of the Feature A platform. This smaller platform appears to have been added to the larger structure, rather than incorporated at the time of initial construction. It has a surface area of 8.75 sq m (3.5 m N/S by 2.5 m E/W) and is raised 0.7 to 0.8 m above ground surface. The side walls of this extension are faced and are constructed from as boulders. The extension platform surface is paved with beach pebbles and coral boulders and cobbles. The coral is much more concentrated on the surface of this small extension than on the large platform (Figure 6).

A small localization (5.3 sq m) of soil occurs near the center, along the west wall of the large platform. This deposit appears to be less than 10.0 cm thick. A well-defined hole, 0.4 m in diameter and 0.4 m deep (posthole ?), occurs in the southeastern quarter of the platform.

A partially buried alignment (wall ?) occurs to the south of the Feature A platform. This alignment is L-shaped, with the long axis (11.2 m) oriented north-south. The east-west section roughly parallels the platform's southern wall and is 1.2 m from its exterior side. The eastern end of this 5.4-m-long section connects with the south wall of the small extension platform. This alignment may represent an old retaining wall; it currently has an average height of 0.15 m.

Retaining walls occur on the north and west sides of Feature A and are associated with various low terraces along the slopes of the aa knoll. The west retaining wall is along the north half of the large platform; it is 6.5 m long and 0.9 to 1.2 m high along the west (downhill) side. This wall is positioned from 0.8 to 2.0 m away from the side wall of the platform, and it follows the general contour of the hill. The north retaining wall is 1.2 to 2.5 m north from the wall of the platform. It is 11.0 m long and slightly curved to follow the natural topography. This wall is 1.0 to 1.25 m high on the north (downhill) side.

A fourth wall, constructed from large aa boulders, defines the southern perimeter of the landscaped area around the platform. Average height is 0.5 m along the outside and 0.35 m along the inside. The east side is intact for a length of 7.3 m; the north side is badly disturbed, with only a few stones still in place; and the west side is partially intact for a distance of 5.5 m. The north end of the west side abuts a bedrock protrusion that also acts as part of the wall. Total area enclosed by this wall is 11.5 m N/S by 10.2 m E/W (117.3 sq m).

Two small localizations of surface midden occur along the west wall within the enclosed yard area south of the platform. These localizations include Cypraea, Neritidae, Patellidae, Thaididae, Echinoidae and coral. Shell fragments, beach pebbles and cobbles, and weathered coral pebbles and cobbles are thinly scattered over the entire enclosed area around the platform.

Feature B is located beyond the enclosed Feature A yard, 18.2 m south-east (91 degrees Az) from the southeast corner of the platform. It consists of a somewhat oval mound, constructed along the west face of a large

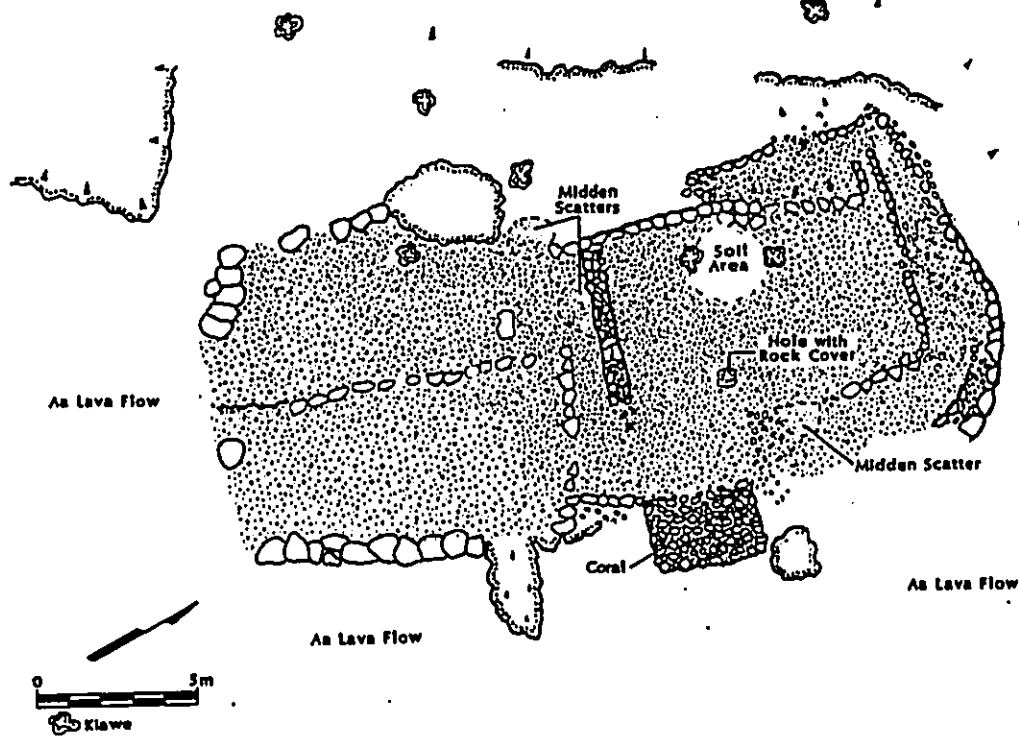


Figure 5. Site T-104, Feature A
G-17

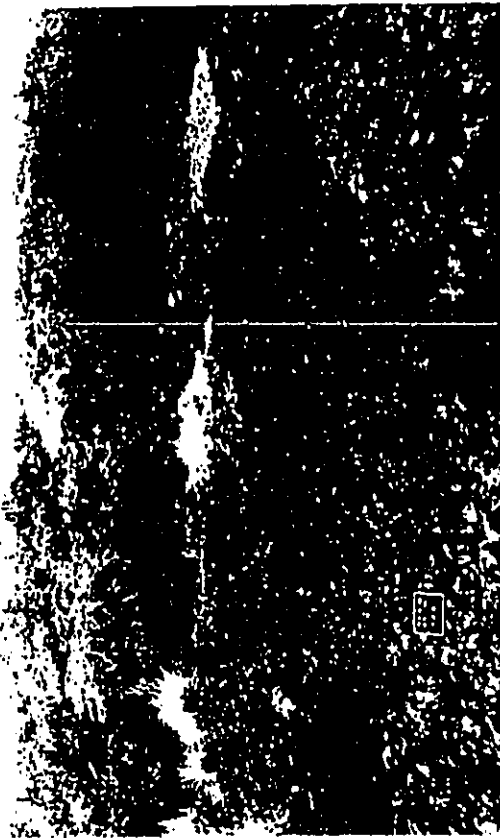


Figure 6. SITE T-104, FEATURE A. View to north.
(PHRI Neg. 523-31)

an upthrust. The perimeter of the mound is defined by large as boulders and the interior is filled with smaller as cobbles and pebbles. Its major axis is 2.0 m and the minor axis is 1.5 m. The core-filled area is 2.1 by 0.65 m across the rounded surface. The walls are nearly vertical and are faced, with an average height of 0.9 m. Some upright slabs have been incorporated into the perimeter wall.

Feature C is located 8.0 m north of Feature B. It is similar to Feature B in construction, with the exception of the surface, which is flat and gives the feature a more platform-like appearance. This feature is circular in plan, with large perimeter boulders stacked nearly vertical and with core fill of smaller cobbles and pebbles. The mound is 2.1 m in diameter and has an average height of 0.4 m. A single piece of marine shell (Conidae) occurs on the as between the two mounds, which appear to be burial monuments.

Feature D is a cairn located 29.1 m west of the Feature A platform. It is situated on an elevated as boulder at the inland edge of the vegetation line. The cairn is constructed from as slabs and boulders and from a single as bomb that is positioned on the top. The northwest side of the feature is nearly vertical and is roughly faced to a height of 0.8 m. The base is rectangular in plan (1.3 by 1.6 m) and is formed from large boulders and slabs stacked to a height of 0.8 m. The upper stones are smaller and are piled in a roughly pyramidal form to a height of 1.2 m.

Site T-104 is interpreted as a permanent habitation site with associated burial monuments and an adjacent shrine or burial monument. No formed artifacts or portable remains which might indicate period of construction and use were located during reconnaissance; however, it is expected that such materials are present at the site.

T-105 Complex

This site covers approximately 1,350 sq m along the western edge of the major as flow, just east of the flow escarpment and 150 m from the shoreline of Waikiki Bay. Sites T-103 and T-104 are within 30.0 m to the northwest and southwest, and features from these complexes are within view. These three sites could be considered as part of a single large complex and were previously grouped together by Rainey, who included several sites in his Site 100 designation (Ms:20). Twelve features were identified at Site T-105, including a walled depression (Feature A), two mounds (Features B, C), three faced excavations (Features D, E, F), two cave shelters (Features H, J), a terrace (Feature I), a platform (Feature K) and a cleared depression (Feature L).

Feature A is situated in a shallow depression at the inland edge of the vegetation line (kies thick). It consists of curved and linear walls constructed around the perimeter of a cleared depression. The north, south and east walls are raised above the surrounding ground surface and are constructed in sections which incorporate the natural bedrock. The west wall is a single large boulder that extends from

Feature D is a nearly circular excavation, with three sides retained by upright or horizontal slabs of ss. The south side consists of a large in situ ss boulder. The opening of the excavation is 0.77 by 0.6 m, and maximum depth is 0.6 m. Walls are vertical and the bottom is flat; it is surfaced with small pebble-sized ss gravel. The excavation is empty, with the exception of a few surface stones that have fallen into the hole.

Feature E is less formally constructed than Feature D. It has a circular opening, 0.7 m in diameter, and a maximum depth of 0.76 m along the south side. Depth along other side walls is 0.4 m. The sides are defined with ss cobbles, and they are not faced or vertical. No portable remains were observed in or around this excavation.

Feature F is located 4.5 m east of Feature D, out of the ravine and c. 1.5 m higher in elevation. It is a third, larger excavation with an opening 0.9 by 0.8 m. At 0.3 m below the opening, the excavation expands to a major east-west axis of 1.2 m. Maximum depth is 1.0 m along the east side; minimum depth is 0.5 m along the west side. The sides are defined both with large in situ boulders and with smaller cobbles that have been stacked and faced. A very shallow overhang occurs at the base of the excavation, along the south and west sides. No portable remains, with the exception of loose ss, were observed in or around the hole. This feature, as well as Features D and E, appear to be storage cupboards.

Feature G is situated at the head of a shallow ravine along the west-facing slope of the ss flow; it is 7.0 m south from Feature F and c. 1.0 m higher in elevation. It consists of a small overhang that has been cleared of loose ss rubble and excavated down to form what appears to be a fourth storage cupboard. The opening to the feature is 0.72 m wide and 0.53 to 0.64 m high. The sheltered area under the overhang opens to a width of 1.2 m; it is 1.0 m deep and has a ceiling height of 0.8 m. The floor of the small shelter has been dropped 0.35 m by excavation, and has been extended 0.3 to 0.4 m beyond the dripline. The floor of the excavation is covered with loose ss pebbles and cobbles that have not been packed or leveled. No portable remains were observed in or around the feature.

Feature H is a small cave shelter located 21.0 m southwest of Feature G. It is the most isolated feature identified within the Site T-105 complex. The cave is accessed through a vertical shaft opening that appears to have been excavated in the loose ss deposit. The shaft is 0.96 m deep and 0.76 m wide at the top, and it tapers toward the bottom, where a buried horizontal cave opening occurs. The opening is 0.6 m wide and 0.56 m high at dripline. The cave extends 2.4 m from the dripline and has a maximum width at the center of 1.73 m. Ceiling height averages 0.8 m, except for the back 0.87 m, which has a ceiling height of 0.5 m. A vent in the back wall of the cave appears to have been closed up from the inside. The floor of the cave is covered with loose ss cobbles and does not appear to have been cleared or modified.

A thin ash deposit was observed in the center of the cave, and charcoal was observed at the base of the vertical entranceway, just outside

ground surface down to the floor of the depression, which is 0.8 m below the surrounding ground surface. Wall sections are constructed from variously sized ss boulders, some of which are quite large. Most of the eastern wall is natural bedrock, with crevices that are filled with small ss boulders. The northern wall is 2.9 m long and linear in form, extending beyond the natural curve of the bedrock at the western end. The southern wall is now mostly tumbled into the interior depression. It is 1.9 m long, has an average width of 0.6 m, and height on both sides is 0.5 m. This unfaced wall is two boulders wide at the base and one to two wide on top (third or fourth course).

The interior area of the shelter is circular in plan, with a surface area of 8.5 sq m. The floor consists of leveled and packed ss gravel, with some cobble-sized pieces. No portable remains were observed inside the shelter. A single Cypraea shell fragment was located, just outside the south wall.

Feature B is located 5.0 m southeast from Feature A and is approximately 1.0 m higher in elevation along the ss escarpment. It consists of a linear mound and an adjacent cleared, leveled area, which is possibly an artificial terrace. The mound is 2.4 m long, 1.3 m wide, and has a maximum height of 0.85 m on the west (downhill) side. Height above the level, cleared surface is 0.5 m. The base is constructed from large ss boulders, and the upper portion is filled with smaller cobble- and pebble-sized pieces of ss. A wall-like extension, 0.8 m wide and 1.2 m long, continues off the south end of the mound and defines the west (downhill) side of the cleared area. It is 0.65 m high along the west side and is 0.3 m above the surface of the leveled area on the east side. This extension has nearly vertical sides, and it may have been constructed as a retaining wall for a small terrace. The cleared, leveled area adjacent to the mound and extension is surfaced with crushed ss pebbles; it is circular in plan and has a surface area of 2.8 sq m. No portable remains were observed near this feature.

Feature C is a second mound and cleared, leveled area located 3.1 m southeast (140 degrees Az) of Feature B. This mound is constructed in two distinguishable levels. The lower level is circular in plan (1.6 m in diameter) and is raised to 0.4 m above the surface of the leveled area. The upper level is rectangular in plan (0.9 m N/S by 1.3 m E/W) and is raised 0.5 m above the top of the lower level. The east side of this level is faced, and the surface is rounded. The level, cleared area is surfaced with crushed, packed ss and is surrounded on all sides by an alignment of large ss boulders. It is somewhat oval in plan and has a surface area of 2.1 sq m. No portable remains were observed near this feature.

Features D and E, two faced excavations in ss, are located within 3.0 m of one another in a shallow ravine along the slope of the ss flow. The northernmost of the two (Feature D) is located 4.5 m east from Feature C and is c. 1.0 m lower in elevation. The ss between Features D and E excavations has been surfaced with packed, cobble-sized pieces of ss. Feature E is c. 0.3 m upslope from Feature D.

the dripline. A partially burned, drilled piece of wood, and additional wood sticks, were also observed in the cave. The modified wood is 10.0 cm long, 4.0 cm wide and 3.0 cm thick. An oval hole, 1.5 by 1.0 cm, is drilled through the artifact. One small *Cypraeidae* shell fragment was noted just outside the entrance to the cave shelter.

Feature I is a cluster of three small terraces located 17.0 m north-west of Feature H. These terraces occur on a high point along the aa flow escarpment, c. 2.0 m above Feature A and c. 3.5 m above Feature J. Two of the terraces are 0.5 m apart, separated by a large in situ aa boulder. The westernmost of these two terraces has a surface area of 1.65 m (1.5 m N/S by 1.1 m E/W) and is faced along the west side, which is 0.5 m high. The eastern terrace has a surface area of 1.92 sq m (1.2 by 1.6 m) and is 0.03 m high. This feature is raised along three sides, with the north and west sides faced. Side walls of both terraces are constructed from rounded aa boulders; they are filled with smaller boulders and cobbles and have flat, but not leveled, surfaces. No pebble-sized paving stones were observed. The third terrace is c. 1.0 m downslope. It is less formal in construction and its side walls are not clearly definable, with the exception of the west wall, which is 0.3 m high. This terrace has a distinguishable surface area of 0.98 sq m (1.4 m N/S by 0.7 m E/W).

A large, flat waterworn basalt boulder with a ground surface was observed to the south of the westernmost terrace. A few pieces of *Cypraeidae* shell, an echinoid spine (slate pencil) and a small waterworn basalt hammerstone were observed along the slope to the west of the westernmost terrace. Finally, a single waterworn coral pebble was observed on the lower terrace. The function of these small terraces is indeterminate at this time; they may represent burials.

Feature J is a small cave shelter and associated terrace. It is located in a deep ravine along the lower, west-facing slope of the aa escarpment, c. 2.5 m below and 9.0 m west of Feature I. The cave occurs under a large pebbles slab that was disrupted and inundated with aa, leaving a north-facing opening (Figure 7). The opening is 1.0 m wide and has a ceiling height of 0.6 m. The cave interior has a surface area of 1.4 sq m (1.4 m N/S by 1.0 m E/W). The floor appears to have been cleared of loose rubble, and it has been expanded 1.0 m beyond the dripline through construction of a terrace that has a surface area of 2.25 sq m (1.5 by 1.5 m). The terrace is raised to a height of 0.75 m along the north and west sides. The raised sides are constructed of aa boulders stacked five courses high and loosely faced; the terrace is also filled and surfaced with aa boulders.

Five small pieces of marine shell were observed inside the cave shelter, and additional pieces occur outside the shelter on the terrace and on the adjacent slopes of the ravine. Families observed include *Cypraeidae*, *Meritidae*, *Thaididae*, *Trochidae* and *Veneridae*. Echinoid fragments and a waterworn basalt boulder with battered and ground surfaces were also observed outside the shelter.



Figure 7. SITE T-105, FEATURE J. View to south.
(FHRI Neg. 523-30)

T-106 Walled Depression

Site T-106 is located at the northern edge of the as flow, 244 m inland from the shoreline and 36.5 m from the nearest identified site (T-104). It consists of a large as upthrust with additional large bedrock boulders that were joined on the northern side with wall sections to form a 10.8 sq m sheltered, depressed area (3.2 m N/S by 3.4 m E/W). The wall sections are constructed from cobble- to boulder-sized chunks of as; they are loosely piled, with no faced sides. Average width of the wall sections is 0.65 m; height varies from 0.70 on the exterior side to 0.85 on the interior side. Length of constructed wall sections between the naturally occurring stones varies from 0.75 to 1.60 m.

A narrow opening in the wall occurs on the western side of the feature, adjacent to a single upright boulder that was positioned against the large upthrust. The surface of the enclosed area is partially covered with a thin layer of as gravel; a single piece of Cypraea shell was observed.

The feature appears to have functioned as a short-term shelter; no remains are present which may suggest period of construction or use.

T-107 Complex

Four modified outcrops occur within a 400 sq m area at this site, which is situated in broken pahoehoe, 219 m inland from the shoreline. Feature A consists of a naturally C-shaped outcrop that has three raised sides with an opening to the west. The interior area of the outcrop has been cleared of large subangular pahoehoe boulders, which have been piled along the sides of the outcrop. These piles may represent collapsed walls; they are presently 0.6 m high on the interior side and 1 m wide; they are 0.3 m high on the exterior side. Boulders have also been placed across the entrance to the sheltered area in order to fill a low area immediately to the west. This 2.0-m-wide pile has a rough terrace-like appearance and is 0.75 m high along the exterior side. Interior surface area is c. 32.5 sq m (6.5 m N/S by 5.0 m E/W).

A deposit of reddish-brown colluvium c. 10.0 to 15.0 cm deep occurs inside the outcrop shelter. Also present are Cypraea, Neritidae (*N. polita* and *N. picea*), and Thaididae shell fragments. A few pieces of weathered coral and waterworn basalt pebbles (*Trifid*) are also present.

Feature B is located 7.5 m north (5 degrees Az) of Feature A and is situated in the same bedrock formation. It is defined by a naturally C-shaped outcrop which averages 0.85 m high and opens to the west. The interior is somewhat depressed and has a surface area of 37.0 sq m (6.3 m SE/NW by 5.9 m NE/SW). Loose pahoehoe boulders have been piled along the south and east sides of the depression in wall-like formations. The eastern pile is 2.5 m long, 1.8 m wide and 0.55 m high. The southern wall is 3.1 m long, 1.3 m wide and 0.35 m wide. These formations are amorphous, with no formal indications of wall structures.

Feature K is a small, nearly circular platform, located 14.5 m northeast of Feature J, along the mid-slope area of the as escarpment. It is outlined with large, rounded as boulders and is filled with smaller as cobbles and pebbles. The surface is nearly flat; however, it is not packed or leveled. All sides are raised, with wall heights of 0.4 to 0.5 m. Surface area inside the perimeter stones has a diameter of 1.0 m; overall diameter is 1.7 m. Shell fragments representing a maximum of six Neritidae individuals occur on the platform fill.

A second, very small platform is located 1.5 m north of the Feature K platform. This disturbed feature is circular and of similar construction, with an overall diameter of 0.8 m and a fill diameter of 0.4 m. Maximum wall height of this tiny platform is 0.7 m and is along the south side. No portable remains were observed on this feature.

Feature L is located 15.5 m northeast of Feature A and 13.8 m southeast (122 degrees Az) of Feature D of Site T-104. It consists of a cluster of three as excavations and two loosely stacked walls. The northern wall is 1.9 m long, 0.55 m wide and 0.55 to 0.4 m high. It is oriented at 280 degrees Az, with the eastern end 0.85 m from the largest of four nearby excavations. The second wall is located 2.4 m southeast (215 degrees Az) of the northern wall; it is oriented nearly parallel to the former wall, at 288 degrees Az. The second wall is 3.9 m long, 0.28 m high and 0.35 m wide. Shallow excavations occur at both ends of this wall, which is unfaced and loosely stacked to three courses high.

The opening of the largest excavation has a diameter of 1.95 m, narrowing to 1.0 by 0.9 m; it is 0.8 m deep. The south and west sides are retained by single upright slabs, and the north and east sides are defined by large rounded as boulders. A second excavation occurs on the north side of the wall, at the west end of the southern wall. It is a simple hole in loose as, 0.85 m in diameter and 0.56 m deep. The third hole is at the east end of the southern wall; it is located under a small overhang 0.72 m wide and 0.4 m deep, and it has a ceiling height of 0.38 m. The floor under the overhang has been deepened to 0.45 m by excavation into the loose as. Two pieces of weathered coral were located near this latter excavation, and a few additional pieces were observed scattered about between the two walls. No subsistence remains were noted.

In summary, twelve features with 22 components were recorded at Site T-105. Six excavations into the loose as deposit were located, which appear to represent storage facilities or receptacles for unidentified material. A seventh possible storage facility is present under a small overhang. Three of the 12 features (A, H, and J) appear to represent short-term shelters. Features B and C may also be shelter sites; however, this inference is indefinite. Three terraces (Feature I) and two platforms (Feature K) may be burial monuments or small shrines.

All features occur within an area of c. 1,000 sq m (40.0 m E/W by 25.0 m N/S). The northernmost feature (L) is closer to Feature D of Site T-104 than to most of the Site T-105 features, and it is possible that all or most features are associated with activities conducted by residents of the permanent habitation structure at Site T-104, which is 62.0 m northwest of the center of Site T-105.

A deposit of reddish-brown soil 10.0 to 15.0 cm thick occurs in this shelter, along with *N. picea* and *Thaididae* shell fragments. Also present is a *Cypraeidae* shell octopus lure part.

Feature C is located 6.5 m north of Feature B. It consists of a roughly rectangular, raised outcrop that has been cleared of loose boulders within an area of 21.6 sq m (7.2 m NE/SW by 3.0 m NW/SE). The phosphate rubble has been piled in a wall-like formation around all sides of the cleared area. The formation is presently 0.4 to 0.9 m wide, and has an interior height of 0.2 m. Exterior height varies from 0.35 to 0.85 m.

A nearly square hearth area has been constructed in a small depression near the center of the interior area of the outcrop. It is constructed of four to five upright pahoehoe slabs and has interior dimensions of 0.35 by 0.38 m. A deposit of grayish, ashy soil occurs within the hearth (Figure 8). Portable remains within this shelter include *Conidae*, *Cypraeidae*, *Echinoidea*, *Hipponididae*, *Veneridae* (*Periglypta reticulata*), weathered coral, and waterworn basalt pebbles.

Feature D is located 16.0 m southwest (255 degrees Az) of Feature A. It consists of a 41.3 sq m rectangular outcrop that has been artificially leveled. Pahoehoe boulders and slabs were used to fill a crevice or depression on the southwest side of the outcrop. The filled area is 4.0 m long (NW/SE) by 1.85 m wide (NE/SW), and has a maximum height of 0.7 m above ground surface to the west. Portable remains present on this outcrop include a *Cypraeidae* shell octopus lure part and sparsely scattered pieces of *Cypraeidae* shell fragments.

Features A, B and C appear to have been used as short-term shelters. Feature D is somewhat problematic and may represent a shelter or possibly a crevice burial.

T-108 Complex

Site T-108 is located 7.0 m directly west of Site T-107 and 134.0 m inland from the shoreline. It consists of an enclosure (Feature A), a low platform (Feature B), a C-shaped wall (Feature C) and a modified outcrop (Feature D), all within a 300 sq m area (Figure 9).

Feature A is a somewhat morphous enclosure that utilizes natural bedrock features as part of the enclosing wall. Maximum interior length is 18.5 m (N/S), and interior width varies from 5.5 to 7.0 m. The constructed wall segments are faced on the interior and exterior sides and are core-filled. Width of constructed sections ranges from 0.7 to 0.85 m, and height varies from 0.15 to 0.9 m, depending upon the height of utilized bedrock. Portions of the enclosure are defined by bedrock that is 0.95 to 2.2 m high. Pockets of loose, brown colluvium occur between exposed bedrock inside the enclosure; no other portable remains were observed. There is no readily identifiable opening in the enclosure.



Figure 8. SITE T-107, FEATURE C, HEARTH. View to southwest.
(FHRI Neg. 524-34)

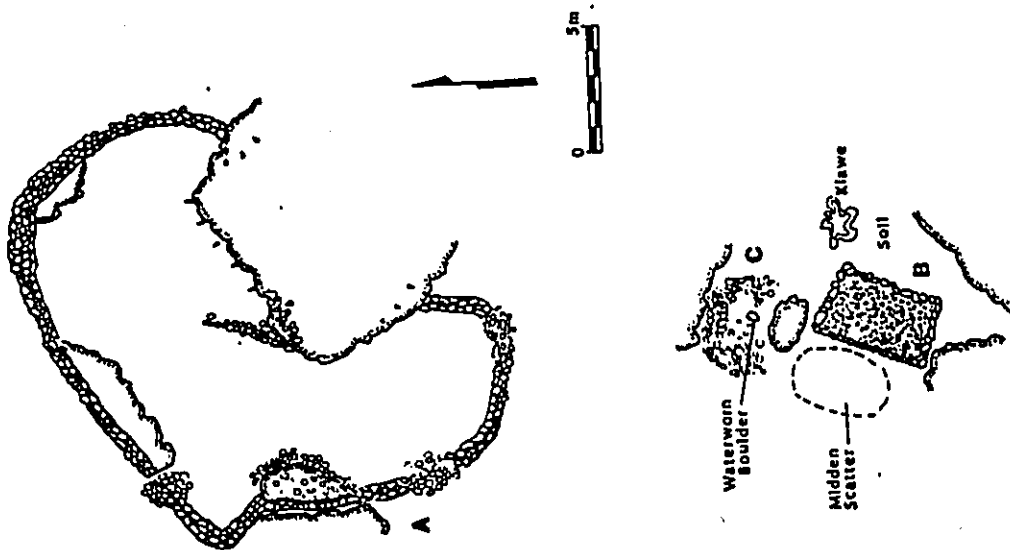


Figure 9. Site T-108, Features A-C

Feature B, a low rectangular platform, is located 9.5 m south (180 degrees Az) of the southern edge of Feature A. The platform is constructed from subangular basalt cobbles and boulders, with larger stones placed along the perimeter. It has a surface area of 12.6 sq m (4.5 m N/S by 2.8 m E/W) and a height of 0.25 to 0.40 m. The platform is situated near the base of a pahoehoe slope, in an area of relatively thick (c. 25.0 cm) soil accumulation. Marine shell midden occurs on the west side of the platform; it includes Cypraea, Neritidae, and Thaididae fragments. Coral pebbles and cobbles, and waterworn cobbles were also observed near the platform.

Feature C is adjacent to Feature B, within 1.5 m to the north. It consists of a C-shaped wall which opens toward the Feature B platform (south). The wall is constructed from loosely stacked subangular pahoehoe boulders, and it is in a collapsed condition. Overall surface area of the structure is 9.88 sq m (3.8 m E/W by 2.6 m N/S), and the interior has a surface area of 3.0 sq m (2.0 m by 1.5 m). Average width of the wall is 0.8 m and height ranges from 0.1 to 0.35 m. A deposit of loose, brown colluvium is present within the shelter, and marine shell midden is nearby, adjacent to Feature B. Two waterworn basalt boulders were observed; one is inside the shelter and one is incorporated into the west wall.

Feature D is a modified bedrock outcrop located 18.0 m north (320 degrees Az) of Feature A. The 15.0 by 20.0 m outcrop is a natural low rise which has been leveled and partially raised by boulder and cobble fill. The filled area occurs over a crevice in the center of the rise; it has a surface area of 16.5 m (5.5 m N/S by 3.0 m E/W) and is raised 0.55 to 0.6 m above the bedrock, or 1.35 to 1.5 m above the surrounding terrain. The surface of the filled area is generally level, but it is not paved or packed. No cultural deposit was observed, and the only portable remains present were a single waterworn boulder. This feature is similar in form to Feature D at Site T-107 and is problematic in terms of a functional inference.

T-109 Walled Depression

This single feature is located midway between three permanent habitation sites (T-104, T-108, T-110), 109 m from the shoreline. It consists of a roughly oval-shaped depression in pahoehoe and contains an apparently natural deposit of loose, brown soil. A loosely constructed wall encloses the perimeter of the depression and encloses portions that are not wall-defined by natural bedrock. Interior area of the enclosed depression is 33.5 sq m (10.0 m NW/SE by 3.35 m NE/SW). Interior depth of the depression varies from 1.20 to 0.15 m along the natural rock face, and from 0.4 to 0.5 m along sections of constructed wall. Four major wall sections occur in the low areas around the perimeter; these vary from 4.2 to 1.4 m long and from 0.4 to 0.6 m wide. Some portions of the wall have collapsed.

Portable remains present include a few waterworn coral and basalt cobbles and pebbles. No subsistence remains or items which might indicate period of construction or use were observed. Possible functions for this feature include use as a small animal pen or as a planting area.

T-110 Complex

This poorly preserved site is located 61.0 m from the shoreline, at the eastern edge of a coral storm beach. Features identified include a concentration of surface midden (Feature A) and what appear to be wall remnants (Feature B).

Feature A covers a 196 sq m area on and adjacent to a smooth pahoehoe outcrop. The deposit is evenly scattered with no significant accumulations, and it is less than 5.0 cm thick. Shellfish families observed in the scatter include Conidae, Cypraeidae, Neritidae, Strombidae, Thaididae, and pearl shell (*Pinctada* sp.). Unidentified mammal bones and a single perforated *N. polita* shell were observed, along with branch coral, water-worn coral, and water-worn basalt pebbles and cobbles.

Feature B is located adjacent to the northern edge of the Feature A midden scatter. It consists of two linear concentrations of disturbed boulders and cobbles oriented in an L-shaped formation. The southernmost boulder concentration is positioned at the foot of the Feature A pahoehoe outcrop. It is 17.0 m long (E/W), 6.1 m wide, and has a maximum height of 0.5 m in the center. The concentration includes coral and basalt cobbles and boulders, all of which are water-worn.

A linear wall remnant extends 11.5 m north from the western end of the boulder concentration. This loosely piled rubble formation is 1.8 m wide and is currently 0.2 m high; it may represent a recent modification. The immediate vicinity of the site is heavily used by campers, and a deposit of modern trash occurs on the site. The features have probably also been affected by storm waves. The site appears to have been used for habitation; however, the degree or extent of usage (permanent or temporary) cannot be determined at this time.

T-111 Complex

Five features occur within a 140 m sq area at this site, which is situated in undulating pahoehoe, 73.0 m from the shoreline. Features A through C are lava tube caves, Feature D is a modified collapsed blister, and Feature E is a collapsed mound.

Feature A is a linear cave 9.0 m long and 5.0 m wide, which opens to the south through a small vertical entrance (Figure 10). The entrance is 1.10 m sq at the opening and 1.4 m above the floor of the cave. Two boulders are positioned below the entrance to serve as steps; these are 0.8 m and 0.6 m above the cave floor. Ceiling height of the main chamber varies from 0.8 to 1.5 m. Two tube extensions branch off the main cave chamber to the west and north. The western extension is 8.4 m long and 3.2 to 5.0 m wide; the northern extension is 6.5 m long. Both extensions have ceiling heights of 0.6 to 0.8 m.

A thin deposit of grayish soil, containing marine shell and other materials, is present within Feature A; this deposit has been disturbed by



Figure 10. SITE T-111. FEATURE A. View to north.
(PHRI Neg. 523-32)

T-112 Complex

This site is located 220 m inland from the shoreline in an area of old, undulating pahoehoe that has a thick cover of fountain grass. Three features are present within an area of c. 120 sq m; these include a platform (Feature A) and two tube cave shelters (Features B and C).

Feature A is rectangular in plan, with a surface area of 40.8 sq m (12.0 m NE/SW by 3.4 m SE/NW). It is constructed from blocky pahoehoe boulders and has a roughly level, unpaved surface. Maximum height of the platform is along the intact portion of the west wall and is 0.55 m. Height averages 0.3 m along the eastern side and ends. The intact western side is faced. A C-shaped wall is located at the northeastern corner of the platform. The wall is constructed from similar material as the platform, and it opens to the northwest. Overall surface area of the platform, and it opens to the northwest. The interior surface area is 4.08 sq m (2.4 m NE/SW by 1.7 m SE/NW), and the interior surface area is 2.1 sq m (1.4 m by 1.5 m). The wall is 0.3 to 0.5 m wide, and its height ranges from 0.4 m to 0.01 m.

Portable remains observed on the platform include waterworn basalt cobbles, branch coral and a sand conglomerate boulder.

Feature B, a cave and collapsed lava blister shelter, is located 3.0 m west (265 degrees Az) of Feature A. The collapsed blister is 2.0 m in diameter, and the cave extends off the southwestern edge of the blister. The 1.10-m-wide cave entrance is horizontal, with a ceiling height of 0.6 m. The cave floor drops 0.55 m from the level of the entrance; it is relatively level bedrock, with a sparse scatter of unidentifiable shell fragments and small pockets of soil (less than 5.0 cm thick). The main cave chamber is 6.7 m long (E/W) and 5.7 m wide (N/S). Ceiling height ranges from 0.35 to 0.95 m. Two small tube extensions branch to the southeast and southwest from the main chamber. Both of these are essentially crawlspaces and were not examined at the time of survey.

A second entranceway to Feature B occurs under the rim of the collapsed blister, 4.5 m southwest from the main entrance. This horizontal opening is 2.5 m wide and 0.3 to 0.6 m high; it accesses the southwestern crawlspace extension from the main chamber. No internal modifications were observed in Feature B. Portable remains present include a few waterworn basalt cobbles and some coconut shell fragments (one perforated).

Feature C is a second cave located under the rim of a collapsed blister. It is 5.0 m southwest (340 degrees Az) of Feature B and is similar in size and shape. The collapsed blister is 3.0 by 2.2 m across the opening, and it has an average depth of 1.0 m. The cave is located along the northeastern rim; it is 1.8 m wide, with a ceiling height of 0.8 to 1.0 m. The main cave chamber is 4.5 m long (E/W) and 4.0 m wide (N/S). A low (crawl-space) tube extension with a ceiling height of 0.8 to 1.0 m. A low (crawl-space) tube extension branches to the east from the main chamber and extends under the floor of the cave. The northwestern side of the cave entrance has been modified to create a narrower entranceway and a larger, more protected, cave chamber.

relic hunters, and backdirt piles occur outside the cave. Portable remains observed in the backdirt include Conidae, Cypraea, Zebinoidea, Isopoda, Meritidae, Patellidae, bird bone, kukui nut shell, volcanic glass, coral, coral abraders, a Cypraea shell octopus lure part, and waterworn basalt pebbles. It is uncertain whether all of the materials present in the backdirt occurred in Feature A, since the adjacent caves were also potted, and all backdirt was removed to the same area.

The entrance to Feature B is 8.2 m southeast (150 degrees Az) of Feature A. The main chamber of the cave is 8.0 m long and 2.5 m wide, and it has a ceiling height of 0.7 to 1.0 m. The entrance is horizontal and opens to the northwest; it is 1.45 m wide and 0.5 m high, and it is situated 0.5 m above the floor of the cave. The cave floor is scattered with loose boulders and cobbles, and the cultural deposit has been extensively disturbed by relic hunters.

Feature C is located 5.8 m southwest of Feature A. This cave is 17.0 m long and 6.0 to 7.0 m wide, and it has a ceiling height of 0.8 to 2.0 m. Two vertical entrances are located along the north and east sides of the lava tube. The northern entrance is 1.1 by 0.8 m at the opening, which is 0.8 m above the cave floor. The eastern entrance is at floor level; it has a 1.1 m wide, 1.0 m high opening. Loose roof-fall and waterworn basalt boulders are scattered on the floor of the cave, which is irregular pahoehoe. A cultural deposit of gray soil and marine shell midden with other materials is present in this cave; it has also been extensively disturbed by relic hunters. Feature C does, however, contain pockets of undisturbed midden.

Feature D is a modified collapsed blister located 3.5 m southwest from Feature B. The interior area of the collapsed blister has not been cleared or modified, but an alignment of boulders is positioned along the northern rim of the collapse. The alignment is 2.3 m long and 0.6 m wide, and its height varies from 0.70 to 0.35 m. A small pile of pahoehoe rubble is also located at the eastern edge of the rim. This pile is 1.10 m long (E/W) by 1.0 m wide and is 0.35 m high. No portable remains were located in this 0.6 to 1.4 m deep collapsed blister.

Feature E is located 12.0 m northwest (315 degrees Az) of Feature A. It consists of a partially faced mound constructed from pahoehoe boulders. The mound is 2.0 m sq at the base and has a maximum height of 0.4 m along the west side. The eastern side of the mound is collapsed. An amorphous pile of loose pahoehoe rubble occurs midway between Features E and A.

Features A through D at Site T-111 appear to have functioned as short-term shelters. Cultural deposits occur at the three cave shelters (Features A, B, and C), but all deposits are disturbed, and backdirt from all three appears to have been mixed together in a central area outside the caves. Feature C still contains intact portions of a deposit, and scattered portable remains are still present in all caves.

Large boulders were piled between the cave drip-line and the floor, in order to close off this portion of the entrance. A second entrance to the cave occurs along the blister rim; this entrance is 2.3 m wide and has a ceiling height of 0.5 m.

Portable remains were primarily observed inside the collapsed blister outside the main entrance to Feature C. Materials observed include water-worn basalt and coral cobbles, a coral abrader, coconut shell fragments, Echinoidae, Crustacea, and marine shell fragments (Cypraeidae, Neritidae, Patellidae, Thaisidae, and Veneridae).

The two cave features at this site appear to represent short-term shelters. The long, narrow platform has somewhat unusual dimensions for a habitation structure, and it is considerably less formal in construction than other habitation platforms or terraces along the coast. Its function is therefore uncertain at this time.

T-113 Complex

A cave shelter (Feature A) and a C-shaped wall (Feature B) occur at this site, which is located 170 m inland from the shore in an area of old pahoehoe with a dense cover of fountain grass. Feature A occurs in a partially collapsed lava blister and is entered from a horizontal, west-facing opening in the side of the blister. The entrance is 0.8 m wide and 0.8 m high, and it has been artificially closed with piled boulders along the south side, in order to decrease overall width. The cave chamber is nearly circular (2.5 N/S by 2.3 E/W), and ceiling height ranges from 0.6 to 0.8 m. A thin soil deposit (5.0 to 10.0 cm) occurs in patches on the cave floor, and a sparse scatter of marine shell is present (Conidae, Cypraeidae, and Neritidae).

Feature B is located on relatively level bedrock, 4.0 m northwest of Feature A. This C-shaped wall opens to the south and is faced along the interior sides, which are 0.6 to 1.0 m high. Overall surface area of the shelter is 5.75 sq m, and the interior surface area is 1.5 sq m (1.5 m E/W by 1.0 m N/S). The wall is constructed from blocky pahoehoe boulders and slabs stacked three to five courses high. The exterior sides of the wall may originally have been faced, but they are presently slumped.

Marine shell fragments are sparsely scattered on the bedrock between Features A and B (same as above); however, no portable remains were located inside Feature B. Both features appear to be short-term shelters.

T-114 Structural Remnant

This feature is located in heavily vegetated, broken pahoehoe, 35.0 m inland from the coral beach and 73.0 m from the shoreline. It is a poorly defined linear formation of basalt and coral boulders oriented SW/NE (40 to 70 degrees Az) for a distance of 10.85 m. Two concentrations, spaced 1.75 m apart, are apparent. The northern concentration is 4.5 m long,

0.7 m wide and 0.25 m high. The north and east sides of this concentration are relatively distinct, whereas all other sides are vague and scattered. No faced sides are present. The southern concentration is 4.6 m long and has a maximum width of 1.5 m. This deposit is a single course of fill and is morphous in plan. At least 30 coral cobbles and boulders are present within the two concentrations of fill, and several other pieces are scattered within a 5.0 m radius. No other portable remains were observed, although the site surface is obscured by fountain grass and kīawe.

The possible function of this feature cannot be determined, based on available information. It is extremely disturbed, and it is possible that no traces of an original form are present.

T-115 Enclosure Remnant

Site T-115 is situated along the vegetation line of a coral storm beach, 36.5 m from the shoreline, near the northern end of Awake Bay. The enclosure is currently represented by an intact southeastern corner and by nearly intact south and east walls (Figure 11). The northern wall is visible as a buried alignment, and only a small portion of the west wall remains. Projected interior dimensions are 24.0 m (N/S) by 12.0 m (E/W). Intact wall sections are 1.0 m wide and vary in height from 0.40 m on the exterior side to 1.0 m on the interior side. The exterior side of the eastern wall is faced, and both sides of the intact corner are faced, and the wall has a core fill of smaller cobbles. Construction material used includes water-worn coral, and water-worn and rough basalt.

No portable remains or internal features were visible in the storm beach deposit at the time of survey. It is uncertain whether additional features are buried or whether they have been completely washed away. The enclosure is tentatively identified as a permanent habitation site.

T-116 Cleared Blister

This small feature is located 10.0 m east (inland) from Site T-115. It consists of a collapsed lava blister from which the rockfall has been removed and repositioned around the blister opening. Total interior area is 16.4 sq m (4.1 m E/W by 4.0 m N/S). Maximum depth of the blister floor is at the western end and is 1.5 m.

A moderate amount of marine shell fragments (Cypraeidae, Neritidae, Thaisidae) is present on the surface around the blister and directly below the opening, but the deposit does not exceed 1.0 cm in thickness. This feature possibly functioned as a short-term shelter.

T-117 Complex

A modified pahoehoe outcrop and a small stack of stones occur at this site, which is located 34.0 m south from Site T-116 and 73.0 m from the



Figure 11. SITE T-115. View to northwest. (PHKI Neg. 526-4)

shoreline. Feature A consists primarily of a low wall constructed against the western face of a 0.3 to 0.5 m high pahoehoe ridge. The wall is oriented northwest/southeast, perpendicular to the major axis of the ridge, and it partially encloses a naturally protected, C-shaped area. It is 2.3 m long, 1.1 m wide (maximum) and 0.7 m high.

The sheltered area is 2.1 m wide at the back (against the bedrock ridge) and 4.0 m wide across the front; maximum depth is 3.0 m. The floor of the sheltered area is 1.2 m below the top of the bedrock ridge. A low, shallow overhang occurs across the back of the sheltered area. Maximum ceiling height of this overhang is 0.5 m; it is too small and low for habitation. A deposit of brown loam occurs on the surface inside the sheltered area of Feature A. This deposit covers c. 12.0 sq m and is over 10.0 cm deep in places. No portable remains were observed in or around the feature.

Feature B is located on the crest of a pahoehoe ridge to the east of Feature A. It is a small stack of four pahoehoe boulders and is 0.3 m high and 0.3 to 0.4 m across the base.

Feature A was possibly used as a temporary shelter; it could also have functioned as a planting area.

T-118 Wall

This isolated feature is located 8.0 m south of the current jeep road, in the inland portion of the project area, 350 m from shoreline. It is a poorly preserved retaining wall 24.0 m long and 0.15 to 1.25 m high, with an average width of 1.25 m. The wall is oriented roughly north-south (27 degrees Az) and is positioned along the eastern edge of a pahoehoe depression. The wall is constructed of pahoehoe slabs and boulders and is not formally faced. Portions of the wall incorporate existing bedrock. The terrain to the east of the wall is flat, and the surface is irregularly covered with pahoehoe cobbles.

No portable remains were associated with this feature, which may represent a terrace retaining wall or an old roadbed retaining wall.

T-119 Complex

A footpath section and two marker cairns occur in this complex, which is located 97.0 m from the shoreline, just north of Awake Bay. Feature A, the footpath section, is identifiable for a distance of 20.0 m along the southwestern slope of a rough and smooth pahoehoe ridge. The path is 0.6 to 0.8 m wide and is oriented at 255 degrees Az. It passes between Sites T-120 and T-121 (C-shaped walls), and it probably continued south-eastward, at least to Site T-115 (see Figure 2).

Features B and C are two small markers located on either side of the footpath. Feature B consists of a single upright boulder supported in a natural bedrock crevice by smaller cobbles and boulders. Feature C is a small collapsed pile of five pahoehoe slabs.

T-120 Complex

Five features are present at this site, which encompasses an area of c. 150 sq m on sloping, rough pahoehoe, 85.0 m inland from the shoreline.

Feature A is a squared, C-shaped wall constructed from pahoehoe slabs and boulders piled laterally at least four courses high or placed upright along sections of the interior side. The wall is open on the west side, and the sides are generally straight, with angled corners. Overall surface area of the structure is 12.0 sq m (3.75 m NW/SE by 3.2 m NE/SW), and the interior area is 3.75 sq m (2.5 by 1.5 m). The interior side of the wall is in better preservation than the exterior side and is faced along sections which include upright slabs. Interior wall height averages 0.4 to 0.5 m; wall width varies from 0.7 to 0.8 m.

A sparse scatter of Cypraea shell fragments occurs just outside the shelter to the west, and three waterworn basalt boulders occur inside the shelter. No soil was observed inside the structure.

Features B, C, and D are cairns, all of which occur within a 10.0 m radius of Feature A. Feature B is situated at the base of a pahoehoe rise, 10.0 m northeast (25 degrees) from Feature A. The cairn is constructed from very rough pieces of pahoehoe that are loosely stacked and somewhat faced on the north and west sides. The base is rectangular in plan, with a long axis (NW/SE) of 1.1 m and a short axis (NE/SW) of 0.7 m. The cairn is presently 0.6 m high.

Feature C is located 6.0 m southwest (245 degrees Az) of Feature A. It is constructed from loosely stacked, rough pahoehoe slabs and boulders, and it has no faced sides. The base of this cairn is oval in plan, with a N/S axis of 1.4 m and an E/W axis of 1.0 m. Maximum height is 0.35 m.

Feature D is located 10.0 m west (280 degrees Az) of Feature A. It is similar to the Feature C cairn in construction and has an oval base with unfaced, stacked sides. The base is 1.4 m NW/SE and 1.0 m SW/NE. Maximum height is 0.4 m.

Feature E is located 10.0 m northwest (285 degrees Az) of Feature D. It consists of a loosely piled wall of pahoehoe slabs, with additional slabs leaned upright against the south side of the pile. The wall is situated on the top of an outcrop that slopes gradually to the south. It is 2.0 m long and 0.7 m wide, and is slightly curved toward the south. Height is 0.20 m on the north side and 0.60 m on the south side along the upright slabs. No portable remains were observed in the vicinity of this feature, and it cannot be definitely assigned a functional category at this time.

T-121 Complex

Site T-121 is located 24.0 m west of the Site T-119 footpath and 55.0 m from the shoreline. It includes a C-shaped wall (Feature A) and a

small cairn (Feature B), which occur at the foot of a sloping pahoehoe bluff. Feature A is constructed from pahoehoe slabs that are piled one to four courses high in a C-shape formation. It is situated on a flat surface of pahoehoe bedrock, and it opens to the northwest. The interior space of the C-shape is 5.8 sq m (3.2 m NE/SW by 1.8 m NW/SE). Wall height varies from 0.25 to 0.40 m, and width varies from 0.35 to 0.70 m. Original wall height was probably greater than the present height, and portions of the wall may have originally been faced.

No portable remains or soil accumulations were observed in or around the feature, which was probably a short-term shelter.

Feature B is located 5.5 m southwest of Feature A. It is a low cairn constructed of waterworn basalt boulders and rough pahoehoe slabs. The cairn is oval in plan view (0.9 by 0.7 m base) and 0.5 m high. Stones are piled to a maximum of three courses.

T-122 Complex

Four cleared pahoehoe blisters (Features A thru D) occur within a 10.0 sq m area at this site, which is located midway between Sites T-121 and T-124, 50.0 m from the shoreline. The site is located on undulating, rough pahoehoe at the base of the major lava bluffline. Feature A is 1.10 m in diameter at the opening and has an average depth of 0.4 m. Feature B is 1.6 by 1.10 m at the opening and has an average depth of 0.8 m. Feature C is 2.5 by 2.0 m at the opening and 0.8 m deep. Feature D is 1.0 by 1.5 m at the opening and 0.5 m deep. No subsistence remains or soil accumulations were observed in or around the clearings. Waterworn boulders occur within the site area and may have been used in breaking away sections of the pahoehoe blisters. Additional cleared blisters may occur in the vicinity.

The specific function of these clearings has not been determined at this time. Possible functions include use as plant mulching pits, as quarries for stone used in construction or for some other purpose, or as temporary shelters.

T-123 Alignment

This buried stone alignment is located on a coral and coarse sand beach, within 20.0 m of the high tide shoreline. The feature is partially buried in sand and appears as two unconnected sections (Figure 12). The north section is a low, semicircular wall remnant, 4.0 m long. Width of visible sections varies from 0.30 to 0.70 m, and height varies from 0.25 to 0.30 m. The south section is 1.5 m long, 0.25 m high and 0.3 m wide. Waterworn basalt and coral boulders were used in wall construction; no faced sides are currently visible. A functional interpretation is not determinable for this feature, based on surface observations alone.

T-124 Walled Depression

Site T-124 is located in the vicinity of the Site T-122 pahoehoe clearing, 35.0 m from the shoreline. It consists of a natural depression in smooth pahoehoe and is defined on three sides by bedrock; it is enclosed by a loosely constructed linear wall along the northwest perimeter. The wall is 1.8 m long, 0.8 m wide and 0.4 m high. It encloses a roughly circular area of 4.4 sq m. A low, shallow overhang occurs along the east side of the depression. The overhang is 1.4 m wide at the opening, 0.6 m deep, and has a maximum ceiling height of 0.4 m. It appears to have been too small for use as a temporary shelter.

No cultural remains were located within or around the depression, which may have functioned as a small animal pen or planting area.

T-125 Terrace

This small terrace is located on a low pahoehoe rise 158 m from the shoreline. The nearest identified Site (T-127) is 80.0 m to the north. The terrace is rectangular in plan and has a surface area of 8.75 sq m (3.5 m N/S by 2.5 m E/W). Maximum height is along the west wall, which is raised 0.5 m above ground surface. The east side of the terrace is positioned along a faulted crevice, and the natural bedrock rises 0.9 m above the terrace surface along that side. The surface of the feature is rough and consists of relatively large subangular pahoehoe boulders. The west side of the terrace is not faced, and overall construction is rather haphazard.

A single *Calliana* sp. shell fragment and a single *Cypraea* sp. fragment were observed on the terrace. A specific function can not be determined at this time.

T-126 Complex

A walled depression (Feature A) and two small stacks of stones (Features B and C) occur at this site, which is located 320 m from the shoreline in an area of rough, broken pahoehoe and heavy fountain grass cover. Feature A is a collapsed pahoehoe blister with an interior area of 20.0 sq m and average depth of 0.9 m. The south and east sides of the blister opening are outlined with a low rubble wall that is 0.5 m high and 0.6 m wide. The wall is in a generally collapsed condition and may have originally exhibited faced interior sides.

No portable remains were observed inside Feature A; however, sufficient soil is present to support fountain grass, which is currently growing in the opening. This feature may represent a shelter, small animal pen, or a planting area.

Feature B is located 10.0 m east of Feature A. It consists of a 0.5 m high stack of four pahoehoe slabs placed one on top of another. Feature C



Figure 12. SITE T-123. View to northwest. (PHRI Neg.526-5)

is located 8.0 m southeast of Feature A. It consists of a 0.5 m high stack of four pahoehoe slabs placed one on top of another, with a fifth slab leaned against the base of the stack. These two features are possibly of recent construction.

T-127 Complex

Three walled depressions occur in a linear north-south pattern 20.0 m long at this site, which is 150 m from the shoreline, in an area of rough, broken pahoehoe. The modified depressions are located in surface contour folds, as opposed to collapsed blisters or sinkholes. Each depression is walled around its perimeter with loosely stacked, low walls of pahoehoe slabs and boulders.

The Feature A depression is oval in plan, with a major axis (NW/SE) of 11.0 m and a minor axis (E/W) of 5.0 m. Depth varies from 0.7 to 0.8 m. The perimeter wall is 0.5 to 0.7 m wide and 0.4 to 0.7 m high; both the interior and exterior sides are crudely faced, except where collapsed.

Feature B is located 5.0 m northeast of Feature A. It is parabolic in plan, with a major axis (E/W) of 12.0 m and minor axes of 6.0 to 8.0 m. Depth of this depression averaged 0.8 m. The perimeter wall is 0.6 m high and 0.5 m wide, and the north portion incorporates numerous upright pahoehoe slabs. Stacked portions are faced on the interior side only.

Feature C is located 13.0 m north (360 degrees Az) of Feature B. This depression is roughly circular in plan, with axes of 6.0 and 5.0 m. Depth varies from 0.4 to 0.7 m. The perimeter wall is 0.5 m high and has an average width of 0.4 m. Several upright slabs occur in this wall, which is crudely faced on both sides of the stacked sections.

No portable remains were observed in these walled depressions, but there is sufficient soil to support fountain grass, which is currently growing in the depressions. Possible functions include small animal pens or planting areas.

T-128 Complex

A low overhang shelter (Feature A) and a boulder alignment (Feature B) occur at this site, which is located in rough, broken pahoehoe and is 134 m from the shoreline. The overhang is situated under the northern rim of an open sinkhole that has a diameter of 7.0 m and an average depth of 0.8 m. The entrance to the overhang is horizontal to the floor of the sinkhole and is 1.4 m wide. The interior area expands to a width of 2.0 m and is 1.7 m deep; ceiling height averages 0.5 m.

A very sparse scatter of Cypraeidae shell fragments was observed inside the overhang, and a waterworn basalt boulder was observed in the sinkhole just outside the entrance.

Feature B is an alignment of pahoehoe boulders located just above the overhang entrance along the edge of the sinkhole. The alignment is oriented east-west; it is 2.3 m long, 0.5 to 0.6 m wide and 0.55 m high.

T-129 Complex

Six features were identified at this site, including a modified outcrop (Feature A), a terrace (Feature B), a footpath (Feature C), two ash concentrations (Features D and E), and a G-shaped wall (Feature F). All features, with the exception of the footpath, are concentrated within a 225 sq m area along the slope of a rough pahoehoe escarpment that overlooks the coral beach (Figure 13). The shoreline is 61.0 m from the site.

Feature A consists of a low overhang shelter and a depression that has been outlined with pahoehoe boulders loosely piled around its perimeter. The sheltered area is exposed to the north and is defined on the east, south and west sides by bedrock slopes that rise 0.6 to 0.8 m above the interior floor. The depression has an interior surface area of roughly 4.0 sq m (2.0 m N/S by 2.0 m E/W). The overhang is situated along the south wall of the depression; it is 1.2 m wide, 0.75 m deep and has a ceiling height of 0.3 m. The boulder alignment around the perimeter of the depression is 0.5 to 0.6 m wide and 0.6 m high along the west (highest) side.

Eight waterworn basalt boulders occur on the floor of the depression; also present are moderate amounts of marine shell fragments. Cypraeidae, Isopodomidae, Neritidae, Patellidae, and Thaididae were observed. Echinoidae and weathered coral pieces are also present.

Feature B is a small terrace located 7.0 m northwest (320 degrees Az) of Feature A. It is roughly square in plan, with a surface area of 4.0 sq m. The west (highest) side is raised to 0.7 m above ground surface. The terrace is constructed from pahoehoe boulders, with coral and waterworn basalt boulders interspersed. The surface is generally level, but it is not packed or paved with smaller stones. A sparse scatter of Cypraeidae, Patellidae and Thaididae shell fragments occurs off the platform to the east, in an area of shallow soil accumulation. Coral and waterworn basalt boulders are also scattered in this area.

Feature C is a 30.0-m-long footpath that connects the cluster of features to the shoreline. It is oriented nearly E/W (275 degrees Az) and follows a shallow ravine feature up the slope of the lava formation. The path is defined by intermittently spaced waterworn boulders of basalt, coral and sand conglomerate. A 7.0 m section of the path exhibits closely spaced steppingstones. This section is 25.0 m west of Feature A. Average width of the path is 0.4 m.

Features D and E are small localizations of ash on open bedrock. Feature D is located 5.0 m northeast (50 degrees Az) of Feature A, and Feature E is 8.0 m northwest (350 degrees Az) of Feature A. Feature D has a surface area of 0.8 sq m (1.0 by 0.8 m), and Feature E has a surface

area of 3.4 sq m (2.0 by 1.7 m). These features appear to represent surface hearth areas. No portable remains or sizeable chunks of charcoal were located within the concentrations of ash.

Feature F is located 7.0 m northeast (25 degrees Az) of Feature A. It is a collapsed C-shaped wall that opens to the west and abuts bedrock alopes to the north and east. The wall is constructed from rough pahoehoe alabe and has no faced sides. Overall surface area of the structure is 6.6 sq m (2.2 m N/S by 3.0 m E/W), and interior surface area is 2.76 sq m (1.2 m N/S by 2.3 m E/W). Average wall height is 0.35 m, and width ranges from 0.6 to 0.7 m. The interior floor area is bedrock, and a sparse scatter of shell fragments is present (Cypridae, Neritidae, Patellidae, Thaididae). A few pieces of waterworn coral and basalt boulders are also present.

Site T-129 appears to represent a short-term camp site; a small shrine is suggested at Feature A.

T-130 U-shaped Wall

This feature is located on a pahoehoe bedrock beach, c. 30.0 m from the shoreline. The wall is relatively substantial and is in good preservation; it is currently 1.0 m high and 0.5 to 0.8 m wide. Overall shape is box-like; the two east corners are squared and the west side is completely open. Overall surface area of the structure is 7.0 sq m (2.8 by 2.5 m), but the interior space is only 2.7 sq m (1.35 m N/S by 2.0 m E/W).

The wall is constructed from angular and subangular pahoehoe boulders and alabe stacked five to six courses high. Both sides of the intact wall sections are faced. A light scatter of Cypridae and Neritidae shell fragments occurs on the surface, inside the wall. Also present are two screw-top bottles (1/2 gallon).

A possible steppingstone footpath connecting this feature with Site T-129 was observed for a distance of 20.0 to the southeast (170 degrees Az). This possible path is suggested by a few intermittently spaced boulders; it may have connected with the Feature C path of Site T-129.

Site T-130 appears to represent a temporary shelter (fishing) that is probably of historic construction, as indicated both by the relatively good preservation and by the construction technique.

T-131 Pahoehoe Clearing

This small feature is situated in a low-lying area of rough, broken pahoehoe, along the slope of a minor ridge, 73.0 m from the shoreline. It was formed by excavation of large pahoehoe chunks from the face of a crevice, creating a vertical opening that is roughly oval in plan view. The opening is 1.6 m (N/S) by 2.0 m (E/W) and is 0.5 m deep. Bedrock chunks had been removed and loosely piled on the northeast (low) side of the excavation. The pile is 3.0 m long, 1.0 m wide and 0.6 m high.

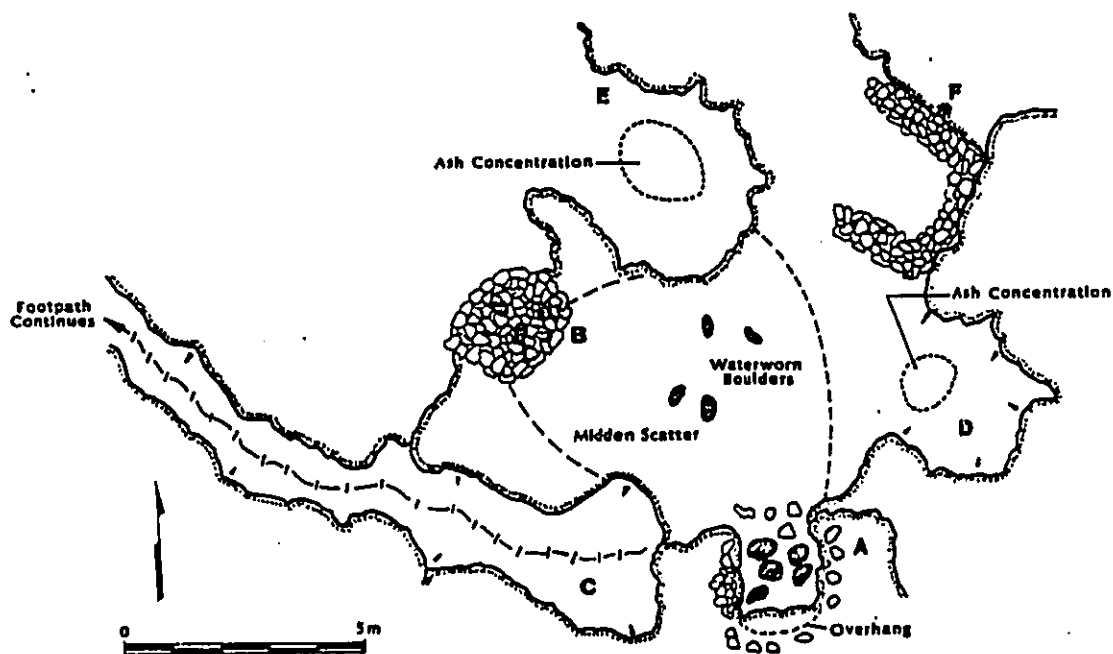


Figure 13. Site T-129, Features A-F

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long and 0.6 to 0.9 m high which opens to the northeast. The interior chamber is relatively linear, with a total surface area of 7.2 sq m (4.0 m NZ/SW by 1.8 m deep). Ceiling height ranges between 0.6 to 0.9 m. A loosely stacked wall of boulders and cobbles occurs just outside the entrance to the overhang. The wall is oriented NZ/SW, with the long axis of the shelter. It is 2.3 m long, 1.4 m wide and 0.6 to 0.7 m high. The wall is centrally raised, with no faced sides and a sloping profile.

A cultural deposit of midden and grayish loam occurs in Feature B, with accumulations up to 25.0 cm thick. Material observed in the deposit includes Conidae, Cypridae, Meritidae, Patelidae, and Thaididae shell fragments, as well as bird bone, fish bone and volcanic glass.

Both features are interpreted as temporary shelters; artifacts present indicate use of both during the prehistoric period and use of Feature A during the historic period as well.

T-134 Cave Shelter

This small cave shelter is located in rough, broken pahoehoe, 269 m from the shoreline. The feature consists of a low tube cave which extends from the southern side of a blister (Figure 14). The dripline of the cave appears to have been excavated back, in order to provide a more open area in front of the entrance. The entrance is 1.2 m wide and has a height of 0.65 m. The tube interior has a surface area of 8.0 m (2.0 m wide, 4.0 m deep) and an average ceiling height of 0.65 m. The bedrock floor of the cave is relatively level; there are no surface deposits, with the exception of feral goat bones.

A crevice in the floor of the blister immediately outside the cave entrance has been filled with pahoehoe chunks and cobbles, creating a somewhat level, but irregular, surfaced area 1.0 m (N/S) by 1.5 m (E/W).

No portable remains were located in the cave or among the fill stones in the collapsed blister. The function of this feature is unclear at this time; it could have been utilized as a shelter or as a planting area.

T-135 Pahoehoe Clearing

This small feature is located 24.0 m east of Site T-134, in rough to undulating pahoehoe intermixed with aa. It consists of a crevice under a low pahoehoe fold that has been excavated and cleared to create an open depression. The exterior opening is 2.6 by 2.0 m, and the interior floor is 1.1 by 1.0 m. Maximum depth of the clearing is 0.7 m; average depth is c. 0.5 m. The pahoehoe chunks removed during excavation are loosely piled in a roughly C-shaped formation to the northeast side of the excavation. The pile is 0.3 m high and 0.4 to 0.7 m wide.

No portable remains were located inside the clearing. There is sufficient soil to support fountain grass, which is currently growing in the depression. Possible function is as a plant mulching pit.

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A single, small waterworn boulder is present near the excavation. No other portable remains were observed. The function of this feature is indefinite; a possible interpretation is as a plant mulching pit.

T-132 Complex

Site T-132 includes a boulder-filled depression (Feature A) and a surface concentration of coral and shell midden (Feature B). It is located on the crest of a pahoehoe rise, in an area of rough, broken pahoehoe 60.0 m from the shoreline.

Feature A consists of a roughly leveled, c. 0.5-m-thick deposit of subangular basalt boulders in an oval depression. The deposit has a surface area of 7.6 m (3.3 m N/S by 2.3 m E/W). A 0.8-m-long section of the south side of the fill is roughly faced, and a small section of the depression adjacent to the faced section is open. This unfilled area is 1.0 m by 0.8 m across the opening and 0.5 m deep. It is defined on three sides by the natural bedrock face.

A waterworn basalt boulder and a sand conglomerate boulder occur on the surface of the stone-fill. No other cultural remains occur in the depression.

Feature B is located 11.0 m northeast (10 degrees Az) of Feature A, on a flat pahoehoe surface. Numerous waterworn coral pebbles and cobbles are scattered within a 9.6 sq m area, along with sparse amounts of Cypridae and Thaididae shell fragments.

The function of Feature A is uncertain, and it is uncertain whether Features A and B are functionally associated.

T-133 Complex

Two overhang shelters occur at this site, which is located along the west slope of a 2.5-m-high pahoehoe pressure ridge, 110 m from the shoreline. Feature A has a horizontal entrance 3.3 m wide and 1.5 m high which opens to the northwest. The shelter interior has a surface area of 5.25 sq m (3.5 m N/S by 1.5 m E/W) and a ceiling height of 1.0 to 1.5 m. The interior has been cleared of rockfall, which was used to form a linear wall along the south side of the entrance. The wall is 2.3 m long, 1.3 m wide and 0.6 to 0.7 m high.

A moderate to relatively dense amount of shell and other subsistence remains is present in Feature A. Conidae, Cypridae, Meritidae, and Patelidae shells were observed, as well as fishbone, Echinoidae, coral, wood charcoal, and waterworn basalt boulders. Artifacts observed include two coral abraders and an unidentified piece of metal.

Feature B is located 8.0 m southwest (220 degrees Az) of Feature A, along the same ridge slope. This shelter has a horizontal entrance 3.5 m



Figure 14. SITE T-134. View to east. (PHRI Neg. 528-13)

T-136 Complex

This site consists of a small surface midden scatter (Feature A) and a collapsed lava tube (Feature B). It is located in an area of rough and broken pahoehoe, 195 m from the shoreline, and inland from Kaholawa Point.

Feature A is a very sparse scatter of Cypraea shell fragments contained within a 0.7 sq m area (1.0 by 0.7 m) on level pahoehoe bedrock. It occurs adjacent to the rim of Feature B, a collapsed lava tube. The collapsed portion of the tube is 7.0 m (SE/NW) by 2.0 m (NE/SW). Two small, unmodified tube extensions are accessed from the central collapsed area. The northeastern tube is 1.0 m wide, 4.5 m long, and has a ceiling height of 0.75 m in the front for about 1.0 m. The remainder of the tube is inaccessible crumpled space. The southeastern tube is 2.0 m wide at the entrance, 3.0 m deep, and has a ceiling height of 0.65 m.

A shallow (1.0 cm and less) deposit of wind-blown soil occurs at the entrance of the northeastern tube, along with a very sparse scatter of Merita picea shell fragments. Extremely limited use of this site, possibly as a temporary shelter, is indicated.

T-137 Complex

This complex encompasses 1.645 sq m along the rough pahoehoe slope just inland from a coral beach at Kaholawa Point. The western edge of the site is within 36.5 m of the shoreline, and the eastern edge is 132 m from the shoreline. Twelve features were identified at this complex: six of the features (A, D, E, F, G, and H) are clustered within a 200 sq m area near the center. The remaining features are spread in a linear pattern that is oriented SE/NW. Features present include a C-shaped wall (Feature A), two cave shelters (Features B and H), four mounds (Features D thru G), a platform (Feature C), a footpath (Feature K), a terrace (Feature L), a walled blister (Feature I), and a cairn (Feature J). The Site T-138 footpath crosses this site within 5.0 m southeast of Feature A.

Feature A is a C-shaped wall constructed from rough pahoehoe slabs that are stacked and faced on the interior and exterior sides. The wall opens to the northwest, and the south (back) portion is still intact; all other portions are partially collapsed. Overall surface area of the structure is 17.5 sq m (5.0 m NE/SW by 3.5 m NW/SE), and the interior area is 7.9 sq m (3.1 m NE/SW by 2.55 m NW/SE). Wall width varies from 0.85 to 1.2 m and heights range from 0.45 to 0.65 m. The surface inside the shelter is covered with loose wall fall and is collapsed under the back wall, where a small overhang occurs. This overhang, which opens to the northwest, is 1.2 m wide, 1.4 m deep and has a ceiling height of 0.35 m. Portable remains located inside the shelter include Cypraea, Meritidae, Patellidae and Echinoides shell fragments, in addition to waterworn coral cobbles.

Feature B is located on the inland side of the Site T-138 footpath, 25.5 m southeast of Feature A. The feature is a collapsed lava blister

with two tube caves extending southeast and west from the blister rim (Figure 15). The blister opening is nearly circular (2.1 by 2.2 m) and has an average depth of 0.9 m. The southeastern tube cave is 4.0 m deep, 2.7 m wide and has a ceiling height of 0.7 m. Half of the tube opening, which is 2.7 m wide, has been blocked by a large pahoehoe slab that was leaned against the dripline. The eastern tube cave is 2.6 m deep, 2.5 m wide and has a ceiling height of 0.7 m.

A moderate amount of marine shell midden occurs on the floor of the collapsed blister and at the front of the two tube caves. Cypraeidae, Echinoidae, Meritidae, and Thaididae are present. No soil accumulation was noted in the feature.

Feature C is located adjacent to the Feature B blister, directly above the southeastern tube cave. It is a low, loosely structured platform constructed from rough pahoehoe boulders. The perimeter of the platform is outlined with relatively large boulders, and the interior is filled with smaller boulders and cobbles. The platform surface is rough and uneven, due to the large size of fill stones. Surface area of the rectangular structure is 3.78 sq m (2.1 m N/S by 1.8 m E/W). The perimeter stones are raised to 0.6 m above ground surface, and the fill is approximately 0.2 m thick. A sparse scatter of Cypraeidae shell fragments occurs on the surface, adjacent to the platform; no portable remains other than pahoehoe rubble were located on the platform.

Features D through G are rubble mounds that form a rectangular cluster to the northeast of Feature A. The mounds are paired into two sets which are spaced 10.0 m apart. Mounds within each set (D/E and F/G) are spaced 4.0 m apart. Each mound has a central depression or hole (possible posthole) that is completely or partially filled with upright slabs. Each is constructed from piled angular and subangular pahoehoe cobbles.

Feature D is roughly oval in plan and is in a collapsed condition, with possible remnants of a faced side wall along the north side. Major axis is 2.1 m (E/W), minor axis is 1.5 m, and overall height is 0.75 m. Several upright slabs were noted in the central area, which is collapsed and filled with loose rubble.

Feature E is rectangular in plan and sloping in profile, with no indications of formerly faced walls. Overall dimensions are similar to those of Feature D (2.2 m N/S by 1.8 m E/W), and height is 0.6 m. A square pit lined on four sides with upright pahoehoe slabs occurs in the center of the mound; the pit is 0.3 m sq and 0.5 m deep. No material was observed in the pit or mound fill.

Feature F is oval in plan, with a major axis of 2.0 m (E/W) and a minor axis of 1.6 m (N/S). It is 0.6 m high and has sloping sides, with no indications of facing. A square pit occurs in the center of the mound, which is identical in size to the Feature E pit (0.3 m sq and 0.5 m deep). This pit is lined on three sides with upright slabs.



Figure 15. SITE T-137, FEATURE B. View to northeast.
(PHRI Neg-526-31)

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Feature L appears to be the remnant of a terrace that is partially buried in waterworn coral and basalt boulders. It is located on a storm beach 42.0 m southeast of Feature J, within 35.0 m of the shoreline. The visible portions of this feature are an alignment of large basalt boulders and an adjacent raised area. The alignment is 3.0 m long (E/W), and the raised area is 2.28 m wide, with a maximum height of 0.45 m along the west side. Cypraeidae, Echinoidae, Neritidae, and charcoal flecks were observed, in addition to a thin deposit of brownish sand. A single, large, upright boulder is incorporated into the buried alignment. This feature may represent a permanent habitation site, but no function can be inferred at this time.

The majority of the features at Site T-137 appear to represent short-term shelters or shelter remnants that exhibit a low level of use. These features include a C-shaped wall and three blister features, two of which have associated tube caves and two of which are modified with walls. A formation of four rubble mounds, each with internal holes, is tentatively interpreted as one or two sets of shelter post supports. The low platform (Feature C) and small terrace in Feature I may also represent shelters, but they could also represent small shrines.

T-138 Footpath

Site T-138 is a section of a coastal footpath through broken pahoehoe and patches of sand. It traverses the area immediately inland from Kahoia Point, and it is roughly parallel with the coastline. The southernmost identified end of the footpath is 135 m from the shoreline. From this point, the path angles northwest (355 degrees Az) and skirts the northern portion of Site T-137. It then angles northeast (15 degrees Az) and continues through the center of Site T-140. The northernmost identifiable end of the path is at the beach, along the western perimeter of Site T-140.

The path is 0.6 to 0.7 m wide and is intermittently visible for a distance of 182 m. A few locations of what appear to be disturbed cairns were noted along the trail, but none of these could be determined to be a feature.

T-139 Complex

This site is situated on a high pahoehoe knoll, 30.0 m from the shoreline. A circular mound of coral boulders (Feature A) and a surface midden scatter (Feature B) were identified at this site; the coral mound is 3.0 m in diameter and 0.1 to 0.2 m high. An upright basalt slab appears to be buried in the coral.

Feature B is located on a flat area of pahoehoe 10.0 m west (265 degrees Az) of Feature A. The surface material covers 20.0 sq m (5.0 m N/S by 4.0 m E/W). Cypraeidae, Echinoidae, Neritidae, Patellidae and Thaididae shell fragments are present. Also observed were glass bottle-neck sherds with hand-applied lips.

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Feature G is somewhat smaller than the preceding mounds; it is 1.5 m long (N/S) by 1.4 m wide and 0.3 m high. The interior area has collapsed, but partially buried upright slabs are still visible, indicating a former lined pit.

Feature H is a lava tube cave and small collapsed lava blister that is outlined on the north, west, and south sides by a C-shaped wall. It is located 7.0 m northwest from the formation of rubble mounds (Features D thru G). The blister opening is oval, with a major axis of 1.5 m and a minor axis (N/S) of 1.35 m. Maximum depth of the blister is 0.9 m. A loosely constructed wall, 0.65 m wide and 0.6 m high (interior), follows the configuration of the blister opening. The wall is somewhat faced on both sides, and it consists of subangular pahoehoe boulders. The north/south axis of the wall is 1.9 m.

A low cave shelter, 5.0 m deep and 3.9 m wide, extends west from the blister rim. This cave has a ceiling height of 0.6 m. A 3.0- to 5.0-cm-thick deposit of loose soil and subsistence remains occurs at the front of the cave and in the floor of the collapsed blister. Cypraeidae, Echinoidae, Isgonomonidae, Neritidae, Patellidae, and Thaididae fragments are present. Feral goat bones were also observed.

Feature I is a walled, collapsed blister located 24.5 m northwest (325 degrees Az) of Feature H. The small blister is 1.6 m by 0.95 m across the opening and is 0.55 m deep. A loosely piled rubble wall outlines the northeast, southeast, and southwest sides of the blister. The wall is 2.1 m across the open end (N/S), and it varies in width from 0.25 to 0.65 m. Interior height is 0.45 m, and exterior height is 0.65 m, with no indications of faced sides along the wall. A small, low terrace-like structure occurs inside the blister, against the eastern edge. This terrace is constructed from pahoehoe boulders and cobbles, with slightly larger stones along the western exterior side. The surface of the terrace is level, but somewhat irregular; formal paving is absent. Terrace dimensions are 0.7 m long (N/S) and 0.5 m wide; it is 0.25 m high along the west side. A few pieces of coral, Cypraeidae and Patellidae shells are scattered in the blister, and it may represent a small shrine or shelter.

Feature J is a cairn located on a raised pahoehoe outcrop 13.3 m northwest (335 degrees Az) of Feature I. It is constructed with angular to subangular pahoehoe boulders and is faced on all exterior sides. The base of the cairn is oval in plan and has a major axis of 1.4 m (E/W). Minor axis is 0.75 m, and height is 0.75 m. No portable remains were located in the vicinity of this feature, and it may not be functionally related to the other features of this complex.

Feature K, a narrow channel along the slope of the lava escarpment, exhibits an intermittent pattern of basalt and waterworn coral stepping-stones. The feature appears to be a footpath that connects the Site T-137 features with the shoreline. It is identifiable for a length of c. 25.0 m, and it ranges in width from 0.6 to 0.7 m. A few Cypraeidae shell fragments occur, scattered along the route.

It is uncertain whether the two features are functionally related. The coral mound may be a small shrine, whereas the surface midden suggests the presence of a short-term shelter or encampment. Feature B artifacts suggest historic use.

T-140 Complex

This site encompasses a 1,502 sq m area at the southern edge of Kaholava Bay, and it extends from the beach to 75.0 m inland. The site appears to correlate with Soehren's Site D20-13, which he located just north of Kaholava Point. Soehren identified two small windbreaks, a *Luhua* (foundation for structure), a low, broken wall and a thick coral paving (Field Log:35). The wall and coral paving may correspond with Sites T-145 and T-146, located along the beach to the north of T-140.

Thirteen features were identified at Site T-140, including four C- or L-shaped walls (Features A, C, D, and M), three cave shelters (Features B, I, and K), five cairns (Features D, E, F, G, H, and J), and a terrace (Feature L). Half of the features are clustered within a 30.0 sq m area at the eastern edge of the site; the remainder are relatively dispersed in a triangular pattern, with two features (A and M) along the edge of the coral beach. The Site T-138 footpath passes between these two features at the point where it reaches the coral beach.

Feature A is a C-shaped wall situated in a dense *kina* thicket at the east edge of a coral beach. It is constructed with angular to subangular pahoehoe boulders, which are stacked and faced on the interior side (Figure 16). A few coral boulders are incorporated into the wall, which opens to the northeast. The exterior side is presently sloping and is in a collapsed condition. The structure has an overall surface area of 22.75 sq m (5.3 m NW/SE by 4.3 m NW/SE) and an interior area of 10.0 sq m (4.0 m NW/SE by 2.5 m NW/SE). Wall height varies from 0.7 to 1.0 m, and width varies from 1.0 to 1.3 m. The floor of the interior area is presently covered with boulders from the wall; however, a sandy deposit with a sparse amount of shell midden was observed. *Gypralidea*, *Echinoides*, *Merita polita*, and *N. pica* were present; additional material probably occurs under the wall fall.

Feature B is a collapsed lava blister with two tube caves, located in rough pahoehoe 57.5 m inland (128 degrees Az) of Feature A. The blister opening is 4.5 m (NW/SE) by 2.0 m across and is 1.2 m deep. Two tubes branch to the northeast and southeast from this opening. The northeast tube is 2.5 m wide by 5.5 m long and it has a ceiling height of 0.8 to 1.3 m. The southeastern tube is 2.0 m wide by 5.0 m long, and it has a ceiling height of 1.0 m. A moderate to thick deposit was apparently present in this feature, but it has been extensively disturbed by relic hunters. Backdirt piles up to 0.5 m high are present outside the caves. Materials observed include coral tools (*Hamastrea*, *abradet*), volcanic glass, charcoal, and marine shell (*Gypralidea*, *Echinoides*, *Isogommonidae*, *Neritidae*, *Fatallidae*, *Theodoxus* sp., *Thaididae*, and *Trochidae*).



Figure 16. SITE T-140, FEATURE A. View to southeast.
(PHKI Neg. 528-7)

Feature C is an L-shaped wall located 3.0 m northeast (110 degrees Az) of Feature B. The wall is constructed from rough pahoehoe slabs and is faced on both sides, and has a core fill of smaller stones. The two straight sections of the wall are of equal length (3.0 m) on the interior side, and they form a distinct square corner. Wall sections are oriented to the northwest and southeast from the corner. Wall height ranges from 0.35 to 0.45 m, and width is 0.9 m. Portable remains associated with Feature B are scattered in and around this wall. It is partially collapsed, and some stones were apparently removed from this wall for the construction of Feature D.

Feature D is a crudely constructed C-shaped wall and rock pile. It is located immediately adjacent to the Feature B blister opening, 2.0 m west of Feature C. The eastern end of the feature consists of a pile of pahoehoe slabs, whereas the western end gradually declines to a simple alignment of stones. The rubble pile is 2.4 m (N/S) by 2.0 m at the base and is 1.0 m high. The wall and the alignment extension curve to the west from the pile, forming an overall E/W axis of 4.2 m and a N/S axis of 2.8 m. The interior area faces north; it is semicircular, with an E/W axis of 2.4 m and a N/S axis of 1.6 m. Wall height ranges from 0.7 m to 0.2 m, and width ranges from 0.8 m to 0.35 m. A sparse scattering of shell fragments occurs on the northwest side of this feature; other remains in the vicinity are associated with Features B and C.

Features E, F, and G are cairns that are clustered to the southwest of Feature B, within 3.0 m from the blister opening. Each cairn is constructed from stacked pahoehoe slabs and boulders, and each is in a generally collapsed condition. Feature E is oval in plan, with base axes of 1.8 m (N/S) and 1.4 m; its maximum height is 0.8 m. Feature F is circular in plan (1.1 m in diameter at the base) and is 0.6 m high. Feature G is oval, with base axes of 1.1 m (N/S) and 0.8 m; its maximum height is 0.25 m. Features F and G exhibit sloping sides, whereas portions of the Feature E sides are roughly faced.

Feature H is a cairn located 14.5 m northwest and upslope of Feature B. It is constructed from rough pahoehoe slabs that are stacked, and it is roughly faced with upright slabs, on the west side. It is oval in plan, with base axes of 1.9 m (N/S) by 1.2 m; its maximum height is 0.8 m.

Feature I, an unmodified cave shelter, is located 3.0 m southwest of the Feature H cairn. The cave opens to the north and is accessed through a horizontal entrance measuring 1.7 m wide and 0.65 to 0.9 m high. The interior chamber has a surface area of c. 8.0 sq m (3.4 m E/W by 2.35 m N/S). The ceiling height range for the chamber is the same as that for the entrance. Loose rockfall boulders are scattered about inside the cave and have probably been moved by relic hunters who have disturbed the midden deposit. A 0.2-m-thick backpile presently occurs just outside the cave entrance. Material observed in the backpile includes volcanic glass, bird bone, fish bone, charcoal, coral, and marine shell (Conidae, Cypraeidae, Echinoidea, Isopoda, and Thaididae).

Feature J is a small, relatively isolated cairn located 19.0 m southwest of Feature B. It consists of five pahoehoe slabs that are simply stacked one on another. It is 0.5 m by 0.5 m at the base and is 0.5 m high.

Feature K is a cave shelter located 22.6 m north (358 degrees Az) of Feature B and 12.0 m northeast of Feature I. It is accessed through a vertical entrance (2.0 m by 1.25 m) that is 2.0 m above the floor of the cave. The main interior chamber has a surface area of c. 11.4 sq m (3.5 m N/S by 3.25 m E/W) and an average ceiling height of 1.3 m. Two extensions branch to the southwest and northeast off the main chamber. The southwest tube is c. 7.0 m long and 2.0 m wide, and it has a ceiling height of 0.8 m. The northeastern tube is a crawlspace; it is 3.0 m long, 1.5 m wide and 0.3 m high. A soil and midden deposit, undisturbed in places and up to c. 25.0 cm thick, occurs inside this feature. A range of marine shell families was observed on the surface, and it is likely that additional material occurs within the deposit. Cypraeidae, Echinoidea, Neritidae, Patelidae, Thaididae, and other families were observed.

Feature L is a poorly preserved terrace located 3.0 m southeast of Feature K. It is constructed from subangular pahoehoe boulders, and it has a rough, irregular surface that is unpaved. Surface area of the rectangular terrace is 13.8 sq m (4.6 m (NE/SW) by 3.0 m (NW/SE)). The northeast and southeast sides of the terrace are raised, to 0.45 and 0.55 m, respectively. A loosely constructed rock mound with sloping sides occurs on the northeast end of the terrace. Base axes are 1.8 m (NW/SE) by 1.15 m; height is 0.75 m. Four sharpened sticks, each 0.4 to 0.5 m long, were observed inside the mound. No cultural deposit or other portable remains were observed on the terrace.

Feature M is probably the *labum* (foundation) observed at this site by Soehren. It is a substantially constructed U-shaped wall with relatively squared corners, located at the vegetation line just east of a coral beach. Feature A is located along the vegetation line 60.0 m to the west, and Feature L is inland, 23.3 m to the southeast. The U-shape opens toward the beach and is constructed with pahoehoe slabs and blocky boulders. Overall surface area of the structure is 30.0 sq m (6.0 m NE/SW by 5.0 m NW/SE), and the interior surface area is 12.4 sq m (4.0 m by 3.1 m). The wall is 1.0 to 1.4 m wide and 0.5 to 0.95 m high. Both sides are faced, but a distinctive core filling is not indicated. Portions of the wall are collapsed. Sparse amounts of Cypraeidae, Neritidae, and Thaididae shell fragments were observed inside the shelter; no soil was observed.

With the possible exception of Feature M, all other shelter features at Site T-140 appear to represent short-term occupation locales. These seven features, particularly the caves, reflect repeated and/or intensive occupation and contain some of the most concentrated cultural deposits located within the project area. Unfortunately, the thickest deposits have been disturbed. The five cairns at Site T-140 reflect three distinct construction styles, that probably relate to intended function and period of construction.

T-141 Complex

This site complex, located in a large collapsed lava blister, is 25.0 m southeast from Site T-140 and 122 m from the shoreline. Two features are present; a cave shelter (Feature A) and an overhang shelter (Feature B). These features occur along the rim of the collapsed blister, which is 15.0 m in diameter.

Feature A is a narrow tube cave that extends off the northeastern edge of the blister. The horizontal opening is 1.8 m wide and 0.9 m high. The tube is 5.0 m long, but only the front 2.0 m are accessible. No modifications are apparent inside the tube, but crevices in the roof have been filled with boulders.

A thin (c. 5.0-10.0 cm) deposit of midden is present along the side walls toward the front of the tube. Material observed in the deposit includes Cypraea, Neritidae, Echinoidae, and Thaididae.

Feature B, an overhang shelter, is located 8.0 m southwest (250 degrees Az) of the entrance to Feature A. The opening is 4.0 m wide and 1.2 m high, and the interior chamber has a surface area of 15 sq m (6.0 m N/S by 2.5 m E/W). A deposit of basalt rockfall is present on the floor of the overhang, and a few fragments of *Nerita picea* are scattered about. Minimal use of these features as short-term shelters is indicated.

T-142 Complex

Three cave shelters and a collapsed C-shaped wall are present within a 236 sq m area at this site, which is located in rough pahoehoe 165 m inland from the shoreline. The site is near the crest of the west-facing lava escarpment, where visibility of the coastline is relatively unimpaired.

Feature A is a cave shelter with a horizontal entrance that opens to the north. The entrance is 2.8 m wide and 0.9 m high. The main chamber of the cave has a surface area of c. 19.2 m (6.0 m E/W by 3.2 m N/S) and a ceiling height of 0.9 to 1.2 m. The floor is scattered with boulder and cobble rockfall, and no internal modifications are apparent. A deposit of dark gray soil and midden is present in the cave and is up to c. 20.0 cm thick in places. Portions of the deposit have been disturbed by relic hunters. Material observed includes volcanic glass, historic (possibly nineteenth century) bottle glass, waterworn pebbles, coral, and marine shell (Conidae, Cypraea, Echinoidae, Neritidae, and Veneridae).

Feature B, a collapsed C-shaped wall, is located 8.0 m directly north of Feature A. Rough pahoehoe slabs and boulders are scattered over a 14.0 sq m area, and the shelter interior is estimated at 4.6 sq m (2.3 m N/S by 2.0 m E/W). The wall remnants are presently 0.6 to 0.9 m wide and 0.3 to 0.4 m high. No indications of faced sides are present at this time. A sparse scatter of Cypraea, Neritidae, and Thaididae shell fragments is present inside the collapsed wall.

Feature C is a collapsed blister with two tube caves under the rim. It is located 17.0 m northeast (60 degrees Az) of Feature B. The blister opening is 6.8 m long (NW/SE), 2.25 m wide and 2.0 to 1.0 m above the floor of the blister. The tube caves extend to the northeast and southeast from this opening; they are accessed from horizontal entrances. The northeast tube is 10.0 m long, and 2.0 m wide, and it has a ceiling height of 1.8 m. The southeast tube is 5.0 m long, 2.1 m wide and has a ceiling height of 0.5 m. A sparse scatter of Cypraea, Conidae, Echinoidae, Neritidae, and Thaididae shells occurs near the entrance to both tube caves. No soil accumulations were observed.

Feature D is a lava tube cave located 15.0 m southeast of Feature A. It is accessed vertically through a small collapsed area in the ceiling that is 0.8 by 0.45 m across and 1.6 m above the cave floor. The main cave chamber is 10.0 m long and 3.5 m wide, and it has an average ceiling height of 1.7 m. A thin deposit of soil and marine shell is present in the cave, but it has been disturbed by relic hunters. Marine shells observed are the same as those listed for Feature C.

All features at this site appear to represent short-term occupation locales that were probably used repeatedly.

T-143 Bedrock Excavation

This feature is located 25.0 m northeast of Site T-142 and 189 m inland from the shoreline. It is situated at the foot of a nearly vertical pahoehoe upthrust near the crest of the lava escarpment. The upthrust rises c. 5.0 m above the feature, and it is conical in form, with a base that is c. 30.0 m in diameter. The excavation is located on the north-facing side of the upthrust and is probably an expansion of an existing crevice. The excavated area is 0.83 m wide and 0.06 m high, and penetrates a stratum of pahoehoe that is 0.45 m thick. The excavation exposed an air pocket in the bedrock; it forms a small overhang shelter that is 1.35 m deep. Average width of the overhang is 0.4 m, and average ceiling height is 0.4 m. The back 0.5 m of the overhang is crawl-space. The floor is irregular and is scattered with loose cobble-sized stones. There is a small pocket of gray soil, c. 1.0 cm deep and 18.0 cm in diameter, against the west wall near the entrance.

A natural revine, which follows the base of the upthrust, has been filled in front of the excavation, forming a very crude terrace-like feature. The filled area is 2.2 m E/W by 1.5 m N/S, and it is raised 0.3 m above the floor of the excavation. It consists primarily of naturally occurring rockfall, as well as detritus removed during excavation. The shape and surface of this feature are very irregular, suggesting very little modification effort. It may represent little more than a backpile. No portable remains were observed near the feature, and a function is indeterminate at this time.

T-144 Cairn

This small, isolated feature is located along a steep west-facing slope of a major pahoehoe ridge, 146 m from the shoreline. It is aligned with two cairns associated with Site T-140 (312 degrees Az), and it is 36.0 m southeast from the Site T-147 cairn. The cairn is constructed from six rough pahoehoe slabs and boulders that are simply stacked one on the other in a rather precarious manner. Height of the stack is 0.7 m; the basal slab is only 0.3 m sq, whereas other stones in the stack are 0.5 to 0.6 m wide.

No footpath was located in the vicinity of this, or the above-mentioned cairns associated with Site T-140. This feature has attributes of a relatively recent construction.

T-145 Modified/Terraced Outcrop

This feature is located along the eastern edge of a narrow coral beach at Kahoueva Bay, within 20.0 m of the shoreline. It consists of a natural pahoehoe outcrop, 4.0 m wide and 4.0 m long (parabolic shape), that has been modified with coral and basalt fill to form a relatively level terrace that is 0.5 to 1.1 m above the surrounding coral sand. The major modification is along the south side of the outcrop, where an low area, 2.0 m long by 1.3 m wide, has been filled with waterworn basalt and with coral cobbles and boulders. The edge of the filled area conforms with the edge of the outcrop, and it is faced for a length of 2.0 m. The filled area is five courses high along the faced side (0.8 m), and it gradually thins toward the center of the outcrop.

A second modification, along the north edge of the outcrop, consists of an alignment of larger basalt boulders, with some sections that are two courses high. This alignment follows the configuration of the outcrop and is 4.0 m long. Two coral deposits occur on the outcrop behind the alignment. These deposits are in low areas, but they are raised above the general surface of the bedrock. The western deposit of coral is 1.1 by 0.7 m in plan; the eastern deposit is 1.0 by 0.75 m. No portable remains, other than coral and waterworn basalt cobbles and boulders, were observed on the pahoehoe outcrop. A recent hearth occurs on the beach c. 7.0 m to the southwest, and there is a considerable amount of recent litter in the vicinity. A functional interpretation is not determinable at this time; the feature may be a shrine, or it may be of relatively recent construction, related to camping activities.

T-146 Wall Remnant

This feature is located 18.0 m south of Site T-145, just inside the vegetation line along a narrow coral beach. It is within a very dense lime thicker and has been extensively disrupted by large trees. It consists of what appears to be a 7.5-m-long bifaced wall or causeway constructed from pahoehoe cobbles and boulders, with a few waterworn basalt

boulders intermixed. The feature is oriented east-west and is positioned over a shallow ravine in the bedrock. An alignment extension continues 4.0 m from the eastern end of the faced section. The faced section is 1.5 to 0.9 m wide and 0.3 to 0.65 m high, with the highest and narrowest portion at the western end. The wall does not appear to be core filled; however, the surface of the feature is littered with loose rockfall. No portable remains were observed on or near this feature. It is extremely disturbed and too obscured by vegetation to adequately interpret its function at this time.

T-147 Cairn

This small cairn is located along the slope of a rough pahoehoe flow ridge, 97.0 m from the shoreline and 36.0 m northwest of the Site T-144 cairn. It is constructed from blocky pahoehoe slabs and amorphous as boulders; c. 12 stones were utilized. Overall plan shape is a square that has a 0.8 m base and a height of 0.6 m. A shallow crevice beneath the base of the cairn was filled with boulders prior to cairn construction. No indications of an adjacent footpath could be located at this site.

T-148 Modified Outcrop

Site T-148 consists of a small boulder alignment at the foot of an exposed rock outcrop along a relatively steep pahoehoe slope, 170 m from the shoreline. The alignment is 1.27 m long, 0.4 m wide and 0.3 m high. Five large, blocky pahoehoe boulders were used; they are aligned north-south at the western end of the outcrop, which is a rough, sloping natural feature. No portable remains were located on or near the alignment, and no functional interpretation is determinable.

T-149 Terrace

This feature is located along the vegetation line that fronts the rocky pahoehoe shoreline of Kahoueva Bay. The retaining wall of the terrace is 30.0 m from the shoreline; it is oriented 220 degrees Az, along the edge of a low, natural rise. The wall is 11.0 m long and 0.5 m wide in most places. Height ranges from 0.7 m to 0.35 m where sections have slumped. A number of large upright boulders were used along the wall, in addition to smaller boulders stacked three to four courses high. Rough pahoehoe stones as well as waterworn basalt stones were used. The southern end of the wall appears to be disturbed by jeep road construction; it currently exists as a rubble pile that extends to within 3.5 m of the road.

The terrace appears to be soil filled; no paving or stone fill material was observed. At least 10.0 cm of soil occur in most areas of the terrace. The eastern extent of soil-fill is presently indeterminate, due to road disturbance; it was probably 4.0 to 6.0 m wide. The surface of the terrace is badly disturbed by large kiawe trees. There is a

quantity of modern rubbish on the terrace. Material observed includes rusted tin cans, glass, shoes, coconut husks, plastic, and Petalidae shells. The terrace is tentatively interpreted as a habitation feature.

T-150 Complex

Site T-150 is probably the southernmost of the group of shelter sites identified by Reinecke as Site 103 (Ma:20). It consists of a small, collapsed enclosure (Feature A) and a rubble pile (Feature B), located on a vegetated bedrock bench just east (c. 8.0 m) of a coral beach. Feature A is c. 35.0 m of the shoreline, and Feature B is 6.3 m west of the coastal jeep road.

Feature A appears to have been a small enclosure or C-shaped wall constructed from loosely stacked cinder boulders and weathered pahoehoe slabs. The south, east and west walls of the structure are collapsed and scattered, and the north wall is partially intact. Interior surface area of the enclosure is 2.8 sq m (2.0 m W/S by 1.4 m E/N). The north wall is 0.4 to 0.5 m wide and 0.76 to 0.45 m high. Maximum height is at the northeastern corner (exterior). The south wall is presently 0.45 m high and is scattered to a width of 1.5 m. It appears to have been more substantial than the other three walls. The shelter entrance was apparently to the west, where the wall is presently an alignment of large cinder boulders. This west side does not appear to have been much higher at the time of construction.

A deposit of sandy soil (dark brown), c. 10.0 cm thick, occurs against the east (back) wall of the enclosure and in small pockets within the interior. Portable remains observed inside the shelter include three waterworn basalt boulders and a modern beverage bottle.

Feature B is located 6.0 m east (90 degrees Az) of Feature A. It is a loose pile of rough cinder boulders that is oval in plan and somewhat flattened on top. The pile is 4.0 m by 2.8 m across the base and 0.4 to 0.6 m high. The sides of the pile are indefinite, and the top is very irregular, with no distinguishable surfacing material or paving. The pile exhibits no formal structural modifications; it may represent a disturbed mound or platform, or simply a backpile of road-clearing detritus. Three waterworn boulders are presently on the top of the pile.

T-151 Shelter Remnant

This site is adjacent to the jeep road, on the cliffs overlooking Kaholawa Bay. 48.0 m from the shoreline. The disturbed remains of a C-shaped or circular wall were located at this site. Approximately one-third of the shelter wall is intact; the remaining portion is scattered over an area 2.4 m in diameter. The standing wall section is 0.6 m high on the exterior side and is 0.45 m high on the interior side; average width is 0.45 m. Construction material consists of large, amorphous as boulders.

Original interior area is indeterminate; it is presently 1.4 sq m and is roughly circular in plan. Soil occurs both inside and outside the shelter; it is relatively shallow and does not exceed 5.0 cm in depth. Two large, fragmentary marine shells were observed among the wall fall. These fragments include a Cypridae shell and a nearly complete *Tonna* peridix.

This site probably represents a short-term shelter; it may well be one of many such shelters observed by Reinecke, who recorded "fourteen or more shelter or hut sites" as part of his Site 103 (Ma:20).

T-152 Cairns

These features occur on a relatively level soil flat at the foot of the Puu Kuili slope, 73.0 m from the shoreline. The cairns are located within 2.4 m of one another and are of similar construction; both are partially disassembled. The northernmost cairn (Feature A) is square in plan view, with sides of 1.5 m and a height of 0.6 m. It is constructed from cinder cobbles, with waterworn basalt cobbles intermixed. The sides are faced, and a large waterworn boulder occurs on top of the cairn.

The southern cairn (Feature B) is rectangular in plan, with sides of 1.6 and 1.4 m. Height varies from 0.6 to 0.4 m. Construction material is similar to that for Feature A, but the Feature B cairn is more disturbed. Small pieces of weathered coral are scattered on the ground surface in the vicinity of these features, and a single coral cobble is present on Feature B. No other portable remains were observed.

These cairns are within 14.0 m of Feature E of Site T-153 and are probably part of the same complex. Function is indeterminate; the cairns may have marked a now-obscured footpath that passed between them, or they may have marked possible grave features immediately upslope (discussed below).

T-153 Complex

This site is located along a relatively steep portion of the cinderland slopes, 75.0 m inland from the shoreline. Five features were identified at this site: an enclosure (Feature A), two terraces (Features B and D), a small platform (Feature C), and a cairn (Feature E), recorded within a 160 sq m area.

Feature A is a compartmentalized enclosure situated on a natural bedrock terrace along the slope (Figure 17), c. 2.0 m above the remaining four features. The enclosure consists of a roughly rectangular main compartment, with smaller compartments adjoining along the northwest (one) and southwest (two) sides. It is constructed from rough cinder boulders stacked three to four courses high, and it is faced on the interior sides of the main compartment walls. The main compartment has an interior surface area of 7.3 sq m (2.8 by 2.6 m). The main wall ranges in height



Figure 17. SITE T-153, FEATURE A. View to South.
(PHRI Neg. 525-34)

from 0.93 m along the east wall to 0.5 m along the other sides. Average width is 0.8 m. The adjoining compartment walls are lower and narrower than the main walls, with an average height of 0.5 m. The interior area of these compartments ranges from 4.5 to 0.3 sq m.

Portable remains observed on the bedrock adjacent to the enclosure include *Cypripedium*, *Echinoides*, and *Thalidites* shell fragments. A small piece of branch coral is present on the enclosure wall.

Feature B is a terrace located 13.0 m west and downlope from Feature A. The terrace has a surface area of 8.8 sq m (4.4 m NE/SW by 2.0 m NW/SE), and it is raised along the north, east, and west sides. The west side is 0.8 to 1.0 m high (maximum height in the center) and is faced with up to five courses of cinder boulders. The north and south sides are raised a single course above the sloping ground surface. The western 1.3 m of the terrace surface has been filled with cinder boulders and cobbles, in order to level the terrace surface. No distinct paving material is present, but waterworn boulders occur on the terrace. No subsistence remains are present.

Feature C is a small platform or faced cairn located on a narrow natural terrace along a steep ravine slope, 7.0 m south of Feature B. The structure is oval in plan, with overall dimensions of 1.3 by 1.0 m. The perimeter of the platform is constructed from large cinder and as boulders, and it is filled with smaller cobbles. The walls are faced with up to four courses of stone, and they vary in height from 0.3 to 1.0 m, depending upon the immediate slope. Maximum height is along the southwest side. The top of the feature has been removed, and portions are excavated to 0.6 m below the top of the perimeter stones. No portable remains were observed on or around this small platform, which appears to be a possible burial monument.

Feature D is a terrace located 9.5 m west and downlope from the Feature B terrace. It is constructed from large cinder boulders, and it incorporates naturally occurring bedrock. Surface area of the terrace is 9.7 sq m (4.4 m N/S by 2.2 m E/W). The western side is raised 0.42 to 0.55 m above the sloping surface, and the other sides are generally flush with the ground surface. The terrace surface is irregular, reflecting the large size of fill stones, and it has no distinguishable paving material. Naturally occurring shallow soil deposits occur around the terrace; no portable remains were observed.

Feature E is a partially disassembled cairn located on a low flat 5.6 m southeast from Feature D. The cairn is constructed from cinder boulders that are stacked around the perimeter and from smaller cobbles that were used as internal fill. It was apparently oval or circular in plan, but it is now semicircular, with a major axis of 1.5 m and a minor axis of 0.85 m. Present height of the cairn is 0.65 m. This feature is 14.0 m east from two additional cairns presently identified as Site T-152, and it may have been of similar construction.

The features at Site T-153 are difficult to interpret at this stage of analysis. The terrace features are relatively small for permanent habitation structures, and the enclosure is definitely too small for such a function. The terraces may reflect either temporary habitation structures or burial monuments. The features at this site are possibly associated with a historic site identified as Lamiu's grave. This former owner of Awake was buried in 1879 at the Awake/Menidowali boundary (Appendix A).

T-154 Enclosure

Site T-154 is located along the west-facing, lower slope of Puu Kuili, 73 m from the shoreline. It is probably one of the several small shelter sites included in Ralbeck's Site 103 (Mar20). The enclosure has an interior surface area of 2.4 sq m (1.7 by 1.4 m) and is defined by a low, wall of stacked pahoehoe and as boulders. Height of the wall on the interior side ranges from 1.0 m to 0.55 m; the highest portion of the wall is an upright pahoehoe slab. Average width of the wall is 0.5 m; there are no breaks or openings.

A deposit of reddish-brown cinder colluvium is present inside the shelter, and bedrock is exposed in places. Portable remains observed include Cypraeidae, Meritidae, and Tonnidae shells, and three, small volcanic glass flakes.

T-155 C-Shaped Wall

This shelter is situated along the edge of the bluffline overlooking Kahoia Bay, 20.0 m from the shoreline and roughly 15.0 m above sea level. The wall is within 4.0 m of the current jeep road and is probably one of the shelters identified by Ralbeck as part of Site 103 (Mar20). It is in relatively good preservation, considering its nearness to the road. The wall is squared in plan, with the southern side open. Average wall width is 0.65 m, and average height is 0.55 m. The wall is constructed from weathered as boulders stacked three wide and three to four courses high. Interior surface area is 4.0 sq m.

A very thin soil deposit occurs inside the shelter, and as gravel is present inside and outside. Portable remains observed include Cypraeidae and Patelidae shell fragments, Echinoidae, brown bottle glass, and rusted tin cans. The feature is interpreted as a short-term shelter, and it appears to have been used, if not constructed, during the historic period.

T-156 Wall Remnant

This disturbed feature is located along the west-facing slope of Puu Kuili, 61.0 m from the shoreline. It is 3.2 m east from the jeep road, and it could have been affected by road construction or use. The wall is oriented roughly north-south (170 degrees Az) and is presently 3.2 m

long. Width varies from 5.8 m at the south end to 1.0 m at the north end. Maximum height is 0.7 m, at the north end. Two very short extensions to the east occur at the ends of the wall; these are 1.2 m (south end) and 0.6 m (north end).

The wall is constructed of as boulders that are rather haphazardly stacked, with no faced sides presently intact. Coral and waterworn basalt boulders (six) occur to the east and west of the wall; these items may have been part of the structure. No other portable remains were observed near the feature. The extent of disturbance is considerable at this site, and it is not possible to make a functional determination at this time.

T-157 Complex

Three features are present at this permanent habitation site, which is situated on a high, level promontory overlooking a rocky point at the north end of Kahoia Bay. A low, walled enclosure (Feature A), U-shaped wall (Feature B), and surface midden deposit (Feature C) are present within a 132 sq m area (Figure 18).

Feature A is a poorly preserved enclosure situated at the seaward edge of the bedrock promontory. It is within 15.0 m of a small inlet shoreline and is exposed to high storm surf. The western side of this rectangular enclosure is almost completely washed away. The wall had enclosed an interior area of 35.4 sq m (6.8 m N/S by 5.2 m E/W). The best-preserved section of the wall is at the northeastern corner, where it is 0.84 m high on the interior side and 0.9 m wide. Other portions of the wall are 0.6 m wide. It is constructed from stacked as boulders, with a few waterworn basalt boulders interspersed. Intact portions are faced on both sides.

The interior area is quite level and is scattered with shell midden. Pockets of soil occur in bedrock crevices and along the inside of the east (back) wall. Waterworn cobbles and pebbles are present, but in insufficient amounts to indicate that the entire interior was paved, although a portion may have been. Marine shells represented include Conidae, Cypraeidae, Echinoidae, Meritidae, Tonnidae, and Thaididae.

Feature B, a U-shaped wall, is located 8.0 m east and upslope from Feature A. The wall is constructed from as and waterworn basalt boulders that are stacked up to four courses high and several stones wide. The overall surface area of the structure is 13.8 sq m (4.6 m N/S by 3.0 m E/W), and the interior area is 3.3 sq m (2.2 m N/S by 1.5 m E/W). A portion of the southern wall is faced on two sides, and additional sections are faced along the interior side. The entire structure was probably bifaced at the time of construction. Wall width varies from 0.7 m, along the bifaced section of the south side, to 1.7 m at the west end of the north side. Height ranges from 0.4 to 0.6 m.

A small, square (1.0 m sq) extension occurs off the northeastern corner of the wall, forming a flat, platform-like area that is raised 0.5 m above ground surface. A small, natural cupboard occurs under the

floor, inside the wall. This cupboard is under the inside portion of the north wall; it is 0.45 m at the opening and 1.0 m deep, with an average width of 0.4 m. The tiny cave extends westward, under the back side of the wall. Material present inside the cupboard includes three waterworn basalt slabs, a coral cobble, pieces of gourd, and a Cypraea shell. Soil is also present inside the cupboard. A large Fatallidae shell is present outside the cupboard, on the floor of the shelter.

Feature C is an extensive deposit of surface midden which occurs on the bedrock between and to the south of Features A and B (figure 18). The scatter covers a roughly oval area, 17.0 m NW/SE by 11.5 m NE/SE. A considerable amount of gravel paving is present within this area, but it is no longer within a definable shape. A very high number of volcanic glass flakes and core fragments was observed in this feature, in addition to Conidae, Cypraea, Patellidae, and Thaididae shell fragments. A scoria abrader was also observed.

T-158 C-Shaped Wall

This site is situated upalope from the Site T-159 complex, along the lower slope of Puu Kuuli. The jeep road is immediately upalope, and the shoreline is 37.0 m to the west. A single shelter wall is present at this site; it is constructed from as boulders and slabs and was apparently faced on the interior side, as indicated along an intact portion of the south side. The wall has rounded corners, and it opens to the east (90 degrees Az). The opening is 1.65 m wide, and its maximum interior depth is 2.3 m; interior surface area is 3.5 sq m. The intact, faced section of the wall is 0.65 m high on the interior side, 0.5 m high on the exterior side, and 0.65 m wide.

A thin, sporadic deposit of soil is present inside the shelter, in addition to a few loose as slabs. Two very large, complete shells were observed, including a *Callana* sp. and a *Tonna* predix. The feature is interpreted as a short-term shelter; it is probably one of the several included by Reinecke in his Site 103.

T-159 Enclosure/Terrace

Site T-159 is located on a high, level promontory along the shoreline of Kahoolawe Bay, c. 30.0 m north of Site T-157, which is clearly visible and connected with this site by a footpath. Site T-159 is at the west edge of a nearly vertical cliff that drops c. 6.0 m down to the water level. Normal surf is within 10.0 m of the site. The enclosure and terrace are extensively storm-washed, and an apparently natural deposit of waterworn basalt and coral pebbles is present. The east side of the enclosure is the only side that is visible for its entire length; it is 16.0 m from the interior sides of the corners, and it is oriented north/south (5 degrees Az). The south wall is presently only 3.8 m long and is broken where a portion of the cliff apparently eroded away. The north wall is 4.3 m long, measuring from the northeast corner, and the

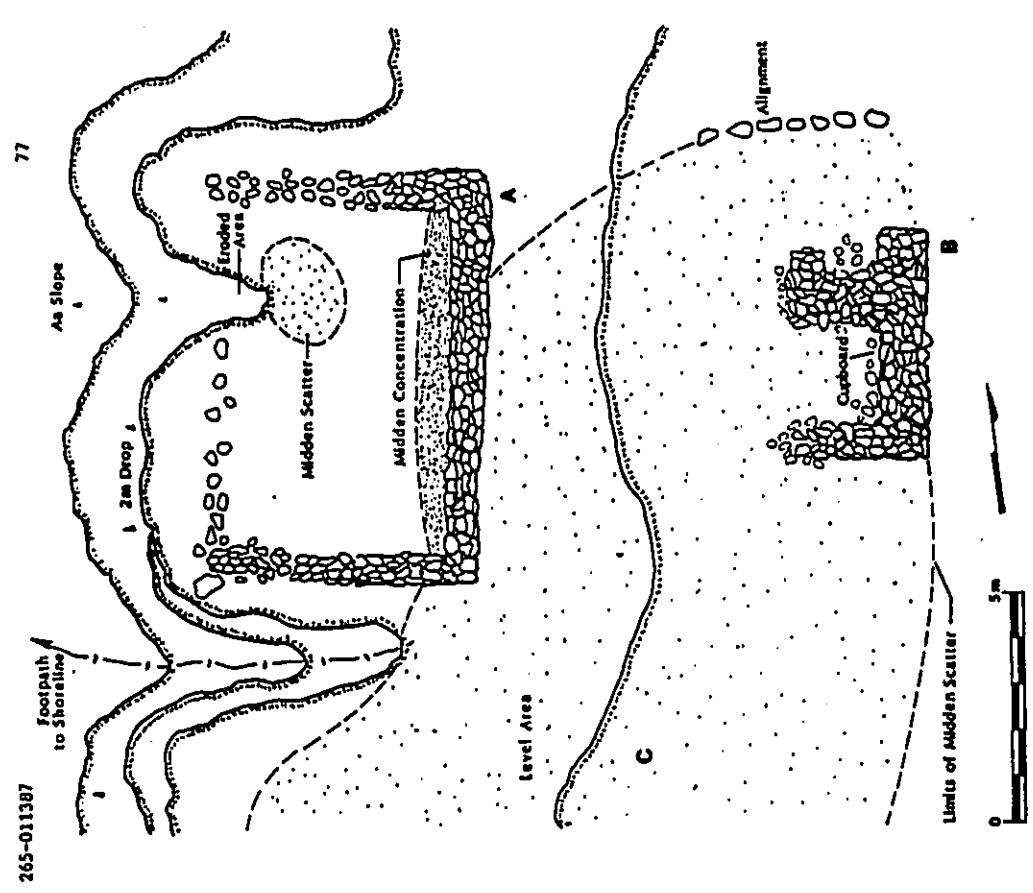


Figure 18. Site T-157, Features A-C

west wall is completely washed out. The enclosure wall is constructed from six boulders that are stacked and faced, with no core fill. Wall width varies from 0.65 to 1.0 m, and current height varies from 0.75 along the east side (interior) to 0.55 along the south side.

The original surface area of the enclosed terrace is indeterminate; it is presently 64.0 sq m, and it may have been 128 sq m. (16.0 by 8.0 m). No internal walls or platforms are evident inside the enclosure. A deposit of reddish-brown colluvium and a darker soil with high organic content is present; it is up to c. 15.0 cm thick in places. Wetmoren basalt and coral pebbles from recent storm wash are present in sufficient quantity to suggest that 'ili'ili paving was present. Marine shell observed includes Conidae, Cypridae, Echinoidae, Pterididae, and Thaididae. Recent fishermen's debris, including a small copper bell, a tabi, monofilament line, lead weights and tin cans, is also present.

This site is nearly too incomplete for interpretation. It was possibly a permanent habitation, based on the presence of a low enclosure, a level terrace, and probably 'ili'ili paving. The location is also a likely place for a permanent structure.

T-160 Complex

This site was included as part of Reinecke's Site 103 and was described as a "pen or possibly walled house site on a point overlooking the slope" (Ms:20). A C-shaped wall (Feature A) and the modified remnants of an enclosure (Feature B) were identified at this site, which is located on a small knoll along the lower slope of Puu Kuli, 134.0 m from the shoreline. The area is rocky, but has a relatively thick soil mantle and a heavy growth of fountain grass.

Feature A is a relatively substantial C-shape that appears to have been incorporated into a later enclosure. The south and west sides of the feature are constructed with pahoehoe slabs and boulders stacked up to seven courses high (1.2 m) and four stones wide (1.0 m). The wall is faced on two sides and is not core-filled. The interior area of the C-shape is 5.88 sq m (2.4 m NW/SE by 2.45 m NW/SE). The wall opens to the southeast and is 0.9 m wide. A loose pile of wall rubble occurs between the sides of the wall, decreasing the size of the opening.

The southern side of Feature A abuts a natural bedrock outcrop that has been incorporated into the south wall of the enclosure. The wall to the east of the outcrop exhibits a less formal construction technique. Overall length of the two connecting wall sections is 11.4 m. A narrow opening occurs in the wall to the east of the bedrock, providing access to the enclosed area, which is surrounded on all other sides by either high bedrock faces or a high wall.

The east wall of the enclosure (Feature B) consists of loosely piled stones on a bedrock outcrop. This wall is 1.2 m high and 3.2 m long. The north wall appears to have been modified to form a second, small C-shaped

wall, which is 4.75 m east of Feature A. This second C-shape exhibits a distinctively different construction technique; the western wall is unfaced and loosely stacked. It has an interior surface area of 2.04 sq m (1.2 m NW/SE by 1.7 m NW/SE).

A deposit of reddish-brown colluvium (c. 15.0 cm) was observed inside Feature A and in patches inside the enclosure. No portable remains were observed; however, the entire site surface is obscured by heavy fountain grass. The site appears to represent a habitation area that has been modified once or twice since its initial construction.

T-161 Cairn

This isolated feature is located 1.3 m west of the coastal jeep road, at the junction of its south and north branches. It is constructed from six large pahoehoe boulders, two of which were used as a base on which to pile the remaining four boulders. The cairn is 1.10 by 0.8 m at the base and is 0.96 m high. Modern refuse is present in the vicinity, including beverage cans and bottles and cardboard.

The cairn is probably a road surveyor's marker; it may date to the nineteenth century.

T-162 Complex

This site consists of a large rubble heap (Feature A), a walled shelter (Feature B), a cairn (Feature C), and a small rubble pile (Feature D). The site is situated on low, heavily vegetated pahoehoe, 36.0 m north from the edge of the high as flow and 365 m inland from the shoreline. Features A and B are located in a broad, shallow, collapsed blister; Features C and D are found along the rim of the blister (Figure 19).

Feature A is an amorphous heap of very large pahoehoe boulders, with smaller stones localized at the north end of the pile. The pile is nearly circular in plan, with axes of 7.3 by 7.0 m and a maximum height of 1.2 m (from ground surface at northwest side). The top of the pile is very irregular; the high point is near the southwestern edge of the pile, and the center is relatively low. A small section of the southeastern edge of the pile looks as though it may have been the faced side of a platform. This portion is 0.4 m high and is slightly curved. The remainder of the pile looks very similar to a loose push. No portable remains were observed on the pile. It was not possible to adequately determine whether Feature A was partially or entirely the result of bulldozing activities, due to the thick vegetation cover (fountain grass and *lihue*) on the feature.

A small, curved wall is adjacent to the southwest edge of the large rubble pile. This wall is a broad C-shaped form; it is 1.49 m across the opening and is 1.0 m deep. Interior wall height is 0.45 m. The feature is constructed from loosely piled and jumbled pahoehoe blocks that appear to have been borrowed from the large pile. The wall opens to the south, and it meets the pile on the west side. No portable remains were observed in the vicinity.

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Feature B consists of a semicircular wall constructed around a shallow overhang shelter situated along the southern rim of the blister. It is 9.0 m south (198 degrees Az) from the south rim of Feature A. The wall encloses a 3.6-m-long section of the rock face, and it extends to within 3.0 m from the rock face at the center. Maximum height of the wall is 0.9 m, and its average height is 0.5 m. Wall width ranges from 0.4 to 0.5 m. The wall is constructed from pahoehoe slabs and boulders that are loosely stacked and two stones wide. The highest wall section occurs where an upright slab is leaned against the exterior side of the stacked boulders.

The overhang is 3.6 m wide and has a maximum depth of 1.1 m, with an average depth of 0.5 m. Nearly all of the overhang area is crumbly, with the exception of a small, 0.7 m deep area that has a gradually sloping ceiling of 1.1 m. A deposit of reddish-brown (noncultural) soil was observed in the walled area, in addition to a few feral goat bones. Feature B could have functioned as a short-term shelter or as a small animal pen.

Feature C is a collapsed cairn located along the west rim of the blister, 8.5 m west of Feature B. The original dimensions of this feature are indeterminate; boulders and cobbles are currently scattered over an area 1.5 m (E/W) by 1.3 m (N/S), and they have tumbled down both sides of the blister rim. Maximum height is presently 0.3 m.

Feature D is a rubble pile situated on the southeastern rim of the blister, 6.0 m from the edge of the Feature A pile. This pile is 2.1 by 2.8 m across the base; it has a maximum height of 0.9 m. The stones in this pile are large pahoehoe boulders that exhibit what appear to be drier scars.

T-163 Platform

Site T-163 is located in a low-lying area of older pahoehoe, 30.0 m north of the aa flow escarpment along the southern boundary of Awakee. The area is heavily overgrown with fountain grass and kiaue.

The platform is oval in plan, with a major axis of 2.5 m and a minor axis of 1.8 m. Maximum current height is 0.93 m; height in the center is 0.7 m. It is constructed from large pahoehoe blocks that were stacked to form a curved, faced perimeter and from smaller blocks that were placed inside the perimeter stones. The upper portion of the platform has been disassembled, and loose stones are scattered to the east side. No portable remains were observed on or near the platform, which may represent a burial monument. This feature is within view from the Site T-165 terrace (Feature A).

T-164 Complex

This site is situated in a low, depressed area of collapsed pahoehoe blisters, 25.0 m north from the major aa flow escarpment. The site is 365.0 m inland from the shoreline, in a heavily vegetated area (fountain grass and kiaue).

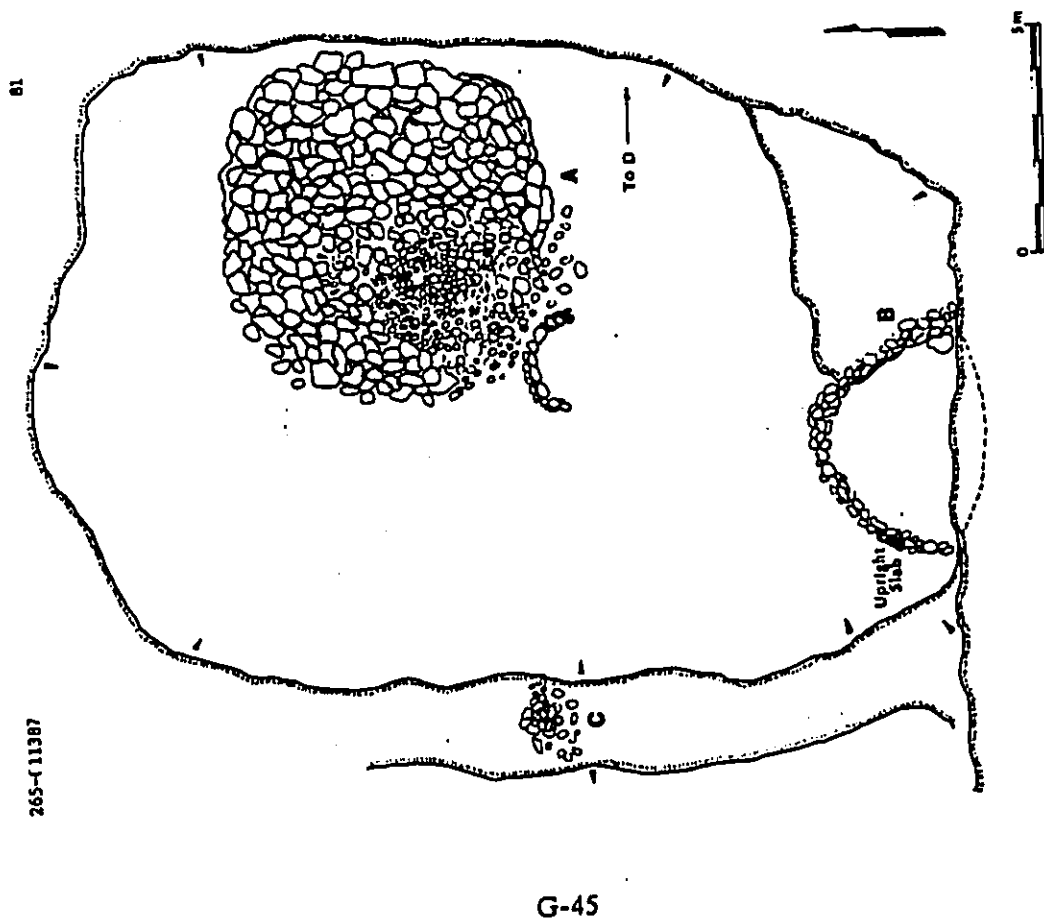


Figure 19. Site T-162, Features A-C

Two cave shelters and several rubble piles are present at this site. Feature A is a large cave shelter situated at the northeastern edge of a collapsed blister. The blister opening is 7.25 by 4.35 across, and the floor is c. 1.5 m below the surrounding ground surface. The main entrance to the cave is along the vertical west rim. The opening faces southwest; it is vertical at ground surface, with a 2.0 m stepped drop to a curved horizontal opening that is 5.9 m wide. Ceiling height at this entrance is 1.98 m. The cave floor gradually slopes downward from the entrance, so that at a distance of 10.0 m from the entrance, the ceiling is 2.2 m high. The front 5.0 m of the main cave chamber is littered with loose rockfall, some of which may be recently disturbed. Maximum depth of the main chamber is 28.0 m; maximum width, at 8.0 m from the drip line is 20.0 m.

A second entrance occurs along the west-facing rim of the blister, where an east-facing hole occurs between the rim and a portion of the collapsed bedrock. This 3.2-m-wide entrance is vertical, and it drops 2.0 m to the cave floor. A large pile of rockfall is located under the south half of the drip line; it forms a raised area 1.0 m above the cave floor and defines a smaller compartment along the west side.

The cave interior has been modified by the construction of low walls, hearths, and cobble pavements. These features have been extensively disturbed by talic bunters, and most of the rockfall features have been rearranged. A moderate-to-thick deposit of gray soil and shell midden is present across the entire cave floor. It was apparently much thicker in places, for there are now several backpiles both inside (15) and outside (five) of the cave. Portions of the deposit at the far eastern end of the cave chamber appear to be undisturbed.

Portable remains observed inside the cave and in backpiles outside include waterworn basalt boulders, cobbles and pebbles, fish bone, bird bone, mammal bone, coral abrasives, basalt hammerstones, volcanic glass, Echinoida abrasives, kukui nut shell, charcoal, ash, unmodified coral, Cypraea shell octopus lure parts, and marine shell fragments (Conidae, Cypraea, Echinoida, Irogonomidae, Neritidae, Patelidae, Tellinidae, and Thaididae). Historic bottle glass shards were also observed inside the cave.

Feature B is an overhang shelter located in a small collapsed blister, 10.5 m west of Feature A. The blister is 1.9 by 1.0 m across and is 1.3 m deep. The shelter entrance is located along the north-facing rim of the blister; it is 1.25 m wide, with a ceiling height of 0.6 m. The overhang has a maximum depth of 1.2 m. A very sparse scatter of marine shell fragments occurs in this overhang, and waterworn basalt and coral pebbles are present on the blister floor.

Feature C is a loosely piled mound of pebbles rubble located adjacent to the Feature B blister opening. It is oval in plan, with base axes of 3.0 by 1.6 m. Maximum height (0.6 m) is at the center. Additional rubble piles were observed in the vicinity, along the rim of the broad, shallow depression where both caves are located.

Feature A is the largest and most intensively utilized cave shelter within the project area. Its use may be associated with the activities conducted at Site T-165, which is located on the sea floor within 30.0 m to the south. A footpath from the south, across the sea and through Site T-165, may have passed adjacent to this cave. Its size would also permit more than simply short-term (in transit) usage. The extent of modifications, as well as the range of activities reflected, tend to suggest longer-term, although not necessarily permanent, habitation.

T-165 Complex

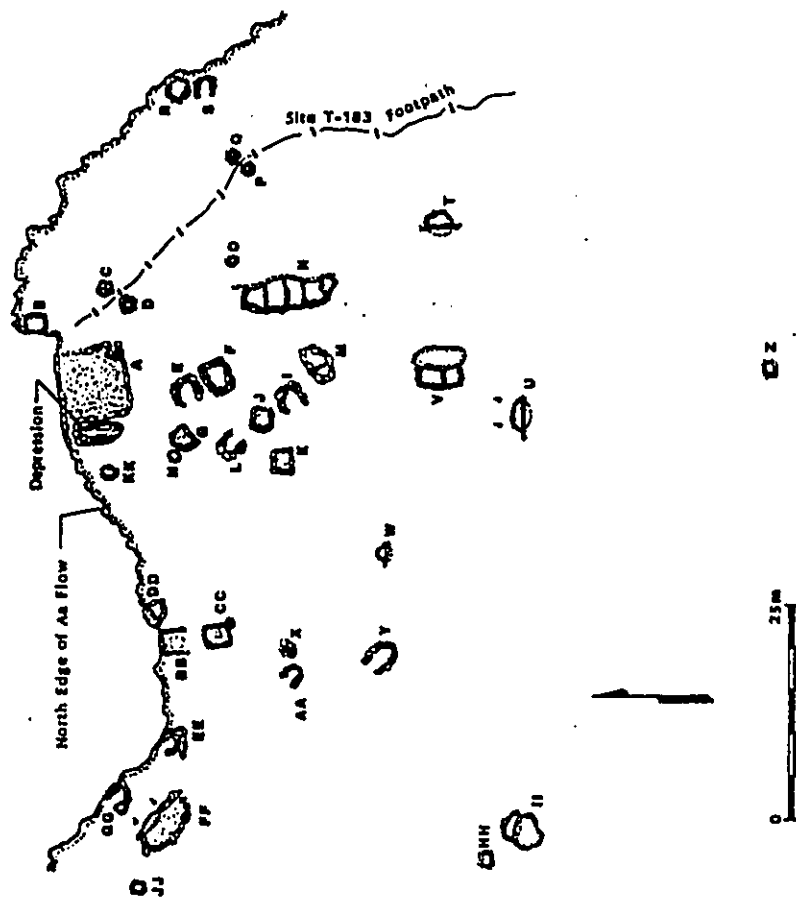
This extensive site is located on the high sea floor, south of and along the north edge of the escarpment. It is 365 to 430 m inland from the shoreline, on totally unvegetated terrain. Thirty-seven features were identified within a 5,600 sq m area (Figure 20). Formal types represented include a large paved terrace, ten walled shelters, eight small excavations, six platforms, six C-shaped walls, five cairns, and an sea clearing with overhang shelter. A well-worn footpath (Site T-183) also occurs on the site.

Feature A is located on an east-west axis near the center of the site, and at the northern edge, along the sea escarpment. This terrace is raised on the west, north, and east sides (Figure 21). It is nearly square in plan, with a surface area of 80.75 sq m. Side lengths are 8.75 m (north), 9.0 m (south), 8.2 m (east), and 9.85 m (west). The terrace is filled with sea boulders and cobbles and is paved with a packed surface of sea gravel. It is relatively level, but the south end is somewhat higher than the north end.

A low wall of stacked sea boulders (0.4 m high) occurs along the east side of the terrace, and a narrow extension of pavement occurs off the west side, at the north end. This extension is 2.0 m sq. In the sea adjacent to the west side, is a depression that is 4.0 m long (N/S), 2.5 m wide and 0.6 to 0.8 m deep. A small portion of the depression extends to a maximum depth of 1.75 m. The Site T-183 footpath is adjacent to the east side of the terrace, and the terrace face along this path has eroded. A small, walled shelter occurs adjacent to the southeast corner of the terrace, and a small rubble pile (disassembled cairn?) is located at the southeast corner of the terrace.

A fragment of a large Cypraea shell and a piece of branch coral are present near the rubble pile, and additional Cypraea and coral fragments are scattered on the terrace surface. A small concentration (1.2 m in diameter) of Cypraea, Neritidae and soil occurs near the center of the terrace, at the north end. Also present is a small water-worn basalt cobble. Cypraea, Conidae, and Thaididae shell fragments occur in the sea depression to the west of the terrace.

Feature B, a roughly square platform constructed from sea boulders and cobbles, is located to the east of Feature A, immediately across the Site T-183 footpath. The platform has a surface area of 6.9 sq m (2.75 m N/S



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Figure 21. SITE T-165, FEATURE A. View to northeast.
(PARI Neg. 525-16)

Figure 20. Site T-165, Features A-KK

by 2.5 m E/W) and is raised 0.3 to 0.55 m above the surrounding aa. The platform surface is level and packed, but has no small aa gravel paving. The aa surface on which the platform was erected does appear to have been paved with aa gravel. A single waterworn basalt fragment was observed on this platform.

Features C and D are cairns located on either side of the Site T-183 footpath, 12.0 m southeast from Feature A. They are positioned on an east/west ridge and are most prominent from the north side. The cairns are 1.2 m apart on an E/W line. Both are square in plan and blockish in profile, and both are constructed from stacked aa boulders and cobbles. Feature C has base dimensions of 1.95 by 2.0 m. It is partially dismantled, and removed stones are scattered 3.0 m to the north. The cairn is 0.7 m high, measuring from the path surface, and it is presently flat on top. Feature D is 2.25 by 2.2 m at the base, and removed stones are scattered within a 4.4 m area. It is 1.1 m high, measured from the footpath surface. A fragment of a ground, waterworn basalt boulder is present on the path between the two cairns.

Feature E is a C-shaped wall constructed from large aa boulders and naturally occurring aa outcrops. It is located 14.0 m due south from Feature A. The interior of the shelter is paved with crushed aa gravel, and it has a surface area of 3.2 sq m. The shelter opens to the west, and the constructed wall portion is 3.25 m long. Interior wall height is 1.2 m, and width is 1.0 m. A natural overhang occurs at the back of the shelter; it is 1.7 m wide and 1.5 m deep, and it has a ceiling height of 0.7 m. Marine shell fragments are lightly scattered within the shelter (35 pcs): Cypraeidae, Isogonomonidae, Thaididae, Trochidae, and pearl shell were observed.

Feature F is a walled shelter incorporating a vertical aa outcrop that forms the eastern wall of the feature. It is located 2.5 m south of Feature E. The interior area of the shelter is rectangular in plan, and it has a surface area of 4.75 sq m (2.8 by 1.7 m). The shelter opens to the west. The north wall is 3.8 m long, 0.8 m high (interior side) and 0.85 to 1.0 m wide. The south wall is essentially an alignment of large aa boulders; it is 1.3 m long and 0.5 m wide. A 2.25-m-long section of the bedrock face is incorporated into the shelter. Portable remains observed inside the shelter include branch coral, Cypraeidae, and Thaididae shell fragments.

Feature G, located 5.0 m west from Feature E, is a D-shaped platform with a hearth pit. The straight side of the platform is 2.8 m long, and the surface has a maximum width of 2.3 m (down the center). Surface area is c. 5.5 sq m. The major axis is oriented NE/SW (240 degrees Az), and average platform height is 0.6 m. The perimeter of the platform is defined by upright aa slabs that are an average of 0.9 m tall. These uprights extend above the fill surface, which consists of aa cobbles. The hearth is located in a shallow depression along the southeast wall of the platform; it is 1.4 by 1.7 m across. An organic matrix with soil and ash is present in the hearth pit.

Feature H is 1.0 m northwest of the north edge of Feature G. It is a vertical excavation in aa and is adjacent to a low overhang. The excavation is faced with seven large aa boulders, and it has overall surface dimensions of 1.6 by 1.3 m. The opening is 0.55 m in diameter, and it is 1.15 m deep measured from the outer surface. The dripline of the overhang is 0.6 m below the exterior opening surface; it is partially exposed in the excavation. The area under the dripline is 0.37 m deep. Small aa gravel occurs at the bottom of the excavation, but no other material was observed.

Feature I is a C-shaped wall located 9.5 m south of Feature F. The wall opens to the west and incorporates a few large in situ aa boulders. The shelter has an interior surface area of 6.8 sq m (3.78 m N/S by 1.8 m E/W). The wall is 0.8 to 1.2 m wide and is in a generally collapsed condition; average interior wall height is 0.85 m. A small faced opening (cupboard) occurs near the shelter entrance in the south wall. It is 0.9 m wide and 0.4 m high at the opening, and it is 0.6 m deep. No portable remains were observed inside this shelter; however, marine shell fragments occur in a depression adjacent to the wall to the southeast. This depression is 2.1 by 1.9 m across and is defined by the walls of Features I and M. Conidae, Cypraeidae, Meritidae, Patelidae, Thaididae, and branch coral occur in this depression along with a shallow soil deposit. It probably represents an additional shelter feature.

Feature J is a small platform located 4.0 m northwest of Feature I. It has a surface area of 4.8 sq m (2.4 m E/W by 2.0 m N/S) and an average height of 0.5 m. It is outlined with large aa boulders and is filled with smaller boulders and cobbles. The surface is flat and is paved with small aa gravel. It is very similar in construction to Feature G. A sparse scatter of Cypraeidae, Meritidae, and Thaididae shell fragments occurs on the platform.

Feature K is a second small platform, located 6.0 m southwest from Feature J. It has a surface area of 4.65 sq m (2.5 by 1.85 m) and an average height of 0.4 m. The platform is outlined with large aa boulders and is filled with small aa cobbles and pebbles. No portable remains occur on the surface of the platform. A small, collapsed excavation occurs on the platform, adjacent to the west side perimeter boulders. The excavation is 0.75 m long by 0.55 m wide at the opening and is 0.3 m deep. It is partially filled with loose gravels from the platform fill.

Feature L is a C-shaped wall located midway between the three platform features (G, J, and K). The wall incorporates several large aa boulders (lava bombs) that are in situ, and it opens to the southeast (120 degrees Az). Interior surface area of the shelter is 5.4 sq m (2.6 by 2.1 m). Wall sections between the boulders range in length from 1.8 m (west wall) to 0.7 m (northeast wall). Widths range from 1.3 m, along the south side, to 1.05 m elsewhere. Wall heights range from 1.15 m, along a bedrock boulder face, to 0.3 m along the northeast constructed wall. The interior is surfaced with crushed aa gravel, and a few Cypraeidae and Meritidae shell fragments were observed.

Feature M is a walled shelter located 4.0 m southeast of Feature L. As indicated above, an additional shelter feature may have occurred between these two shelters and may have utilized walls from each. Feature M consists of an oval enclosure with an internal dividing wall that forms two small compartments. The wall incorporates immobile as boulders that comprise c. 20% of the structure. Total interior surface area is 8.0 sq m. Overall interior width is 2.3 m; the southeast compartment is 1.3 m long, and the northeast compartment is 1.6 m long. The divider wall is 1.4 m long, 0.65 m high and 0.8 m wide. The enclosing wall has an average height of 0.55 m and is 0.8 m wide where constructed. Marine shell fragments observed inside the shelter include Cypraeidae, Meritidae, Patellidae, and Thaididae.

Feature N is located 10.0 m northeast of Feature M. It is a walled shelter that has been divided into four compartments. The major axis of the feature is oriented north/south (175 degrees Az), and the major exterior wall is 10.4 m long. A constructed wall, 2.0 m long, occurs at the north end of the feature, and the south and west sides are defined by natural bedrock outcrops. Width of the exterior walls varies from 1.15 to 1.25 m. The northernmost compartment is 2.0 m long (E/W) and 1.8 m wide. A few waterworn basalt pebbles and Cypraeidae shell fragments occur in this compartment. The internal wall on the south side is 2.2 m long and 0.65 m high.

The adjacent compartment to the south is 2.2 to 4.2 m long and 3.0 m wide. The floor of this compartment is 0.25 m lower than the adjacent compartment, and the internal wall to the south is 0.96 m above the floor. Three Cypraeidae shell octopus lure parts, a piece of branch coral, and marine shell fragments (Cypraeidae, Meritidae, and Thaididae) occur in this compartment. The third compartment is 4.0 m long and 2.0 m wide; it contains a piece of branch coral, a waterworn basalt pebble, and marine shell fragments (Cypraeidae, Meritidae, and Patellidae). The southernmost compartment is defined primarily by bedrock outcrops. It is 4.0 m long and 3.8 m wide. The internal dividing wall to the north is 0.65 m above the floor of this compartment. A long, narrow waterworn basalt boulder and a few waterworn pebbles occur in the southern compartment, along with a Cypraeidae shell octopus lure part.

Feature O is a vertical excavation into as it is located 6.0 m northeast of Feature N. The excavation is 0.33 by 0.30 m across the opening and is 0.55 m deep. It expands to a maximum width of 0.88 m near the base of the excavation. The feature abuts a bedrock outcrop which defines the eastern side. On the remaining sides at the opening, it is outlined with seven as boulders. No portable remains were located in or around this feature.

Features P and Q are cairns located on either side of the Site T-183 footpath, 22.0 m southeast of the Feature C and D footpath cairns. Both of these features are partially dismantled and are considerably smaller than their original size. They are spaced 2.35 m apart and are aligned along either side of the footpath. Feature P is presently 1.8 by 1.3 m, at the base and 0.45 m high. It was outlined with large boulders and was

filled with smaller as cobbles. Feature Q is presently 1.6 by 1.0 m at the base and is 0.95 m high on the southwest side only. This cairn appears to be less than half its original size. A portion of the south side is intact; this side is faced to four courses high. No portable remains were located near these features.

Feature R is a walled shelter located along the northeastern edge of the as flow. It consists of an 0.8 m high, 0.5 m wide wall that incorporates three large, immobile boulders to form an oval enclosure. Major axis of the interior area is 3.3 m, and minor axis is 2.55 m. A small portion of this area (1.8 by 1.3 m) has been leveled; the remainder is sloping and irregular. Three waterworn basalt cobbles were observed inside this shelter.

Feature S, a walled shelter, is 1.5 m south of Feature R. It consists of an enclosed shelter formed by a semicircular wall and a high rock face. The constructed wall is 0.55 m high on the interior side and is 0.35 m wide. The enclosed area is circular, with a diameter of 2.3 m. A shallow overhang occurs in the rock face at the back of the shelter. This overhang is 0.35 m deep, and it has a ceiling height of 0.95 m. A small excavation occurs on the inside of the east wall. This opening is 0.35 by 0.45 m across, and it extends vertically to a maximum depth of 0.45 m below the surface on which the wall was erected. A piece of weathered coral and a burned Echinoidea spine were observed in this shelter.

Feature T is a relatively isolated, walled overhang located at the southeastern edge of the site, 17.0 m east of Feature V. The overhang is situated on the east-facing side of a massive bedrock outcrop. An oval area (1.8 m E/W by 1.1 m) immediately east of the overhang has been cleared of loose as rubble that had been used to form a curved enclosing wall. The wall is 1.9 m long, 0.3 m wide and 0.65 m high on the exterior side. The overhang is 1.9 m wide at dripline, 1.3 m deep, and has a ceiling height of 0.6 m. No portable remains were observed in or around this feature.

Feature U is a walled overhang that opens to the north and is situated along the steep slope of a large, natural depression that is c. 3.0 m deep. The wall is roughly L-shaped, with a 7.0-m-long section oriented east/west and a 1.6-m-long section oriented north/south. Average wall width is 0.55 m, and height is 0.7 m.

The overhang is 1.6 m wide at dripline and is 1.1 m deep. Ceiling height is 0.82 m. An area, 0.92 m wide, is enclosed in front of the dripline. This area is somewhat level, but is not paved, and the overhang floor is irregular. No portable remains were observed in the vicinity.

Feature V is a walled, compartmentalized shelter located 12.0 m northeast of Feature U. This cleared, walled feature is constructed in a manner similar to other walled shelters in this complex. Major axis of the interior area (N/S) is 5.4 m, and minor axis varies from 2.0 to 2.75 m. The enclosing wall is generally tumbled and has an average width of 0.5 m. The western side of the enclosure is primarily a large, immobile

are defined with stacked as boulders, and the terrace is filled with smaller boulders and cobbles. The surface is level and is paved with as gravel. Cypraeidae shell fragments, waterworn coral pieces, and a waterworn basalt boulder occur off the terrace, to the west side.

Feature CC is a rectangular platform located 4.5 m south and upslope from Feature BB. The platform is outlined with large as boulders that rise 0.8 m above the surrounding surface and 0.4 m above the surface of the platform. Surface area inside the perimeter stones is 12.4 sq m (4.0 m N/S by 3.1 m E/W). The platform is paved with as gravel, and a few marine shell fragments are present (Cypraeidae, Conidae, and Thaididae). One waterworn basalt cobble is also present on the platform, in addition to a shallow soil deposit.

Feature DD is a walled shelter located 3.0 m northeast of Feature BB. It consists of an enclosed depression against the south side of a large immobile as boulder. The 0.55-m-wide enclosing wall is semicircular; it has an interior height of 0.74 m and the top is generally flush with the surrounding ground surface. The bedrock along the north side rises to 1.5 m above the shelter floor. No portable remains were located inside this shelter.

Feature EE, a C-shaped wall, is located 10.5 m west of Feature BB, along the north edge of the as flow escarpment. The shelter opens to the northwest (340 degrees Az) and is in a depression surrounded by c. 70% naturally immobile as boulders. The constructed portion of the wall is 0.6 m wide and 0.65 m high on the interior side. The top of the constructed wall is flush with the surrounding ground surface. A narrow footpath leads directly from this shelter down the slope of the escarpment and onto the grassy pebbles flat, where it becomes obscured. The interior surface of the shelter is flat and level and is scattered with a few pieces of Cypraeidae shell.

Feature FF is an oval platform situated on a level as rise, 12.0 m west of Feature EE. The perimeter of the platform is defined by large immobile as boulders and by sections of a stacked wall. The north side is constructed principally of in situ boulders and is 1.1 m above the surrounding ground surface. The south side is principally constructed and is 0.74 m high. The surface area inside the perimeter stones is c. 12.0 sq m (6.0 m N/S by 2.0 m E/W). The wall is 0.55 m wide and 0.55 m high, measured from the interior side. The natural boulder wall is a maximum of 0.84 m above the surface of the platform. A waterworn basalt boulder, pieces of coral, and marine shell fragments (Cypraeidae, Neritidae, and Thaididae) occur just off the platform surface to the south.

Feature GG is a C-shaped wall that incorporates a few large, immobile boulders and defines a level, as gravel-paved interior area. It is located 7.0 m northeast of Feature FF, c. 2.0 m below the level of the platform surface. The wall consists of c. 50% naturally occurring boulders; constructed sections are 0.6 m wide and have an interior height of 0.6 m. The interior area is 2.25 m (N/S) by 2.1 m (E/W). The shelter opens to the northwest (310 degrees Az). A waterworn pebble and a few marine shell fragments (Conidae and Cypraeidae) occur within the shelter.

as boulder. An internal wall, 0.84 m high, divides the shelter into two compartments. The north compartment is 3.0 by 2.0 m, and the south compartment is 1.1 by 2.75 m. No portable remains were located in either compartment.

Feature H is a small overhang that has been walled at the front of the dripline to form a vertical-sided storage cupboard. It is located 7.0 m northwest of the Feature F cairn. The cupboard opening is 0.60 by 0.4 m and is 0.6 m deep. The wall consists of a single row of as boulders stacked to 0.35 m above ground surface and 0.35 m out from the dripline of the overhang. The overhang is 0.6 m wide, 0.59 m deep, and has a ceiling height of 0.4 m. No portable remains were located in this feature.

Feature I is a small cairn erected on a 1.35-m-high boulder near the center of the site (41.0 m southwest of Feature A). The cairn is constructed from nine as boulders that are stacked four courses high (0.52 m). It is conical in form, and it has base area of 0.7 by 0.5 m. It apparently marks a barely discernable footpath between various features within the site.

Feature J is a walled shelter located 10.0 m directly south of Feature X. The wall consists of c. 40% naturally immobile as boulders, and it has an opening to the northwest. Interior surface area is c. 14.0 sq m (5.6 m N/S by 2.5 m E/W). The interior is depressed so that the top of the west wall is level with the exterior surface. The east wall is, however, 0.7 m above the surface on the exterior side (0.55 m high on the interior side). Average wall width is 0.87 m. The floor is paved with small as gravel and is slightly sloping. A few pieces of Cypraeidae and Patalidae shells are present inside the shelter, and a waterworn basalt boulder and a piece of scoria occur just outside the entrance.

Feature K is located at the far southern edge of the site, 31.0 m southeast of Feature J. It is a minimally modified, natural hole in surface lava. The 0.5- by 0.25-m-opening is vertical, and it expands to a maximum width of 1.0 m. Maximum depth is 0.55 m. The west side of the vertical opening is defined with four as boulders. No portable remains were observed in or around the cupboard.

Feature LL is a C-shaped wall located 3.5 m west of the Feature X cairn. This shelter has an interior surface area of 1.68 sq m (1.4 by 1.2 m), and it opens to the northwest. The entire wall is constructed, and it has an average interior height of 0.5 m (0.65 maximum) and an average width of 0.5 m. The interior surface is paved with small as gravel. A burned coral cobble and a waterworn basalt cobble are present in the shelter.

Feature MM is a terrace located along the north edge of the as escarpment, 33.0 m west of Feature A. The north and west sides of the terrace are completely raised and faced, the east side is partially faced, and the south side is level with the surrounding surface. Total surface area of the rectangular structure is 11.2 sq m (4.0 m N/S by 2.8 m E/W). The west wall is raised 0.9 m, and the north wall is raised 0.45 m. Sides

Feature HH is a small, vertical excavation in the ss and is adjacent to a large immobile boulder. It is located at the southeastern edge of the site, 35.0 m southwest of the Feature X cairn. The excavation is 1.0 m deep and has vertical sides that are built 0.45 m wide and up to 0.45 m from the surface. The opening of the excavation is 0.9 m eq. A small overhang, 0.15 m deep, occurs along the boulder (west) side. The bottom of the excavation is level. A single waterworn basalt cobble occurs inside the excavation.

Feature II is a cleared and leveled area against a large, immobile as boulder; it is 4.0 m southeast of Feature HH. The clearing is on the west side of the boulder and is outlined with as boulders. It is naturally raised to c. 0.6 m above the surrounding ground, and it has a surface area of 2.6 sq m (2.0 m by 1.3 m). A very shallow overhang is present in the boulder at the back of the clearing. This overhang is 2.0 m wide; it has a maximum depth of 0.6 m and a ceiling height of 1.12 m. A single waterworn basalt cobble, which has been flaked, is in this shelter.

Feature JJ is a small excavation located at the western edge of the site, 7.5 m west of Feature FF. The excavation is adjacent to a large as boulder; it is 0.55 m deep and has vertical walls. The opening is 0.45 by 0.55 m, and the bottom is irregular and partially covered with loose as pebbles. No portable remains were observed in this probable storage cupboard.

Feature KK is also a small excavation, located 11.0 m southwest of Feature A. This excavation is located against the side of a bedrock outcrop and is 0.6 m deep. The walls expand outward, from a 0.75 by 0.3 m opening to a maximum width of 0.9 m. The opening is outlined with a 0.4-m-wide facing of as cobbles. A single waterworn basalt pebble was located inside the excavation, which is probably a storage cupboard.

In summary, 37 features were identified at Site T-165. Seventeen of these features appear to have functioned as short-term shelter sites; these include six C-shaped walls and ten walled shelters that are all quite similar in general construction technique, size and energy expended in construction. Most of these shelters utilize the natural topography and the available lava formations, to a large extent. A single large terrace (Feature A), and possibly a second smaller terrace (Feature BB), may reflect permanent residences or ceremonial structures. Six small platforms at the site may represent burial monuments. The five cairns are all associated with footpaths; four mark the Site T-163 footpath, which continues to the southeast and northeast of the site in a generally east/west orientation. No substantial soil or midden deposits were observed; however, many of the features exhibit surface scatters of shell, and waterworn basalt occurs at several sites. Eight small excavations, tentatively interpreted as storage facilities, were located.

T-166 Overhang Shelter

This small, isolated feature is located in a depressed lava channel within a rough pahoehoe flow. It is 550 m from the shoreline and 240 m

from the nearest identified site (T-126, a walled depression). The overhang is situated at the northeastern end of the channel, and it opens to the southwest (240° degrees Az). The interior portion of the overhang has a surface area of 3.1 sq m (21.0 m E/W by 1.5 m N/S). Maximum ceiling height at the dripline is 1.45 m.

A deposit of pahoehoe boulders occurs under the dripline of the shelter, against the southern wall. This pavement-like deposit is oriented parallel with the dripline and is 1.5 m long and 1.0 m wide. It apparently served to level the front floor space of the shelter.

No portable remains were observed in or around the overhang, which is tentatively interpreted as a short-term shelter.

T-167 Complex

This site consists of two, walled kipuka (vegetated areas) within the high as flow at the southeastern corner of the project area. Two walled features (A and B) occur in the larger of the two kipuka, and a third enclosure wall (Feature C) completely surrounds the smaller kipuka (Figures 22 and 23). The features are located 622 to 682 m inland from the shoreline.

Feature A is a curved, standing wall that follows the western perimeter of the large kipuka; it is situated 2.0 to 3.0 m above the average depth of the low, vegetated area. The wall is constructed from stacked as slabs and boulders and is faced on two sides, but it has no core fill. Portions of the wall base consist of very large as boulders. The wall is 50.0 m long, 0.3 to 0.6 m wide, and 0.3 to 1.0 m high. Portions are collapsed, and no gate is apparent. The north and south ends of the wall abut and apparently end at raised as outcrops. A short, disconnected wall section, 3.0 m long, follows a portion of the opposite (east) kipuka perimeter. There is no indication these walls were connected; however, portions of this feature could have been borrowed for the construction of Feature B.

A single bottle-glass shard (probably nineteenth century) was located, 2.0 m east of the Feature A wall. No other portable remains were observed. This feature apparently served as an animal enclosure.

Feature B is an oval enclosure wall constructed against the east side of the raised as, 6.0 m east of Feature A. The wall outlines a low depression within the kipuka, and it incorporates naturally occurring raised as bedrock. The interior enclosed area is 11.5 m long (N/S) and 5.3 m wide (E/W). Height of the wall varies from 0.4 to 1.2 m, depending upon adjacent terrain. Interior height is consistently greater than exterior height, and width ranges from 0.5 to 0.7 m. The north and east portions of the wall are constructed from large as boulders stacked up to five courses high and are faced on both sides; these portions also have a core filling of smaller boulders and cobbles. The south portion of the enclosure consists of stacked as boulders and slabs.

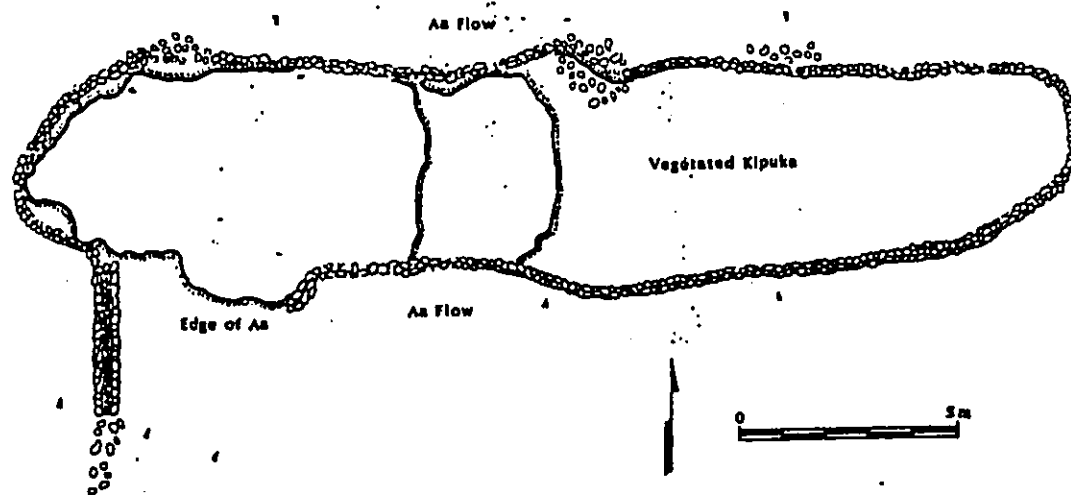


Figure 23. Site T-167, Feature C

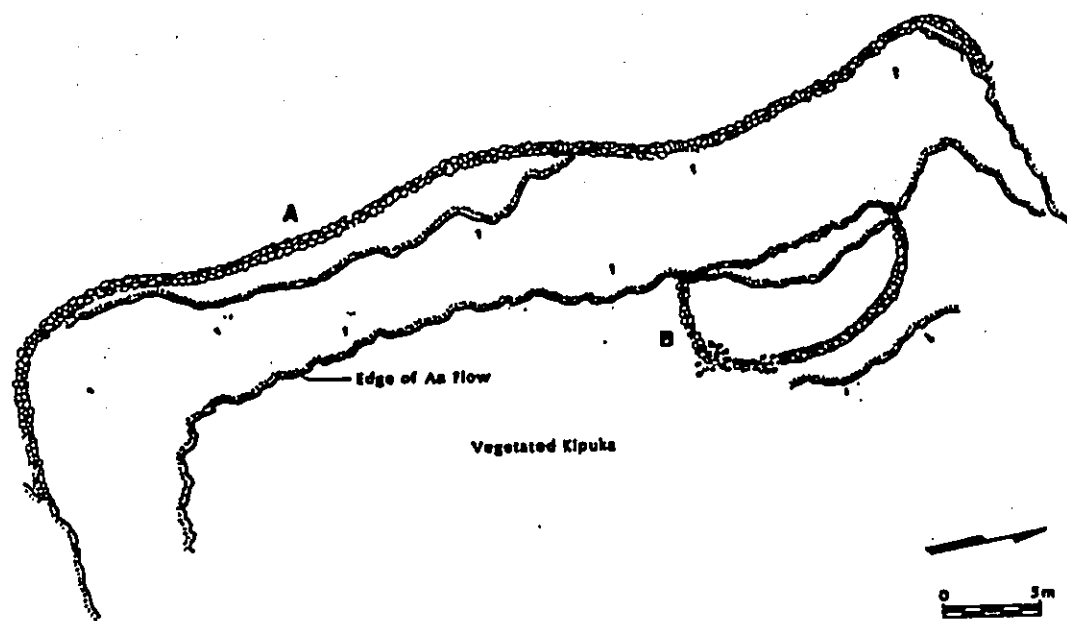


Figure 22. Site T-167, Features A-B

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Figure 24. Site T-168, FEATURE A. View to south.
(PML Neg. 523-9)

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A shallow deposit of noncultural soil occurs inside the enclosure. No portable remains were observed; however, the surface is obscured with heavy fountain grass. This feature is also interpreted as an animal enclosure.

Feature C, a third animal enclosure, is located around the perimeter of a separate kipuka, 12.2 m east of the eastern edge of the larger kipuka and 36.5 m east of the southern end of the Feature A wall. The wall is constructed from an boulders and cobbles stacked up to five courses high. The wall is broken where naturally occurring bedrock is of sufficient height to serve as part of the enclosure. The enclosed area is 24.0 m long and has an average width of 4.4 m. Wall height ranges from 1.15 m at the west end to 0.4 m along the north side. A bifaced, core-filled wall section extends south from the western end of the enclosure. This wall section proceeds upslope along the as for a distance of 4.5 m. The south end of this wall is indistinct and disturbed. A few pieces of weathered coral were observed inside this enclosure.

T-168 Complex

This site is located at the eastern edge of a large kipuka, 80.0 m south of the Site T-167 (Feature A) wall and 682 m inland of the shoreline. An overhang shelter and two modified outcrops were identified at this site; all three features are within a 12.0 sq m area and are situated in a depression between a rough pahoehoe bedrock rise and the edge of the surrounding as.

Feature A is a small overhang shelter located along the north face of the as flow slope (Figure 24). The overhang is 2.3 m wide, 0.9 m deep, and has a maximum ceiling height of 1.0 m. The floor of the overhang is scattered with cobble-sized pieces of rough pahoehoe that extend outside the sheltered area and into the depression at the front of the overhang. This depression has a surface area of c. 42.0 sq m. Two pieces of Oryzoidae shell were observed on the loose rubble, which appears to be a natural deposit.

Feature B is a small, modified natural terrace located immediately north of the Feature A dipline. This feature has been loosely surfaced with small, rough pahoehoe cobbles, and the north and east sides have been defined with low, stacked walls. Surface area of the terrace is 10.4 sq m (4.0 m E/W by 2.6 m N/S). Maximum height of the north face is 1.0 m, and maximum height of the east face is 0.6 m.

Feature C is a rubble-filled crevice located immediately north of Feature B. The crevice is 4.5 m long, with an average width of 1.4 m. Rubble is loosely piled inside the crevice to a maximum height of 1.4 m. There is no formal treatment of the fill, and no portable remains were observed. A portion of the rubble in the crevice may have been naturally deposited. The features at this site represent minimal energy expenditure and only marginal modification of existing natural features; they appear to represent a short-term shelter site.

T-169 Complex

This site, located on the high aa flow near the southern boundary of the project area, is 24.5 m south of the Site T-168 kipuka and 670 m inland from the shoreline. Two features were identified at this site: a leveled, cleared area in the aa (Feature A) and a C-shaped wall (Feature B). The features are aligned along the northern slope of an aa ridge and are 11.0 m apart.

Feature A is a cleared and leveled oval area surrounded by an alignment of rounded aa boulders (Figure 25). The alignment is raised 0.3 m to 0.5 m above the leveled interior surface. Overall dimensions of the feature are 4.8 m N/S by 3.7 m E/W, and the interior level surface is 3.5 m N/S by 2.9 m E/W. The leveled surface is paved with aa cobbles and is relatively rough. No portable remains were observed on the feature.

Feature B is a C-shaped wall that surrounds a cleared, level area in the aa. The wall consists of loosely piled aa boulders and cobbles, and it incorporates a naturally raised aa surface along the eastern side. Overall dimensions of the structure are 3.5 m NE/SW by 2.6 m NW/SE. The interior area is 2.2 m NE/SW by 2.1 m NW/SE. The wall varies in width from 0.45 to 0.7 m, and average height is 0.45 m. The sides of the wall are sloping or collapsed, and no faced sections are present. The wall opens to the west, and the interior is paved with aa cobbles. No portable remains were observed in this feature, which is probably a short-term shelter.

T-170 Cairns

This site is located at the northern edge of the aa flow, 740 m from the shoreline. Two small cairns, located 30.0 m apart on a line 329 degrees Az, were identified at the site. Feature A is positioned on a bedrock outcrop and is 1.5-2.0 m above surrounding ground surface. It consists of a simple stack of four aa boulders and is 0.6 m high and 0.35 m in diameter. Feature B consists of seven aa boulders stacked loosely against a small aa upthrust; it is 0.5 by 0.7 m at the base and is 0.9 m high.

Both cairns represent minimal energy expenditure in construction, and they possibly are recent. No footpath could be located in the vicinity of these features.

T-171 C-shaped Wall

Site T-171 is located on pahoehoe bedrock, c. 10.0 m north of the aa flow escarpment and 792 m from the shoreline. It is a C-shaped wall that is nearly V-shaped in form, and it opens to the southwest. The wall is constructed from pahoehoe slabs and boulders, and it has slabs positioned upright along the interior side. Average wall height is 0.45 m, and width varies from 0.35 to 0.45 m. Interior space is 1.0 m NW/SE by 1.1 m NE/SW, and overall dimensions are 1.43 m NW/SE by 1.5 m NE/SW.



Figure 25. Site T-169, FEATURE A. View to north.
(PHRI Neg.523-12)

No portable remains or soil accumulations were observed in or around the feature; it is interpreted as a short-term shelter site.

T-172 Cave Shelter

This isolated feature is located in an area of undulating pahoehoe, 725 m inland from the shoreline and 295 m from the nearest identified site (other than the Site T-161 cairn). The cave is accessed through a south-facing opening in the side of a pressure ridge; the opening is 3.2 m wide and 1.2 m high (Figure 26). The cave interior has two chambers, the largest of which has a surface area of c. 52.0 sq m (6.5 m W/S by 8.0 m E/W). Ceiling height ranges from 0.9 to 0.8 m. The smaller chamber extends from the southwest side of the larger chamber; it has a separate opening, 0.5 m wide and 0.35 m high, along the crevice. The interior has a surface area of c. 2.95 sq m (1.85 m W/S by 1.6 m E/W). Ceiling height in the small chamber is 0.8 m.

A few pockets of soil up to 5.0 cm thick were observed in the cave, along with rodent bones and a few fragments of Oryzoidae and Thaididae shells. A pig mandible is also present. In the main chamber, five pahoehoe slabs had been positioned in low areas of the floor, apparently to help level the living surface.

This site appears to represent a short-term shelter; it is farther inland than any other cave site located within the project area.

T-173 Enclosure

Site T-173 is located in a shallow, collapsed pahoehoe blister along the eastern slope of Puu Kuili, just west of a rough as flow. It is 792 m inland from the shoreline and is very near the northeastern corner of the project area. The enclosure is rectangular in plan, with a major axis of 7.4 m (oriented 70 degrees Az) and a minor axis of 6.5 m. Three sides of the enclosure consist of totally or partially constructed walls, and the west side is a nearly vertical bedrock face that has an average height of 1.0 m.

The constructed walls follow the rim of the collapsed blister and incorporate bedrock, particularly along the north side. The walls consist of stacked pahoehoe boulders and cobbles. The east wall is 0.85 m wide and varies in height from 1.0 to 0.5 m above the interior surface. The south wall is 0.65 m high and 0.85 m wide; it is constructed completely from stacked, unfaced boulders. A low wall occurs along the inside of the western rock face to within 1.0 m from the south wall. This wall is of larger boulders and is 4.9 m long, 0.65 m high, and 0.55 m wide. Width of the interior area in front of this lower level wall is 3.2 m.

Immediately outside of, and adjacent to, the eastern wall is a small collapsed blister, 3.1 m by 2.35 m across the opening and 0.9 m deep. The rock floor of this vertical hole is completely void of cultural material

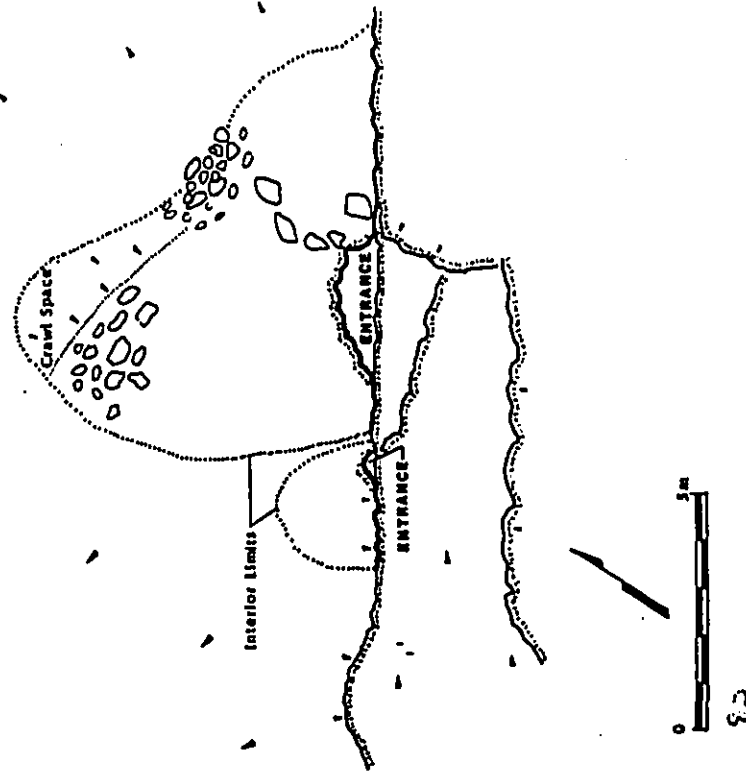


Figure 26. Site T-172

and soil. There is sufficient soil within the enclosure to support fountain grass, and live trees are on the site. Possible functions for the enclosure include use as an animal pen or as a temporary shelter site.

T-174 Cairns

This site is located in rough pahoehoe, 915 m inland from the coast; it is the easternmost site within the project area. Two small cairns were identified at the site; they are 22.0 m apart on a line oriented 208 degrees Az. Both are constructed from rough pahoehoe slabs and medium-sized boulders. Feature A, the northernmost cairn, is a simple stack of slabs, 0.35 m high; it is 0.60 m wide at the base. Feature B is a table-like formation that has a stack of five small slabs and one large upright to serve as "legs" for a large flat slab, on which is placed two smaller slabs. No footpath or other features could be located in the vicinity of these two cairns; they may be relatively recent features. Both exhibit little energy expenditure in construction.

T-175 Rubble Pile

This feature is located on the western crest of Puu Kuili, immediately west of its the highest point and 7.4 m from the existing U.S. Coast Geodetic Survey reference mark. The rubble pile appears to represent a disassembled structure; it presently has no formal shape. The major concentration of rubble is 3.0 m in diameter and has a maximum height of 0.3 m in the center. It is situated on a surface pavement of cinder cobbles and pebbles, which extends from the rubble pile to the existing survey mark. Sand-based mortar is adhering to some cinder cobbles. Coral and waterworn basalt pebbles are scattered on the surface adjacent to the rubble and the surface paving. All coral is weathered and pebble-sized. Although a functional interpretation is not certain, this feature may well represent the discarded remnants of a former survey marker. This point was in use during the nineteenth century and is identified on the current marker (1967) as the Hawaii Geologic Survey Kuili mark, dated 1882.

T-176 Rubble Pile

These features are located on the crest of the southern lobe of Puu Kuili, near a slightly worn vehicular path. The largest of the two piles (Feature A) is 1.6 by 1.28 m at the base and is 0.2 m high. It consists principally of cobble-sized cinders and has a slightly curved shape, with no discernable faced or stacked sides. Two small pieces of coral are mixed with the cinder cobbles.

The smaller pile (Feature B) is 0.7 by 0.7 m at the base and is 0.3 m high. This feature consists of c. 30 cobble-sized cinders and has a somewhat conical shape. A few pieces of coral and a short length of a one-inch square post (filled lumber) are found on this pile, which was possibly built as a signpost support.

T-177 Rubble Pile

Site T-177, located at the eastern edge of the southern lobe of Puu Kuili, is 87.0 m east of site T-176. It consists of an amorphous pile of cinder boulders, 1.2 m in diameter and 0.4 m high, surrounded by a peripheral scatter of rubble, 2.5 by 2.7 m across. Some boulders in the pile are fractured, as if disturbed by a bulldozer. No indication of an original formal shape is present in this pile, which may represent a grubbing pile. No portable remains were identified in the vicinity; however, the surface was obscured by thick fountain grass.

T-178 Wall Remnants

This isolated feature is situated on the eastern slope of the lower, easternmost lobe of Puu Kuili. It consists of two disconnected wall sections constructed from basalt bombs and cinder cobbles (Figure 27). Wall sections are loosely stacked and unfaced and have broad bases and narrow tops. The western wall is 1.8 m long and 1.1 to 0.8 m wide at the base, and it has a maximum height of 0.4 m. It is oriented east-west and abuts an exposed bedrock outcrop, giving an overall C-shaped configuration to the structure.

The eastern wall is 2.3 m long, 0.5 to 0.9 m wide, and 0.3 m high. It is oriented east-west, with the western end 3.0 south of the east end of the former wall. A loose alignment of six basalt bombs occurs between the two walls, and additional displaced stones are scattered in the immediate vicinity.

No portable remains were observed on the site; however, a thick cover of fountain grass, which would obscure small surface materials, is present. The feature appears to represent a short-term shelter that was disturbed after abandonment.

T-179 Modified Pond

This long, narrow, modified anchialine pond is located in loose sand on the *Awakea/Makaleena* boundary, directly behind a high, coral storm berm at *Kawikohala Point*. The pond has an overall length of 74.8 m and varies in width from 3.0 to 10.0 m. It is oriented north/south and has a variable depth of c. 0.3 to 1.0 m. The pond is divided into three sections, by two walls constructed from sand boulders. The largest section is to the north and is 61.0 m long. The central section is 6.0 m long, and the southern section (in *Makaleena*) is 7.8 m long (N/S).

The northernmost dividing wall is 6.0 m long (E/W) and is loosely stacked, with no faced sides. This wall was mostly exposed at the time of survey, and it is positioned on top of a broader, more substantial submerged wall. The southern dividing wall is also loosely stacked on top of a more substantial submerged wall.

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T-181 Modified Pond

This site appears to correspond to the Awakee fishpond noted by Emerson in 1882. The site is located just inland of the coastal jeep road, 97.5 m from the Makalewena/Awakee boundary. The pond is situated in a low, sandy area and is surrounded to the south and east by ss. At the southeastern end of the pond, which has a base deposit of ss, are a number of walled sections. The northwestern portion has a silty bottom and was quite shallow at the time of survey. Overall surface area of the pond is 113 sq m.

The major modification at this pond consists of an 11.8-m-long, faced wall along the east side of the southernmost finger of the pond. The wall is constructed from ss boulders and cobbles and has an average height of 0.95 m. The top of the wall was 0.6 m above water level at the time of survey. The western side of this 0.4-m-wide finger is defined by a very large, immobile ss boulder and by sections of constructed wall around the sides of the boulder.

Additional wall sections, many of which are loosely stacked, occur across portions of the pond, and small pools have been deepened. Average depth of unmodified sections is c. 0.4 m. Much of the loose ss rubble scattered across the area appears to be storm-wash. A few pieces of weathered and unweathered branch coral were observed at the southeastern edge of the pond, where the Site T-182 footpath ends.

T-182 Footpath

This footpath connects the Site T-181 anchialine pond complex with Opaeula Pond in Makalewena. The complex was located on Soehren's 1963 map of Makalewena sites and was recorded as Sites T-4 and T-6 in Makalewena (Donham 1986). The footpath in Makalewena consists of two parallel branches that join to form a single path at the Makalewena/Awakee boundary. Length of this single path, from the boundary to Site T-181, is 122 m. Overall length between the two ponds is 245 m.

The footpath is oriented north-south through unvegetated ss. It is well-worn and is recessed in places by as much as 0.5 m below the surrounding surface. Average width of the path is 0.8 m; it is surfaced with small ss pebbles and a few waterworn basalt pebbles. The north end of the path is marked with two cairns and with waterworn basalt boulders. The cairns are located along the shoreline of the Site T-181 pond; both are constructed from stacked ss boulders and cobbles.

T-183 Footpath

This footpath is a section of a coastal-upland path that runs across the high ss flow at the southern end of the project area. It crosses from Makalewena into Awakee near the Site T-168 kipuka (795 m inland from the shoreline); then it angles northwest through Sites T-184 and T-165 before

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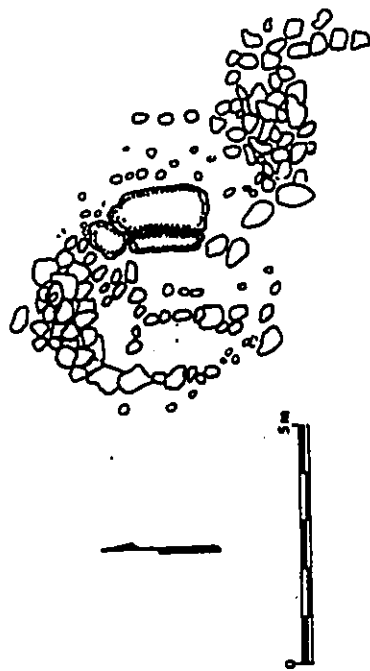


Figure 27 Site T-178

Three ss structures are present in the northern section of the pond, along with two cleared, deepened pools. A completely submerged platform is present along the western shoreline, c. 10.0 m from the northern end of the pond. Two linear walls of ss and coral occur along the northern shoreline. These structures are loosely piled and have no faced sides, and they are partially exposed. Modifications in the central and southern sections of the pond include two cleared and deepened pools, each located adjacent to the south side of one of the ss walls.

All portable remains observed are recent rubbish, and it appears the upper sections of the divider walls are recent. The pond appears to have been (and still is) used for recreational purposes.

T-180 Modified Pond

This small anchialine pond is located in the ss flow at Kwikohale Point, 97.0 m inland from the shoreline. It has been cleared and artificially deepened by the removal of loose ss from the bottom of the pond. At the time of survey, the pond measured 6.5 m N/S by 7.3 m E/W. The cleared area is 6.5 m N/S by 5.0 m E/W and has a maximum depth of 1.3 m. A submerged bedrock shelf along the western perimeter of the pond has been cleared, probably in order to facilitate entry into the pond.

There is no purposive placement of removed ss; rather, it was apparently thrown away from the perimeter for a distance of up to 6.0 m. The water in the pond is clear, and no floral material was observed on the surface. No portable remains were observed in or around the pond, and no footpaths through the ss could be located.

becoming obscured in the thick fountain grass north of the ss flow. In Awake, a section 305 m long was identified across the ss. The path is similar, in average width and surface material, to the Site T-182 footpath. It does, however, widen to 1.2 m in places, particularly where it crosses Site T-165. The path is marked with two sets of paired cairns on Site T-165 (see T-165 site description), and a few isolated pieces of marine shell occur along the path between Sites T-165 and T-184. Given the number of temporary shelters at these two sites, the T-183 path appears to have been an important transportation route between Awake and the uplands.

T-184 Complex

This site is located on rough ss, 610 m inland from the shoreline and c. 50.0 m north from the Mahalewa/Awake boundary. It consists of fourteen walled shelters and a small platform, all concentrated within a 620 sq m area on both sides of the Site T-183 footpath. A major rift occurs in the ss immediately south of the site, where a darker and apparently more recent ss flow ends. A number of very large accretional boulders occur on the site and are incorporated into the shelter walls, where they have been immobilized.

Feature A is located near the northwestern edge of the complex. It is a walled, cleared depression in the ss, and it has a 0.75-m-wide opening to the northwest (310 degrees Az). The interior area is oval in plan and has a major NW/SE axis of 3.9 m and a minor axis of 2.4 m. The wall varies considerably in construction, due to differences in the immediate terrain. The north wall section is quite substantial; it is 1.2 m wide and is faced on the exterior side, where the height is 0.7 m. Interior height is 0.6 m. The south wall section is located over a depression; the wall has filled, sloping sides rather than faced sides. Exterior height is 0.7 m and interior height is 0.3 m. The east wall consists of a few, very large, aligned boulders; it is 0.8 m high on the interior side. The interior floor is below the surrounding ground surface, except along the south side. The floor is surfaced with ss gravel, and it inclines slightly at the opening, up to ground surface. Marine shell fragments observed inside the shelter include two *Cypridae* (one large and one small), a few *Meritidae*, and one large *Thaididae* individual.

Feature B is located 9.0 m northeast of Feature A (center to center). This shelter is nearly circular in plan and is open to the southwest (250 degrees Az). The opening faces the Site T-183 footpath, which passes within 1.5 m of the shelter wall. The interior of the shelter has a surface area of 6.6 sq m (2.9 m diameter); it is defined with a wall of stacked ss bombs and accretion boulders. Wall width varies from 1.2 m at the base to 0.6 m at the top, near the entrance. Portions of the west wall section are faced on the interior side, and it appears that other sections were faced prior to wall collapse. The interior floor is surfaced with ss gravel, and a soil deposit is discernable under the gravel. Portable remains observed include a *Cypridae* shell and a few waterworn basalt pebbles.

Feature C is located 8.0 m directly south of Feature A, along the western edge of the site. This walled shelter is also circular and has an interior surface area of 3.2 sq m (2.0 m in diameter). The shelter has a relatively wide opening (1.4 m) that faces northwest (300 degrees Az). The shelter is positioned on sloping terrain, so that the exterior wall height varies from 0.55 m on the south side to 0.90 m on the north side. Maximum interior wall height is 0.94 m; average interior height is 0.7 m. The wall is unfaced and has an average width of 0.4 m. A few fragments of *Meritidae*, *Patellidae*, and *Thaididae* shells occur on the ss gravel floor inside the shelter.

Feature D is located 10.0 m southeast of Feature C. It is a walled shelter with a depressed interior that is oval in plan. Major axis of the interior is 3.3 m N/S, and minor axis is 2.3 m E/W. The shelter wall opens to the southeast (100 degrees Az) and is 0.6 m wide. The wall is generally consistent on the exterior side and has an average height of 0.75 m. Interior wall height varies from 0.85 m along the east section to 0.9 m along the north section. Average width of the unfaced ss boulder wall is 0.4 m. The interior floor is surfaced with ss gravel; no portable remains were located on the surface in this shelter.

Feature E is a roughly U-shaped, walled shelter located 6.0 m directly east of Feature D. This shelter has a depressed interior and is open to the east (80 degrees Az). Major axis of the interior area is 3.8 m E/W, and minor axis is 2.3 m N/S. The opening is 2.0 m wide, and the back (west) section of the wall is 1.4 m long on the interior side. Interior wall height varies from 0.84 m along the south side to 0.6 m along the north side of the shelter. Average exterior wall height is 0.55 m, and wall width ranges from 0.8 to 1.15 m. A concentration of *Conidae*, *Cypridae*, and *Meritidae* shells occurs within a 0.6-m-diameter area near the opening at the eastern end of this shelter. Several waterworn basalt pebbles are also present.

Feature F is a partially walled clearing in the ss; it adjoins the south wall of Feature E. Separate walls for this shelter occur on the east and south sides only. These walls are simple alignments of large ss boulders, 0.55 m high (exterior side) and 0.45 m wide. The walls are presently disrupted, and they may have been more substantial at the time of construction. The Feature E wall that is incorporated into this shelter is 0.65 m high on the interior side. The interior surface is slightly higher than the Feature E interior, and it is surfaced with ss gravel. Portable remains present in the shelter include waterworn basalt pebbles, *Cypridae*, *Meritidae*, *Isognomonidae*, and *Tellinidae* shell fragments. A thin soil deposit is present under the surface layer of ss gravel.

Feature G is a depressed, walled shelter located 5.0 m southeast of Feature F. It is oval in plan, with interior axes of 2.7 m E/W by 2.45 m N/S. The opening is 0.95 m wide and is oriented to the northeast (20 degrees Az). The tops of the south and west wall sections are level with surrounding ground surface and are an average of 0.9 m above the interior floor. The east wall rises to 0.7 m above exterior surface. Average wall width is 0.7 m. A concentration of shell midden and soil, 0.65 m in

The opening is 3.0 m wide, which is also the major axis of the interior area; minor axis is 2.75 m. The floor of this shelter is 0.70 m above the surface of the footpath and is defined by the footpath along the east side. The wall has an average interior height of 0.55 m, and width ranges from 0.55 to 0.75 m, with maximum width at the base of the stacked wall. A small cupboard occurs under a large, immobile as boulder along the south wall of the shelter. A sparse scatter of Meritidae shell fragments and pieces of coral occurs inside this shelter.

Feature M is the northernmost walled shelter in this complex; it is located 11.0 m north of Feature B. This shelter is somewhat smaller than the others, with interior axes of 1.9 m SW/NE by 1.6 m. The entrance is 0.7 m wide, and it faces southwest (220 degrees Az). The north section of the shelter wall consists of a large immobile as boulder, and the west section mostly is natural bedrock. The constructed wall sections are 0.5 m wide, with interior heights of 0.65 m and exterior heights of 0.5 m. The shelter floor consists of crushed as gravel. No portable remains were observed inside this relatively isolated shelter.

Feature N is adjacent to the Site T-183 footpath and is 9.0 m south of Feature B. This walled shelter has no well-defined opening; a low area in the wall occurs on the northwest side, but this 1.0-m-wide area may simply be a tumbled section of the wall. Interior wall height is 0.5 m and exterior height is 0.5 m; average wall width is 0.4 m. The east wall of this shelter is located immediately along the adjacent footpath. The interior area is circular in plan, with a diameter of 1.8 m, and is surfaced with a level deposit of as gravel. A battered, waterworn basalt cobble hammerstone, in addition to Conidae, Cypraeidae, Meritidae, Patalidae, and Thaididae shells, occurs inside the shelter.

Feature O, a poorly defined platform, is located adjacent to Feature D to the northwest. The platform is roughly circular in plan, with an overall diameter of 2.3 m and an interior surface area of 2.0 by 1.85 m. It is outlined with large as boulders and is raised 0.4 m above the surrounding ground surface on the west and north sides. The southeastern section of the platform is level with the top of the Feature D wall. The platform surface is level and is surfaced with as gravel. No portable remains occur on this feature.

With the possible exception of Feature O, all 15 features identified at Site T-184 are interpreted as temporary shelters. They are of a generally similar construction and within a relatively limited size range. It is possible they were all constructed within a relatively short period of time. In addition to the subsistence remains observed on the as gravel surface, a number of the features contain internal soil and midden deposits that will potentially yield datable volcanic glass.

diameter and c. 2.0 m deep, occurs against the west wall, near the center of this shelter. Conidae, Cypraeidae, Meritidae, Tellinidae, and Thaididae were observed in the concentration and were scattered about the shelter interior. Also present is a waterworn basalt cobble.

Feature H is a walled depression located adjacent to the Site T-183 footpath and 6.0 m northeast of Feature G. The 1.15-m-wide opening to this shelter faces west and is immediately adjacent to the footpath. The interior is an average of 0.6 m below the level of the footpath, and fill from the path has tumbled into the shelter. The interior has a major axis of 2.1 m E/W and a minor axis of 1.85 m N/S. The walls are comprised primarily of large immobile boulders, with smaller chinking stones placed between them. Average interior wall height is 0.7 m, and average exterior height is 0.55 m. A moderate scatter of Cypraeidae, Meritidae and Thaididae shell is present inside this shelter.

Feature I is a slightly depressed walled shelter located just east of the Site T-183 footpath and 8.2 m northeast of Feature E. The shelter has a 1.0-m-wide opening that faces west (280 degrees Az) and is outlined by a wall incorporating c. 40% naturally immobile as boulders. Major interior axis is 3.0 m N/S, and minor axis is 2.65 m E/W. The wall has an average width of 0.7 m and a relatively consistent interior/exterior height of 0.65 m. The interior is surfaced with as gravel, and a small cupboard occurs under a large in situ wall boulder along the west side. Material observed inside this shelter includes Cypraeidae and Meritidae shell fragments, a waterworn basalt cobble, and waterworn coral.

Feature J adjoins Feature I to the north and shares the northeast section of the Feature I wall. This shelter opens to the southeast (150 degrees Az) and has a 0.88-m-wide entrance. The interior area is 2.25 m SE/NW by 1.6 m NE/SW, and the floor is irregular and unlevel. Much of the surrounding wall is natural bedrock that rises to a maximum of 1.2 m above the interior floor. Constructed sections of the wall vary from 0.55 to 0.75 m high and have an average width of 0.77 m. No portable remains were observed inside this shelter.

Feature K, a platform-like raised area with a surrounding wall, is located 5.4 m northeast of Feature H. The feature is rectangular in plan and has a surface area of 11.4 sq m (3.8 by 3.0 m) inside the perimeter walls. The east wall is essentially an alignment of large as boulders and bombs, some of which are naturally immobile. The north wall consists of stacked as boulders and cobbles; it is 0.8 m wide. The west wall is partially constructed with upright slabs that have an exterior height of 0.8 m and an interior height of 0.65 m. The surface of the crude platform is irregular, and it consists primarily of as cobbles, rather than gravel. Exposed bedrock is present within the platform area, as well as in depressions in the fill. Average height of the platform surface is 0.3 m. No portable remains were observed on this feature.

Feature L adjoins Feature K to the east side; it shares the northeastern wall section of that feature. Feature L also adjoins the Site T-183 footpath, which passes immediately to the east side. This shelter has a broad, U-shaped wall that opens to the southwest (220 degrees Az).

CONCLUSION

DISCUSSION

Findings of the reconnaissance survey are summarized here, and interpretive hypotheses are offered where appropriate. Interpretation is limited by the level of investigation conducted and, with subsequent data collection at Awakee, is subject to change. A few summary data are given, followed by a discussion of features and general functional categories.

Eighty-four archaeological sites were located during reconnaissance survey of the Proposed Awakee Resort Development project area. The majority of sites (63, 75%) occur within 300 m from the shoreline. Over half of these coastal zone sites (38, 61%) are within 100 m from the shoreline. Only 13 sites are 300 m or more inland; three of these sites occur in vegetated kipuka, and four are on the crest or slopes of Puu Kuli. Over half of the sites recorded (44, 52%) consist of a single feature, and 69 (82%) have three or fewer features. Five sites consist of over ten features; these include Sites T-105, T-137, T-140, T-165 and T-184. Individual site areas range in size from less than 10 sq m up to 5600 sq m. Fifty sites (61%) are less than 50 sq m in area, and four are greater than 1000 sq m. The four latter sites are among those with 10 or more features. Additional comments concerning site size and location are included in the following discussion.

Features

A total of 239 features with 243 components was recorded at the 84 sites during reconnaissance. Twenty-two formal categories are represented among the features (Table 3). The most frequently occurring categories are briefly summarized here, and the spatial patterning of various features is considered. Functional and architectural variability within and between formal categories is also discussed. Formal categories not described individually here will be included in the discussion of functional categories. All surface area figures used below are rounded to the nearest meter; more exact feature dimensions are given in the site descriptions.

Terraces are filled and generally leveled structures that are raised above ground surface on at least one side. Seventeen terrace features were identified at ten sites within the project area (Table 4). These features vary considerably in size, construction technique and inferred function. The three largest terraces occur at Sites T-101 and T-159, and they are associated with low enclosure walls. In all cases, the enclosures and terraces have been storm-washed; however, a sufficient amount of waterworn basalt and coral pebbles is present to indicate 'fill' filling. These terraces range from 95 to 135 sq m in surface area and are interpreted as residential features that were occupied during the historic

Table 3.
FEATURE AND FEATURE COMPONENT FREQUENCIES BY FORMAL CATEGORY

Formal Category	Number of Features	Percent of Total	Number of Sites	Percent of Sites
Terrace	17	7.0	10	11.9
Platform	16	6.6	9	10.7
Enclosure	10	4.1	9	10.7
Subtotal:	43	17.6		
C-Shaped wall	21	8.6	15	17.9
U-Shaped wall	3	1.2	3	3.6
Walled shelter	22	9.1	7	8.3
Walled depression	9	3.7	7	8.3
Walled overhang	4	1.6	2	2.4
Cleared/walled blister	4	1.6	3	3.6
Cleared/leveled area	4	1.6	3	3.6
Subtotal:	67	27.9		
Cave	19	7.8	11	13.1
Overhang	8	3.3	7	8.3
Subtotal:	27	11.1		
Modified outcrop	13	5.3	9	10.7
Mound	8	3.3	4	4.8
Rubble pile	8	3.3	6	7.1
Pebbles clearing/	7	2.9	4	4.8
excavation	9	3.7	2	2.4
Subtotal:	45	18.4		
Indeterminate structural	3	1.2	3	3.6
remnants				
Wall remnants	9	3.7	9	10.7
Surface midden or ash	7	2.9	6	7.1
Subtotal:	19	7.9		
Footpath	6	2.5	6	7.1
Cairn	33	13.6	17	20.2
Modified pond	3	1.2	3	3.6
Subtotal:	42	17.2		
Total	244	100.1	-	-

period. There is some indication of more than one construction stage at Site T-101, and it is not assumed that the two large terraces at this site were erected during the historic period. All three large terraces are within the size range (72-144 sq m) of Cordy's Type 1 men's house category (Cordy 1981:82). Terrace B at Site T-101 has a smaller, raised platform on the surface. Such platforms are interpreted by Cordy as altars and are included by him as being characteristic of men's houses. As indicated below, however, the Site T-101 platform is somewhat large (27 sq m) for an altar. An unusual aspect of the Site T-101 complex is that the two largest terraces within the project area are within 25.0 m of one another. To date, there is no evidence these two features were within a single enclosure prior to a possibly later construction of low-walled enclosures around each. The proximity of the terraces and the presence of a third smaller, unpaved terrace between them suggests the features were once components of a single residency and/or ceremonial complex.

The fourth terrace with a surface area greater than 50 sq m (81 sq m) occurs at Site T-165. This terrace is situated at the edge of the high as flow and is adjacent to the Site T-183 footpath. The terrace has faced sides and is paved with an gravel. Surface area of the terrace is within the men's house category size range defined by Cordy (1982:82). Numerous shakers and small platforms, in addition to a smaller terrace, are associated with this feature. The large terrace is interpreted as a ceremonial feature at this time; it does not appear to have a historic component. This complex has two important locational characteristics: it is not within the immediate coastal zone, and it is in the vicinity of a historical abrupt boundary.

Only two of the 17 terraces identified within the project area are within the size range (17/24-66 sq m, mean=34) of Cordy's sleeping house category (1981:82). These terraces occur at Sites T-101 and T-149. The former terrace is a loosely filled, unfaced structure located in a low area between the two major terraces at Site T-101. The Site T-149 terrace is storm-washed, and its surface area has been estimated. This terrace appears to have been soil-filled and may represent an agricultural feature.

All of the remaining 10 terraces are 14 sq m or less in area. The two largest of this group occur at Sites T-140 (14 sq m) and T-165 (11 sq m). Both of these sites are large complexes that consist predominantly of short-term shelters and small features such as cairns or cupboards. It is hypothesized that the two terraces were probably used as domestic structures and were maintained on a permanent basis. The small terraces at Site T-105 appear to represent possible burials; those at Sites T-129 and T-137 are interpreted as surface modifications for shelters. The Site T-153 terraces are located along a relatively steep slope and may be agricultural features; one is soil-filled.

Sixteen platforms were identified at nine sites during reconnaissance. These features are differentiated from terraces in that all sides are raised above ground surface. Sites with platform features tend to occur farther inland than do sites with terraces (Table 4). Mean distance

Table 4.
SUMMARY STATISTICS-TERRACE AND PLATFORM FEATURES

Formal Category	Site/Feature	Surface Area (sq m)	Paving	Notes on Construction	Coral	Waterworn Basalt	Shell Midden	Distance from Shoreline
Terrace								
	101-A	135	fill:fill	faced, enclosed	-	+	-	20 m
	101-B	138	fill:fill	faced, enclosed	-	+	-	-
	101-D	50	-	loose fill	-	-	-	150
	105-I(3)	<2	-	loose fill	-	-	+	158
	125	9	-	loose fill	-	+	+	61
	129-B	4	-	loose fill	+	+	+	30
	137-L	7	-	storm washed	-	upright	-	50
	140-A	14	-	loose fill	-	-	-	30
	149	45(ext)	-	soil fill	-	boulders	-	75
	153-B	9	-	faced	-	-	-	-
	153-D	10	-	soil fill	-	-	+	15
	159	95(ext)	fill:fill	enclosed	-	+	+	400
	165-A	81	ss	faced	-	+	+	-
	165-BB	11	ss	faced	-	-	-	-
Platform								
	101-6	27	fill:fill	faced	-	+	-	20
	104-A1	60	fill:fill	faced	+	-	+	210
	104-A2	9	coral	faced	+	-	-	150
	105-K(2)	3	-	loose fill	assoc.	+	+	134
	108-B	13	-	loose fill	branch	+	-	220
	112-A	41	-	loose fill	-	-	+	100
	137-C	4	-	loose fill	-	-	+	377
	163	4	-	loose fill	-	-	-	400
	165-B	7	-	loose fill	-	frag.	+	-
	165-G	6	-	hearth	-	-	+	-
	165-J	5	ss	boulder sides	-	-	+	-
	165-K	7	ss	loose sides	-	-	+	-
	165-CC	12	ss	boulder sides	-	-	+	-
	165-FF	12	-	loose fill	-	pebble	+	610
	184-K	11	-	loose fill	-	-	-	-
	184-O	3	ss	loose fill	-	-	-	-

from shoreline is 247 m for platforms, whereas mean distance from shoreline is 99.0 m for terraces. This divergence may reflect differential erosion rates (some storm-washed platforms may have acquired attributes of terraces), topographic variance (greater use of sloping terrain along the shoreline), or differences in land use that are related to the structural forms.

The largest and most formally constructed platform within the project area occurs at Site T-104. This 60 sq m feature is paved with limestone and adjoins a leveled yard area that is partially enclosed. A smaller, coral-paved platform addition occurs off the southeast corner of the larger feature. Partially buried walls or alignments occur in the yard area, suggesting that at least two construction stages are represented. The site appears to have been utilized historically as a residency; however, the major feature may have been constructed during the prehistoric period. The size of the main platform is within both the sleeping house and men's house ranges defined by Cordy (1981:82). On the basis of coral association, the feature would be included in the men's house category; however, in this case the coral platform appears to be a later addition and may represent a historic-period burial or shrine.

Two of the 16 platforms are within the size range defined by Cordy for sleeping houses (1981:82). The smaller of the two (27 sq m) occurs at Site T-101 and is located on the Feature B terrace. As noted above, this feature is relatively large for consideration as an internal altar. It may represent the location of a superstructure on the terrace. In such a case, the terrace size cannot be used to infer the presence of a large (i.e., men's house) superstructure.

The platform at Site T-112 has a surface area of 41 sq m and is loosely filled and unpaved. It is not interpreted as a sleeping house platform due to the following factors: the length-to-width ratio is nearly four to one; a small C-shaped wall is on the platform and; waterworn basalt boulders, branch coral and a beach conglomerate boulder occur on the platform. This feature is associated with two cave shelters and is interpreted either as a shrine or as a burial platform.

Six platform features within the size range of 5-12 sq m occur at Site T-105. All have partially constructed sides and are built around naturally occurring boulders. The largest of these platforms possibly represents a permanent residency or dependency associated with the large terrace; others may represent shelter loci or possible burials. One of the platforms (Feature G, 6 sq m) has a hearth pit near the center, and three are paved with crushed gravel, which occurs in most of the walled shelters at the site.

Other small platforms occur at Sites T-104, T-105, T-137, T-163, and T-184. These features are considered to be possible burials, particularly the features at Sites T-105 and T-163. Feature O at Site T-184 may represent a shelter platform, since it is within the size range of other adjacent shelters and has a surface of crushed gravel.

Enclosures are areas with walls erected around all sides. Enclosures may or may not have formal entrances; if entrances do occur, they are relatively narrow. Ten enclosure features were recorded at nine sites within the project area. These features represent a range of hypothesized functions, including habitation, animal keeping and possibly agriculture. They are the most widely dispersed formal category; enclosures occur along the coast and at the four corners of the project area.

The four largest enclosures all appear to be animal pens; these occur at Sites T-108, T-167 and T-173, and they range in area from 48 to 87 sq m. Two of the pens occur in Hipuka, and one is at the foot of the steep eastern slope of Puu Kuli (T-173). One of the pens is within the coastal zone; it is the only pen associated with a habitation structure (Site T-108).

Two enclosures are interpreted as permanent habitation loci. The largest of these (35 sq m) is at Site T-157 and is situated on a high, rocky point along the shoreline. The feature is severely storm-washed, but it appears to have been a low, bifaced wall similar to those associated with terraces at Sites T-101 and T-159. An associated structural feature occurs immediately to the east, and a considerable amount of surface midden is present at this site. The second, hypothesized, permanent habitation enclosure is somewhat more problematic; it occurs at Site T-160 and has an interior surface area of 24 sq m. A substantial C-shaped wall (bifaced) is inside this enclosure, which incorporates one side of the C-shape. Two different construction techniques are exhibited in the enclosure wall, and it appears the C-shape was possibly constructed prior to construction of the enclosure.

The remaining three enclosures are all 7 sq m or less in area and are interpreted either as short-term shelters or as dependencies. Two (T-153 and T-154) occur within the coastal zone at the north end of the project area. One occurs at Site T-103, in association with a long, rubble-filled causeway. This enclosure has wide, faced walls and appears to have supported a more permanent superstructure. Its small interior size (7 sq m) indicates a possible function as a storage or other type of dependency associated with the nearby residential site (T-104).

C-shaped walls are partially enclosing walls with rounded corners and curved sides. Twenty-one of these features were identified at 15 sites within the project area. With the exception of caims, this category occurs at more sites than does any other formal category. Nearly all of the sites (12) with C-shapes are located in the coastal zone; however, the most concentrated occurrence of these features at one site is in the inland zone (Site T-165).

All C-shaped walls have an interior surface area of 10 sq m or less. Most of the features (16) are 5 sq m or less in area, and nearly all are loosely constructed, with unfaced exterior sides. Exceptions occur at C-shapes at Site T-160 and T-140, where the walls are bifaced and are more substantial than those found at other sites in this category. These two structures have interior areas of 6 and 10 sq m, respectively, and they

Walled depressions are naturally low areas that have a perimeter entirely or nearly entirely outlined with a wall. Nine walled depressions were identified at seven sites (T-102, T-105, T-109, T-124, T-126, T-127, T-167) within the project area. One feature (at Site T-105) is in an as depression, one feature is in a kipuka (T-167), and the remainder are in pahoehoe depressions. Four of the walled depressions occur as single features, and three co-occur on one site (T-127). As a group, these features differ from walled shelters and C-shapes in size and in associated portable remains. Walled shelters range from 5-65 sq m in interior area and have a mean interior area of 25.5 sq m (the large, walled kipuka is excluded). In addition, no surface shell midden was observed in any of the walled depressions. Occurrence rates of shell midden in C-shapes and walled shelters is 69% and 54%, respectively. Average interior area for C-shapes is 4.5 sq m, and average interior area for walled shelters is 5 sq m.

Walled depressions do not appear to be temporary shelter locales. Alternative functions are as animal pens and as planting areas. The latter alternative is more feasible, based on the following observations: depressions have gently sloping sides, and collapsed blisters do not; walls constructed around depressions are too low to be of utility in containing animals such as pigs, dogs or chickens. In addition, all but one of the depressions contain observed soil deposits or are heavily overgrown with fountain grass and kiawe. Vegetation obscures surface observation, but it also indicates the presence of at least a minimal soil deposit. The depression that does not contain soil is located in an area that may represent a shelter.

The formal categories of caves and overhangs consist of short-term or temporary shelter features. Features within these categories are included in the following discussion of temporary habitation. Also included in the discussion are the infrequently occurring formal categories of cleared, leveled areas, cleared and/or walled blisters, and walled overhangs.

The final formal category (with the exception of cairns) that occurs with a frequency rate greater than 5% is the modified outcrop category. Modified outcrops are natural bedrock exposures that in some way have been altered by the addition of stones as fill. Thirteen of these features occur at nine sites within the project area. Eight of the sites occur within the immediate coastal zone; mean distance from shoreline for these sites is 102 m. Nearly all of the modified outcrops occur in association with other kinds of features; however, two occur on single-feature sites (T-145 and T-148). A wide range of functions is indicated for this category, but most of the features cannot be accurately interpreted, due to their extremely amorphous and informal nature.

Five modified outcrops appear to have functioned as short-term shelters. This inference is not definitive and is based primarily on the presence of shell midden in or near the features. Four of these deposits occur at Site T-107, and one occurs at Site T-132. The Site T-107 features are somewhat similar to walled depressions in general morphology, and they are larger than most artificially constructed shelters. The

occur in association with features suggestive of permanent habitations. All other C-shapes are interpreted as short-term shelters.

Shell midden and/or soil occurs in 11 of the 16 C-shapes; it is found immediately outside one feature. Waterworn basalt boulders occur in three C-shapes, located at Sites T-120, T-129, and T-165. In only one instance (T-129) does shell midden co-occur with waterworn boulders. Three boulders occur in the Site T-120 C-shape, which is located along the Site T-119 footpath. This feature may represent a shelter that was converted to a small shrine.

Three U-shaped walls were identified at three sites (T-130, T-140, and T-157) within the project area. These features are similar to C-shaped walls, except they exhibit straight, rather than curved, side walls. All three of these features have substantial walls that are bifaced, but not core-filled. The U-shapes at Sites T-130 and T-157 have interior areas of only 3 sq m. The T-130 feature is isolated and is probably a short-term shelter. The Site T-157 U-shape is associated with a residential enclosure and is interpreted as a dependency structure. The Site T-140 U-shape has a surface area of 12 sq m; it is associated with numerous features (12), most of which are intensively utilized caves and cairns. A small terrace is also present at this site, in addition to a relatively large C-shaped wall (10 sq m). On the basis of these associations, it appears structures at Site T-140 had some degree of permanent maintenance, if not permanent occupation.

Walled shelters are features located in naturally sheltered areas other than caves, overhangs, depressions or blisters; they incorporate natural features and include some degree of artificial wall construction. Twenty-two walled shelters were recorded at three sites (T-106, T-165 and T-184) within the project area; all are located on the high as flow. This distribution pattern is partially an artifact of the category definition; the natural attributes of as are conducive to this type of shelter construction. The concentration of these features is, however, a unique phenomenon within the project area and reflects a land use pattern that should be explainable. Eight walled shelters occur at Site T-165, and 13 occur at Site T-184. These two sites along the Site T-183 footpath are 85 m apart, which is less than the distance between some of the features within Site T-165.

The walled shelters at Sites T-165 and T-184 are constructed in areas naturally sheltered by large, accretional as boulders or by upthrust sheets of as. Several have depressed floors that appear to have been excavated into loose as, with removed material placed in openings between the perimeter boulders. The walled shelters at Site T-165 are more widely spaced than those at T-184; they include two large, compartmentalized features with adjacent areas of 5 sq m and with a shared divider wall. As a group, the Site T-165 shelters are slightly larger and have a mean interior area of 6 sq m (counting compartments as individual floor areas) and a range of 3-10 sq m. The Site T-184 shelters have a mean interior area of 5 sq m and a range of 2-7 sq m. Shell midden occurs in slightly over half of these features and is generally sparse, with a few concentrations.

usable area of these features ranges from 22-41 sq m; all contain surface shell midden scatters, and one contains a constructed central hearth. The Site T-132 modified outcrop is associated with a surface midden deposit located outside the feature.

Three modified outcrops may represent agricultural features; these occur at Sites T-117, T-146 and T-168. The Site T-117 feature is similar to a walled overhang and could also have functioned as a shelter. It has a usable area of 12 sq m and contains a deposit of soil up to 10 cm deep in places. No portable remains were located at this feature. The modified outcrop at Site T-146 is a simple alignment of filling stones along the face of a natural terrace-like exposure on the slope of Puu Kuili. The Site T-168 feature is on the edge of a slight depression that has a very low overhang and contains loose bedrock rubble; it is a loose fill deposit on a small terrace-like outcrop.

A third possible function indicated by two of the modified outcrops is that of a shrine. The feature at Site T-145 is a level, terrace-like pahoehoe outcrop along the beach; in places, it has been filled with coral cobbles and rubble. The Site T-129 feature is a small depression that is partially filled and contains eight waterworn boulders. It is associated with surface ash concentrations, a small terrace and a footpath.

Functional Categories

Those sites and features for which a general function can be tentatively determined are summarized using six categories--permanent habitation, temporary habitation, agriculture, transportation, ceremonial, and miscellaneous.

At this time, nine sites within the project area are included in the permanent habitation category. Two additional sites can be provisionally included, pending further investigations. With one exception (T-165), all these sites occur within the immediate coastal zone. One of the most conspicuous residential sites is T-101, which includes two large terraces, each defined by separate, low-walled enclosures. This site has been modified to an unknown extent by historic-period occupation, during which time two households were apparently maintained. It is uncertain at this time what the specific functions of the major features were during the prehistoric period. If all features were extant at that time, a relatively major site is indicated. The site is located along the south shoreline of Awaake Bay, at the northern edge of a major anchialine pond complex (Site T-181). It is also at the crossroads of an historic coastal trail and a trail to Puu Kuili (see Appendix A).

About 100 m directly inland from Site T-101 is Site T-104, a possible permanent habitation complex. This site is hypothesized to have a historic-period component, due to the extent and nature of structural modifications (described above). The major structural feature is a relatively large platform; a small, coral-paved platform was added to this feature subsequent to its construction. Associated features at this site

are limited to small mounds that appear to be burial features. A possible dependency structure is indicated at the adjacent site (T-103), less than 30.0 m from Site T-104. Also adjacent to Site T-104 is a complex (T-105) of numerous small features, some of which are possible burials. The proximity of the Site T-105 complex and of other monuments nearby suggests a ceremonial function for this platform during the prehistoric period.

Two structural remnants that are somewhat suggestive of permanent habitation were located between the northern shore of Awaake Bay and the immediate vicinity of Kahoia Bay Point. These sites include a buried alignment (T-123) and the remnants of an enclosure (T-115). Both sites are along the storm beach and are extremely disturbed. These features are in the vicinity of Kahoia's Site 101; he estimated eight house sites here. All located in the sand (Ma:19). The Site T-123 and T-115 features are not included in the count of permanent habitation sites, since there is insufficient evidence for such an inference at this time.

Two extensive habitation complexes (T-137 and T-140) occur at Kahoia Bay Point. These sites do not contain large terraces or platforms; in fact, all major structural features are smaller than the range used by Cordy to define domestic structures. However, both sites front a low storm beach and include structural features that have been affected by wave action. If large structures were present at these sites, they probably would have been located at the seaward edges and therefore would have been exposed to wave erosion. Remnants of a terrace of indeterminate size were located on the beach at Site T-137. The extent structures at Sites T-137 and T-140 include terraces, substantial C-shaped walls, and U-shaped walls with interior surface areas of 10-14 sq m. These structures appear to represent either permanent habitation structures or dependencies associated with permanent houses.

Two permanent habitation sites occur along the northern shoreline of Kahoia Bay, near the northern boundary of Awaake. These neighboring sites are on high rocky promontories, and both have been exposed to considerable wave erosion. Both consist of low-walled enclosures, and one (T-159) has terrace remnants inside the enclosure. A U-shaped wall representing a hypothesized dependency occurs just outside the Site T-157 enclosure. These sites may have been occupied during the historic period.

Two sites that possibly represent permanent habitation occur in the Kahoia Bay area. One (T-145) consists of storm-washed terrace remnants, and the other (T-160) is a substantial C-shaped wall with attached enclosure.

The final site included in the permanent habitation category at this time is Site T-165; it is located along the northern edge of the high aa flow, 365-450 m inland from the shoreline. This site includes a large (81 sq m), wall-constructed terrace, two medium-sized terraces (11-12 sq m), a medium-sized platform (12 sq m), and numerous small platforms and walled shelters. Several small (c. 1 m sq) excavations in the aa, hypothesized to be storage cupboards and/or post holes, also occur at this site. Despite the fact that the medium-sized platforms are too small to fit the

walls, walled shelters, cleared and leveled areas, and cleared and/or walled blisters. Sites with these features are scattered throughout the project area, and their patterning reflects the general pattern of all sites. However, a few distinct patterns emerge when the various formal categories within this group are examined separately. C-shaped walls and walled shelters have been discussed above.

Nineteen caves containing evidence of human utilization were located. These features occur at 11 sites, nine of which are within the immediate coastal zone. Two distinct clusters of cave shelters are obvious along the coast. The southernmost cluster includes features at Sites T-105, T-111 (3), T-112 (2), T-113, and T-164. These sites occur inland and slightly north of the permanent habitation sites, T-101, T-103, T-104 and T-165. Site T-164 is the largest and most intensively utilized cave within the project area. It is situated in the inland zone, in a low pahoehoe area at the foot of the high as escarpment. This shelter is in a direct line with the last identifiable traces of the Site T-183 footpath at the north edge of the as flow. It is hypothesized that this cave was utilized by the Site T-165 residents or visitors; it appears to have served as a residency, possibly for extended periods of time. Unfortunately, much of the interior modifications have been altered, and the cultural deposit is badly disturbed.

The second cluster of coastal cave shelters occurs within and just inland of the Site T-137 and T-140 complexes at Kahoieva Point. Three caves are present at Site T-140, and one occurs at Site T-137. The remaining three sites with caves are T-134, T-141, and T-142 (3). Within this cluster, the three caves at Site T-142 exhibit evidence of the most intensive utilization. These features have been disturbed, but portions of the cultural deposit are still intact.

The final cave shelter identified (Site T-172) is one of the most isolated sites within the project area. It is 725 m inland from the shoreline and nearly 300 m from the nearest site. This feature exhibits minimal modification and has a very sparse scatter of shell midden.

Seven overhangs are interpreted as short-term shelters; these occur at four sites, three of which (T-133, T-141, and T-164) also have cave shelter features. The fourth overhang site (T-168) is located in a large, vegetated kipuka near the southern, inland boundary of the project area. Very minimal use of this shelter is indicated; it may represent an agricultural feature.

In general, the majority of the natural and constructed short-term shelters exhibit minimal evidence of intensive or repeated use. Exceptions to this pattern are cave shelters at Sites T-140, T-142 and T-164. Among these, the only shelter that may have been used as a habitation area is the Site T-164 cave.

The transportation category is represented by six footpath sections, by a number of cairns, and possibly by three linear features that may represent trail or road causeways.

range of domestic (sleeping) structures defined by Cordy, they are interpreted as such in this case. It should be noted that if perimeter stones are included in surface area computations, these three structures would be well within the indicated size range.

The Site T-165 complex includes at least three domestic structures, a number of features that could be included in the category of special-purpose structures, and what is inferred to be a large ceremonial structure. The size range and number of features present at Site T-165 provisionally fulfill the conditions necessary for its consideration as a chiefly residency, as outlined by Cordy (1981:84). The final condition specified is that the site be enclosed by a stone or wood palisade. There is no substantive evidence of a constructed palisade at this site; however, there are indications that large wooden posts may have been erected around the perimeter of the main site area. Three of the as excavated features (JJ, HH, and O) are small, vertical shafts less than 0.5 m wide at the top and at least 0.5 m deep. These excavations occur at the northwest and southwest edges of the site, and at the eastern edge of the main feature concentration, near the Site T-183 path (see Figure 20). Additional excavations may be present; intensive searching will be required to locate them, due to their small size.

Some type of site perimeter designation is suggested at this time for Site T-165. The final condition for consideration as a chiefly residency is therefore provisionally met. Such conditions were not expected to occur within the project area, based on the North Kona settlement model discussed earlier in the Research Problems section.

Certain attributes of Site T-165 do not, however, permit the immediate association of this site with a chiefly residency. A number of the features have been interpreted as short-term shelters and/or burials. These features would not be expected to occur within the perimeter of a chiefly residential site. They may, however, be expected to occur within or near the perimeter of a ceremonial center, especially one that was periodically visited by groups of people. If present, the permanent residents of such a site might therefore be members of a priestly, as opposed to chiefly, social group and would be considered separate from commoners, as indicated in historical references to the priestly "class" (cf. Appendix A). This alternative interpretation seems more tenable at this time, and it is indirectly supported by locational aspects of the site. During the late prehistoric period, traditional locations for group gatherings were certain places along the borders of ahupua'a, where goods were collected from commoners for transfer to the ahupua'a chief. The Site T-165 complex is close enough to the existing boundary (which has been disputed historically) between Awakee and Makalevua to suggest that it may have been on the boundary prior to contact. It is along a major coastal-upland footpath that parallels the current boundary and appears to cross into Makalevua just west of the Queen Kaahumanu Highway (based on aerial photo observations). This feature would have provided an indisputable boundary indicator, prior to the initiation of government surveys.

Temporary habitation is indicated at 24 sites within the project area. Formal categories within this group include caves, overhangs, C-shaped

The longest and probably the most significant footprint is at Site T-183; it is identifiable for a distance of c. 300 m within the project area. This footprint is traceable on scale aerial photographs (1:400') and can be followed eastward beyond the project area to just west of the Queen Kahuamau Highway, where it descends from the as onto old pahoehoe. It undoubtedly continued westward to the beach from its westernmost identifiable point within the project area. Two major complexes (Sites T-165 and T-184) occur along this footprint, with features located on both sides of the path. It is marked by two sets of paired cairns within Site T-165 and by additional cairns along its route. It is possible this footprint followed a prehistoric ahupua'a boundary, given its close proximity to the existing straight-line boundary and to the associated complexes (discussed above).

The remaining three footprint sites all appear to represent sections of north/south coastal routes. The southernmost site (T-182) crosses rough as and connects the anchialine ponds of Mahaloana and Awakee. This path does not correspond with the coastal trail plotted by Perryman in 1882 (Appendix A); that trail follows the curve of the as point, such as near to the shoreline. The existing jeep road currently follows this latter trail.

Two, identified coastal footprint sections probably represent segments of a connected path between Awakee Bay and Kaholoa Point (Sites T-119 and T-138). Both sections are inland of the coastal trail plotted by Perryman that closely follows the shoreline. It appears the north end of Site T-140 and the south end of Site T-119 connected with this coastal trail.

Sections of minor footpaths between structural features and the shoreline were identified at Sites T-129 and T-137. Both of these paths consist of intermittently spaced steppingstones in a narrow as channel.

Features that may represent sections of stone-filled trails were located at Sites T-103, T-114, and T-118. The longest and most substantial of these features is at Site T-103. It is 75.0 m long, 2.0 to 4.0 m wide, and is oriented northwest-southeast. The location of this feature does not correspond closely with trails shown on available historic maps. It is, however, roughly aligned with the Site T-183 footprint, and it could possibly represent a section of that route, although it is structurally dissimilar. An alternative function for this feature is as a small *holu* slide. Additional work is needed to determine the function of this feature.

Sites T-118 and T-114 are linear, wall-like patterns of disturbed stones that may represent sections of earlier trails sketched by Perryman in 1882. Site T-118 may be remnants of the trail between Awakee Bay and Fuu Kuili. This feature is within a few meters of the existing jeep road that, with minor deviations, probably follows the older trail route. The Site T-114 feature may be a remnant of the former coastal trail, which is no longer present north of Awakee Bay.

Features tentatively interpreted as possible agricultural areas occur at 16 sites within the project area. Features were assigned to this category if: (a) they were morphologically similar to previously described dryland agricultural features; (b) they exhibited a soil deposit or the ability to support a thick growth of wild vegetation and; (c) they lacked deposits of shell midden or other portable remains, such as waterworn basalt boulders or cobbles, that might indicate use for other purposes.

Formal categories included in this functional group include soil-filled terraces (T-149, T-153), small modified outcrops (T-117, T-148, and T-168), walled depressions (T-102, T-109, T-124, T-126, T-127, and T-167), and pahoehoe clearings (T-122, T-131, T-135, and T-143). Some sites also exhibit a few stone mounds or rubble piles such as those at Site T-137. All of these sites either are within the immediate coastal zone or are in vegetated kipuka. The coastal sites are scattered from north to south; they occur in the vicinity of the three permanent habitation clusters and are also scattered between the clusters.

There does not appear to be any correlation between the area of thicker soil deposition west of Fuu Kuili and the distribution of agricultural features. Most of the features included in this category are modifications of natural pahoehoe features and would therefore not occur in the cinderland zone. It is possible that if additional minor terraces did occur along the slopes of Fuu Kuili, they would have rapidly eroded away as soon as maintenance ceased. If traces of such features occur, they would be nearly impossible to detect in the thick fountain grass that now covers this area.

The ceremonial function is represented by features at ten sites. Shrines have been identified or tentatively identified at five sites (T-104, T-129, T-137, and T-145), and possible burial features have been identified at six sites (T-104, T-105, T-152, T-163, T-165, and T-184). A shrine and possible burials co-occur at Site T-104. Five of these sites occur in the southern area, inland from Awakee Bay; three are in the vicinity of Kaholoa Point, and one is near the northern boundary of the project area. A single shrine site (T-129) occurs between the Awakee Bay and Kaholoa Point clusters.

Shrine features include a wide range of formal categories and degrees of elaboration. The most elaborate of the group is a coral-paved platform that adjoins a large *ilili* paved platform at Site T-104. Other shrines incorporating coral cobbles and small boulders include the Site T-139 coral mound, which may actually be a disturbed platform or terrace, and the Site T-145 modified outcrop, which includes two areas of coral fill.

The shrines at Sites T-129 and T-137 are small areas in depressions; they include some modification of the surface and contain coral or water-worn basalt boulders. The Site T-129 shrine contains eight boulders.

Possible burial features include small, oval to nearly circular platforms, small stone-filled terraces, and faced rock mounds. Small platform burials may occur at Sites T-104 (1), T-105 (3), T-163 (1), T-165 (3), and

T-184 (1). Small terrace burials may occur at Site T-105 (3). Faced rock mound (platform-like) burials may occur at Sites T-104 (2) and T-152/153 (1).

All of the possible burial features enumerated above are quite small (less than 8 sq m in surface area) and probably represent a single interment. The total projected burial count derived from inferred burials (15) is well within an expected range, given the minimum number of permanent habitations within the same area (10-12).

The miscellaneous use category includes the functions of aquaculture, animal keeping, and recreation. This category is represented at a limited number of sites and by a small range of formal categories. Aquaculture is inferred for modified anchialine ponds at Sites T-179 and T-181. Animal keeping is inferred at the enclosures located at Sites T-108, T-167, and T-173. Finally, Site T-180 appears to represent a recreational feature.

Comparative Remarks

In all, nine to eleven permanent habitation sites have been identified at Awakee at this time. These sites occur in three main clusters: four to five house sites at Awakee Bay, two to three sites at Kahoia Point, and three sites at Kahoia Bay. Features within these sites that were determined to be permanent structures include three or four low enclosures, four substantial C-shaped or U-shaped walls, six platforms, and eight terraces.

At Maniowali, Cordy identified twelve permanent habitation sites: nine are clustered at the northern end of the Shupua'a. Two sites occur at the southern end of Maniowali, along the northern shoreline of Kahoia Bay. All twelve of the sites are within the immediate coastal zone. Features recorded by Cordy within these sites include one substantial C-shaped wall, three long and narrow enclosures, five platforms, and seven low enclosures (Cordy 1981:162).

There appear to be major differences concerning architectural forms identified at permanent habitation sites in Awakee and Maniowali. No terrace features were recorded at the Maniowali sites, yet terraces are the most numerous formal category found at permanent house sites in Awakee. No long, narrow enclosures, inferred to be canoe and men's houses, were observed at Awakee; three of these features occur at Maniowali. More C-shaped and U-shaped walls, and fewer low enclosures, are present at Awakee.

Differences between the settlement patterns of Awakee and Makalewena are even more overt. A recent reconnaissance survey of Makalewena identified only four permanent habitation sites, all of which are historic-period residences. Permanent features reflective of possibly prehistoric components occur at two of these sites and include two terraces and one platform (Donham 1986). Historic references indicate that the number of residences at Makalewena was at least three times greater than the number of archaeological sites located. This difference is attributable mainly

to the combined effects of house location patterns and storm wave erosion. Nearly the entire coastline of Makalewena is a low, white-sand beach, and most of the historic-period habitations were located on the beach. It is suspected that prehistoric habitations occurred at Makalewena, but there is currently very scant evidence of such.

At this time, insufficient investigations have been conducted at Awakee and Makalewena to permit formulation of hypotheses that might explain the differences between these two areas, in terms of settlement. Likewise, suggestions as to why architectural forms at Awakee and Maniowali are divergent would be highly speculative at this time. A possible explanation for the absence of canoe houses at Awakee might be related to the less accessible landing areas along the Awakee coastline, but this tenet has not been empirically demonstrated. Differences in the numbers of terraces could be related to period of construction, or to topographic factors that as yet are not identified.

Archaeological features suggestive of boundary markers were not identified along the Awakee/Maniowali boundary within the project area. A possible border site has been suggested for the Awakee/Makalewena boundary. This site (T-165) is not on the current Shupua'a boundary, but it does exhibit characteristics of a border site. The site does not conform to the pattern of coastal zone settlement demonstrated in data collected by Cordy throughout North Kona (1981). Instead, it is on a major coastal/upland trail, and it consists of a major terrace, smaller terraces and platforms, four relatively large cairns, numerous small, walled shelters, and possible postholes around the perimeter of the main site area.

Site T-165 exhibits general similarities to a complex located in Waikoloa and Puuanahulu, along the border of North Kona and South Kohala. Included in this complex are the Kahu-a-Lono shrine (50-Ba-E1-63), a traditional and historical boundary marker, and over a hundred small, walled shelters (Sites T-103 and 50-Ha-E1-60). The historic Kibolo-Puko Trail passes through this site, as does a former footpath, which follows the same north-south course as the karstose trail (Walker and Rosendahl 1986:8-11). Intensive-level survey and testing were conducted at Site T-103, and seven volcanic glass dates were determined from collected specimens. Calendrical date ranges for all specimens are between AD 1668-1790, reflecting use during the late prehistoric period (Walker and Rosendahl 1986:17). A similar date range is predicted for most of the features at Site T-165.

To date, no documentary evidence has been located that might indicate whether the Awakee/Makalewena boundary was slightly north of its present location during the early historic period. There are indications that the Awakee/Maniowali border was somewhat obscure, or at least not recognized by government surveyors, during the early historic period (Appendix A).

EVALUATIONS

The significance categories used here follow definitions derived from the National Register of Historic Places criteria for cultural resources

meaningful prehistory or history. Sites determined to contain significant information are those that will aid in solving problems such as those outlined earlier, thereby contributing to prehistory or history.

Sites with observed materials for absolute or relative age determinations, with appreciable accumulations of midden, and with intact structural features suggestive of permanent habitation or special function are viewed as having significant information. These sites have been discussed above and are further enumerated in the following Recommendations section.

A number of sites within the project area have been determined to be significant as excellent type examples and/or as culturally valued resources, in addition to having significant information content. These sites are listed below, with brief synopses.

- T-101 Coastal habitation complex consisting of two large, enclosed terraces, a platform and other features. Significant for information content and as best example of historic-period habitation in project area; possibly a major prehistoric complex.
- T-103 Unique linear stone feature (possible small holus slide or former trail) and associated permanent structure. Significant for information content and as excellent type example (pending further investigations).
- T-104 Large habitation platform associated with possible burial mounds and coral-paved shrine or monument. Significant as type example (largest and best-preserved platform in project area); the only coral-paved platform. Significant for cultural values, as shrine, and provisionally as burial site. Significant for information content.
- T-105 Complex of small platforms and mounds; associated with Site T-104 complex. Significant for information content; provisionally significant cultural value as burial site.
- T-137 Extensive complex of structural features, stone mounds, and shrines; located along coastal footpath. Significant cultural value due to presence of possible shrine feature and nearby associated foot trails. Significant for information content and as example of site type.
- T-139 Coral boulder mound and surface midden; possible shrine site. Significant for cultural value (pending further investigation), and significant for information content of midden deposit.
- T-140 Complex with numerous structural features and intensively utilized cave shelters; located along

evaluation, as outlined in the Code of Federal Regulations (36 CFR Part 60). These criteria are employed by the Hawaii State Historic Preservation Office with reference to the Hawaii State Register of Historic Places, and by all federal agencies involved in the historic preservation process. Sites determined here to be potentially significant for their information content are assessed under Criterion D, which defines significant resources as those that "have yielded or are likely to yield information important in prehistory or history" (36 CFR Sec. 60.4). Sites with significant information content may also be relatively ranked as having moderate to high research value.

Sites determined to be potentially significant as excellent examples of a site type are assessed under Criterion C, which defines significant resources as those that "embody the distinctive characteristics of a type, period, or method of construction..." (36 CFR Sec. 60.4). These sites have interpretive value in that, when properly studied and developed for interpretation, they provide ongoing education to the public. Interpretive development is also a means of preserving significant resources.

Sites determined to be (potentially) culturally significant are assessed under the "Guidelines for Consideration of Traditional Cultural Values in Historic Preservation Review" (Draft August 1985), prepared by the Advisory Council on Historic Preservation. Cultural value is defined in the guidelines as "...the contribution made by an historic property to an ongoing society or cultural system. A traditional cultural value is a cultural value that has historic depth" (1985:11). The guidelines specify that a "...property need not have been in consistent use since antiquity by a cultural system in order to have traditional cultural value" (1985:7). Both religious and nonreligious cultural values are specified, and examples include burial sites, loci of traditional economic activities, and loci that are symbolic of a group's identity or history (1985:11).

Definitive significance evaluations, particularly those concerning interpretive and cultural values, often are not possible on the basis of reconnaissance survey findings. As indicated in the above discussion, there are a number of features and sites for which the function cannot be determined without subsurface excavation, more intensive-level recordation, and/or more extensive comparative analysis. For example, a number of sites include small platforms and mound features that could contain human interments. Recommendations concerning these sites must therefore be provisional, pending further field work. Assessment of sites as to their significance as exemplary type models is based on the assumption that site function has been accurately inferred. Again, these evaluations may change with the acquisition of new data. For these reasons, significance evaluations concerning site information content are considered very important at this stage of cultural resource management at Waikiki.

A preliminary research design that briefly outlines general research concerns has been presented above. The approaches described are among the most reliable means available for transforming archaeological data into

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remaining 46 identified sites, further archaeological work in the form of intensive survey (including historical documentary research, vegetation clearing, detailed mapping and recordings, and controlled test excavations), possibly subsequent data recovery excavations (mitigation), and/or some level of interpretive development is recommended.

Survey findings and preliminary conclusions--including tentative evaluations and recommendations--were discussed (October 14, 1986) with Mr. Virginia Goldstein, staff planner and historic sites specialist in the Hawaii County Planning Department. Mr. Goldstein concurred with the preliminary conclusions and the tentative recommendations presented here regarding further archaeological work to be done within the Proposed Waialeale National Development project area.

The following specific field tasks were determined to constitute an adequate scope of work for the intensive survey:

- Accurate locational plotting of sites on an appropriate scale topographic map of the project area;
- Intensive-level survey recording of sites--including detailed plan mapping, written descriptions, and photographs;
- Surface collection of portable remains (middens and artifacts) from sites;
- Subsurface testing of sites with apparent excavation potential; and
- Subsurface testing to determine the presence or absence of buried cultural deposits in sand beach deposits/pockets at Kahoelawe Bay and along the coast.

Recommendations concerning site preservation, either with interpretive development or with protection "as is", are offered at this time; however, these recommendations should be considered tentative until intensive-level survey work is completed.

Preservation with interpretive development is recommended for all but four sites determined to be significant as excellent examples of a site type; these include Sites T-101, T-103, T-104, T-119, T-137, T-138, T-140, T-163, T-182, T-183 and T-184. These sites are listed and briefly described above and are interpreted in the discussion. Additional sites with moderate interpretive value could also be considered for interpretive development, particularly if they occur in open-space areas that will not be affected by construction activities.

Preservation "as is" is recommended for one site (T-180) determined to be significant for its cultural value, but not necessarily unique; and for unique sites with cultural value that would not be enhanced by interpretive development. These sites include small shrines and modified anchialine ponds (Sites T-139, T-145, T-179, and T-181).

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coastal footpath. Significant for information content and as example of site type.

T-145 Possible beach shrines. Significant as site type, for cultural value, and for information content.

T-152 Possible grave monuments associated with historical grave site. Provisionally significant cultural value as burial site; significant for information content.

T-163 Collapsed platform. Provisionally significant cultural value as burial site; significant for information content.

T-165 Large habitation/ceremonial complex on major coastal/inland trail. Includes large terrace, smaller terraces and platforms, and numerous temporary shelters; possibly an *ahupua'a* border complex. Significant as a type example and for information content; provisionally high cultural value as border shrine and burial area.

T-184 Large complex shelter along major coastal/upland trail. Includes possible burial platform. Significant as type example and for information content; provisionally significant cultural value as a burial site.

Various foot trails (T-119, -138, -182, and -183). Significant as type examples and for cultural values (in terms of traditional transportation routes and access rights).

Anchialine pond complex (T-179, -180, and -181). Significant as type examples (T-179, -181) and for cultural values.

A number of additional sites within the project area have a degree of interpretive and cultural value, but cannot be considered to be "significant" in terms of National Register evaluation criteria. In order to identify these sites, a relative rating of high, moderate and low is utilized in Table 2 (at end) for each site. Sites with moderate interpretive value therefore have a greater potential for interpretive development than do those with a low interpretive rating. These more fine-grained evaluations are offered so that development planners can consider additional archaeological sites for preservation and interpretation, if they so choose. All sites in Table 2 that rated high in interpretive and/or cultural values are included in the above list.

RECOMMENDATIONS

Based on the findings of the reconnaissance survey, 38 sites (59 component features) are believed to require no further work. For the

In addition to the archaeological work specified above as part of an intensive-level survey, it is recommended that additional archival and historic reference research be conducted. Such further investigations may clarify a number of questions generated by the preliminary historical research and will provide a more sound basis for analytic and educational interpretation of the cultural resources at *Maunaloa*.

It is also recommended that, with the aid of an archaeologist, all sites be accurately located and plotted by professional surveyors, using an appropriate scale topographic map of the project area. This work would greatly aid development planning and would allow for more specific recommendations concerning site impacts and preservation measures.

General significance assessments determined for each site are summarized in the following discussion.

SUMMARY OF GENERAL SIGNIFICANCE ASSESSMENTS AND RECOMMENDED GENERAL TREATMENTS

To facilitate State and County review of these evaluations and recommendations, general significance assessments and recommended general treatments are summarized here in Table 5. As noted in the Evaluations section, the categories used follow criteria specified in the Code of Federal Regulations and in guidelines provided by the Advisory Council on Historic Preservation. These criteria and guidelines for significance evaluation follow those used by the National Register of Historic Places and by the Hawaii Register of Historic Places. On January 12, 1987, the significance assessments and recommendations presented in Table 5 were discussed with, and reviewed by, Dr. Ross Corby, chief staff archaeologist in the Historic Sites Section-Division of State Parks, Department of Land and Natural Resources. Dr. Corby concurred with the assessments and recommendations presented in Table 5.

Sixty-five of the 84 archaeological sites identified within the project area have been determined to be significant solely for their information content. All relevant data were collected from 37 of these 65 sites during reconnaissance survey. They therefore no longer contain endangered significant information (Significance Category X), and no further data collection or other mitigation measures can be justifiably recommended at this time. The 37 sites included in this category are the following:

T-102, T-106, T-109, T-117, T-118, T-121, T-122, T-124 thru T-128, T-130 thru T-132, T-134 thru T-136, T-143, T-144, T-147, T-148, T-156, T-161, T-166 thru T-178.

Twenty-eight of the sites determined to be significant solely for their information content still contain information that will potentially contribute to the prehistory and history of the region (Significance Category A). Additional data collection has been recommended for these sites (Recommended Treatment FDC). The following sites are within this category:

T-107, T-108, T-110 thru T-116, T-120, T-123, T-129, T-133, T-141, T-142, T-146, T-149 thru T-151, T-153 thru T-155, T-157 thru T-160, T-162, and T-164.

Three sites have been determined to be significant for their information content and have also been determined to have interpretive potential as examples of a site type (Significance Categories A and B): Sites T-101, T-103, and T-140 are within this category. Recommended treatment of these sites is to conduct further data collection and to develop the sites as interpretive locales (Recommended Treatments FDR and FID).

Six sites have been determined to be significant for their information content, as excellent examples of a site type, and as having cultural value as locations of shrines (T-104, T-137, T-139 and T-43) or as a traditional ceremonial center (T-165) or as a burial area (T-165 and T-184). Assessment of cultural significance is not possible until additional investigations are conducted. Recommendations for these sites are to conduct further work and to develop the sites for interpretation or, alternatively, to preserve and protect them.

Two sites have been determined to contain significant information, to be good examples of site types, and to provisionally have cultural value as a traditional ceremonial center (T-165) or as a burial area (T-165 and T-184). Assessment of cultural significance is not possible until additional investigations are conducted. Recommendations for these sites are to conduct further work and to develop the sites for interpretation or, alternatively, to preserve and protect them.

Three additional sites with significant information are provisionally assessed as having high cultural value, due to the possible occurrence of burials; these sites include T-105, T-152, and T-163. Additional data recovery is recommended at this time. If no burials are located at these sites, they will be determined not to have cultural value. If burials occur, a recommendation of preservation and protection will be made. Alternatively, if preservation and protection is not feasible, then appropriate data recovery work (including disinterment and reinterment) may be carried out.

Four sites (T-119, T-138, T-182 and T-183) have been determined to have interpretive and cultural value as well-preserved sections of transportation routes. No additional data recovery is recommended at these sites, with the exception of accurate locational plotting by surveyors. Preservation with interpretive development is recommended.

Finally, a single site has been determined to have cultural value as part of a traditionally utilized anchialine pond complex; its preservation and protection is recommended.

Table 5.

**SUMMARY OF GENERAL SIGNIFICANCE ASSESSMENTS
AND RECOMMENDED GENERAL TREATMENTS
PROPOSED AWAKEE RESORT DEVELOPMENT PROJECT AREA**

Site or Feature No.	Significance Category			Recommended Treatment		
	A	X	C	FDC	NTW	PID
T-107	+	-	-	+	-	-
T-108	+	-	-	+	-	-
T-110	+	-	-	+	-	-
T-111	+	-	-	+	-	-
T-112	+	-	-	+	-	-
T-113	+	-	-	+	-	-
T-114	+	-	-	+	-	-
T-115	+	-	-	+	-	-
T-116	+	-	-	+	-	-
T-120	+	-	-	+	-	-
T-123	+	-	-	+	-	-
T-129	+	-	-	+	-	-
T-133	+	-	-	+	-	-
T-141	+	-	-	+	-	-
T-142	+	-	-	+	-	-
T-146	+	-	-	+	-	-
T-149	+	-	-	+	-	-

General Significance Categories:

A=Important for information content, further data collection necessary (FHR=research value);
 X=Important for information content, no further data collection necessary (FHR=research value, SHP=not significant);
 B=Excellent example of site type at local, region, island, State, or National level (FHR=interpretive value); and
 C=Culturally significant (FHR=cultural value).

Recommended General Treatments:

FDC=Further data collection necessary (intensive survey and testing, and possibly subsequent data recovery/mitigation excavations);
 NTW=No further work of any kind necessary, sufficient data collected, archaeological clearance recommended, no preservation potential (possible inclusion into landscaping suggested for consideration);
 PID=Preservation with some level of interpretive development recommended (including appropriate related data recovery work); and
 PAI=Preservation "as is," with no further work (and possible inclusion into landscaping), or minimal further data collection necessary.

Table 5. (Cont.)

Site or Feature No.	Significance Category			Recommended Treatment		
	A	X	C	FDC	NTW	PID
T-150	+	-	-	+	-	-
T-151	+	-	-	+	-	-
T-153	+	-	-	+	-	-
T-154	+	-	-	+	-	-
T-155	+	-	-	+	-	-
T-157	+	-	-	+	-	-
T-158	+	-	-	+	-	-
T-159	+	-	-	+	-	-
T-160	+	-	-	+	-	-
T-162	+	-	-	+	-	-
T-164	+	-	-	+	-	-
Subtotal: 28	28	0	0	28	0	0
T-102	-	+	-	-	+	-
T-106	-	+	-	-	+	-
T-109	-	+	-	-	+	-
T-117	-	+	-	-	+	-
T-118	-	+	-	-	+	-
T-121	-	+	-	-	+	-
T-122	-	+	-	-	+	-
T-124	-	+	-	-	+	-
T-125	-	+	-	-	+	-
T-126	-	+	-	-	+	-
T-127	-	+	-	-	+	-
T-128	-	+	-	-	+	-
T-130	-	+	-	-	+	-
T-131	-	+	-	-	+	-
T-132	-	+	-	-	+	-
T-134	-	+	-	-	+	-
T-135	-	+	-	-	+	-
T-136	-	+	-	-	+	-
T-143	-	+	-	-	+	-
T-144	-	+	-	-	+	-
T-147	-	+	-	-	+	-
T-148	-	+	-	-	+	-
T-156	-	+	-	-	+	-
T-161	-	+	-	-	+	-
T-166	-	+	-	-	+	-
T-167	-	+	-	-	+	-
T-168	-	+	-	-	+	-
T-169	-	+	-	-	+	-
T-170	-	+	-	-	+	-
T-171	-	+	-	-	+	-
T-172	-	+	-	-	+	-
T-173	-	+	-	-	+	-

Table 5. (Cont.)

Site or Feature No.	Significance Category			Recommended Treatment		
	A	X	B	FDC	NFM	FDI
T-174	-	+	-	-	+	-
T-175	-	+	-	-	+	-
T-176	-	+	-	-	+	-
T-177	-	+	-	-	+	-
T-178	-	+	-	-	+	-
Subtotal: 37	0	37	0	0	37	0
T-101	+	-	+	-	+	-
T-103	+	-	+	-	+	-
T-140	+	-	+	-	+	-
Subtotal: 3	3	0	3	0	3	0
T-104	+	-	+	+	+	-
T-137	+	-	+	+	+	-
Subtotal: 2	2	0	2	2	0	2
T-139	+	-	+	+	+	-
T-145	+	-	+	+	+	-
T-179	+	-	+	+	+	-
T-181	+	-	+	+	+	-
Subtotal: 4	4	0	4	4	0	4
T-165	+	-	+	+	+	-
T-184	+	-	+	+	+	-
Subtotal: 2	2	0	2	2	0	2
T-105	+	-	+	+	+	-
T-152	+	-	+	+	+	-
T-163	+	-	+	+	+	-
Subtotal: 3	3	0	3	3	0	3

*Provisional assessment; definite assessment pending further data collection (i.e., testing features for presence/absence of skeletal remains).

Table 5. (Cont.)

Site or Feature No.	Significance Category			Recommended Treatment		
	A	X	B	FDC	NFM	FDI
T-119	-	+	+	-	-	+
T-138	-	+	+	-	-	+
T-182	-	+	+	-	-	+
T-183	-	+	+	-	-	+
Subtotal: 4	0	4	4	0	0	4
T-180	-	-	-	+	-	+
Subtotal: 1	0	0	0	1	0	1
Total: 84	42	41	15	16	42	38

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Table 2.

SUMMARY OF IDENTIFIED SITES AND FEATURES
PROPOSED AMAKE RESORT DEVELOPMENT PROJECT AREA

Site #	Formal Site/Feature Number	Tentative Interpretation	Functional Interpretation	Significance Evaluation			Field Work Tasks	Comments
				I	C	DR		
T-101	Complex (A)+ A Enclosed terrace B Terrace C Platform D Terrace	Habitat	Habitat	H	M	+	+	Fea. A contains 'ili'ili paved surface, cistern and walls; Feas. B-D consist of three smaller terraces with scattered 'ili'ili; identified by Soehren as BPHM Sites D20-10, -11
T-102	Walled depression	Poss. Agricultural		L	L	-	-	Overhang appears too small and low for habitation
T-103	Complex (2) A Ramp B Enclosure	Habitat/recreation		H	H	+	+	Fea. A poss. a small hollow slide; 'ili'ili present within Fea. B; identified by Soehren as BPHM Site D20-12
T-104	Complex (5) A Platform B Mound C Mound/platform D Cairn	Habitat		H	M/H	+	+	Fea. A platform contains coral boulder paved section (poss. shrine); artifacts and marine shell midden present

*Significance Evaluation--Nature: R = scientific research, I = interpretive, C = cultural;
Degree: H = high, M = moderate, L = low.

Field Work Tasks: DR = detailed recording (scaled drawings, photographs, and written descriptions), SC = surface collections, EX = test excavations.

*Number of component features within complex.

Table 2. (Cont.)

Site & Feature Number	Formal Site/Feature Type	Tentative Functional Interpretation	Significance Evaluation			Field Work Tasks			Comments
			R	I	C	DR	SC	EX	
T-105	Complex (12)	Indeterminate	H	M	L/R	+	+	+	Complex consists of numerous small features on a flow; several poss. burials
A	Walled depression								
B	Mound/clearing								
C	Mound/clearing								
D	Faced an excavation								
E	Faced an excavation								
F	Faced an excavation								
G	Overhang cupboard								
H	Small cave								
I	Small terraces (3)								
J	Cave shelter and terrace								
K	Small platforms (2)								
L	Small excavations and walls (2)								
T-106	Walled shelter	Temporary habitation	L	L	L	-	-	-	Situated on a flow; utilizes bedrock outcrops
T-107	Complex (4)	Habitation	M	L	L	+	+	+	Foss. A, B, and C function as shelters; slab lined hearth (in Foss. C) and marine shell midden present
A	Modified outcrop								
B	Modified outcrop								
C	Modified outcrop								
D	Modified outcrop								
T-108	Complex (4)	Habitation	M	L	L	+	+	+	Marine shell midden and waterworn boulders present on Foss. B-C; Foss. A poss. planting area or animal pen
A	Enclosure								
B	Low platform								
C	C-shape								
D	Modified outcrop								
T-109	Walled depression	Poss. Agriculture	L	L	L	-	-	-	Consists of rubble wall around edge of depression; soil interior
T-110	Complex (2)	Habitation	M	L	L	+	+	+	Foss. A thin midden deposit on bedrock; Foss. B poss. structural remnant
A	Midden concentration								
B	Wall remnant								

Table 2. (Cont.)

Site & Feature Number	Formal Site/Feature Type	Tentative Functional Interpretation	Significance Evaluation			Field Work Tasks		Comments	
			R	I	C	DR	SC		EX
T-111	Complex (4)	Temporary habitation	M	M	M	+	+	+	Deposit disturbed by pothunter excavations; intact deposit present; marine shell midden present
A	Cave shelter								
B	Cave shelter								
C	Cave shelter								
D	Modified blister								
E	Mound								
T-112	Complex (3)	Temporary habitation	M	M	M	+	+	+	Marine shell midden present in Foss. B and C; coral abrader in Foss. C
A	Platform								
B	Cave shelter								
C	Cave shelter								
T-113	Complex (2)	Temporary habitation	M	L	L	+	+	+	Sparse marine shell midden present in Foss. A
A	Cave shelter								
B	C-shape								
T-114	Structural remnant	Indeterminate	M	M	M	+	-	+	Poss. foundation for coastal trail
T-115	Enclosure remnant	Habitation	M	M	M	+	+	+	Site partially destroyed by high surf; partially buried by coral and basalt beach boulders
T-116	Cleared blister	Temporary habitation	M	L	L	+	+	-	Marine shell midden present
T-117	Complex (2)	Temporary shelter	L	L	L	-	-	-	No portable remains present on surface
A	Modified outcrop								
B	Cairn								
T-118	Wall	Indeterminate	L	L	L	-	-	-	Wall collapsed and in poor condition
T-119	Complex (3)	Transportation	M	H	H	-	-	-	Coastal foot trail consists of worn pahoehoe and crushed gravel; cairns mark trail
A	Foot trail								
B	Cairn								
C	Cairn								
T-120	Complex (5)	Temporary habitation	M	M	M	+	-	+	Associated with Site T-119 trail; Foss. A contains waterworn boulders
A	Box C-shape								
B	Cairn								
C	Cairn								

Table 2. (Cont.)

Site #	Formal Site/Feature Number	Tentative Interpretation	Significance Evaluation	Field Work Tasks	Comments
		Type	R I C	DR SC EX	
T-120	Complex (cont.)				
	D Cairn				and upright slabs; Fea. E consists of a temporary shelter with upright slabs
	E Modified outcrop				
T-121	Complex (2)	Temporary	L L L	- - -	With the exception of waterworn boulders on Fea. B, no portable remains present
	A C-shaped wall	habitation			
	B Cairn				
T-122	Complex (4)	Poss. Agricultural clearing	L L L	- - -	Waterworn boulders present and poss. utilized in breaking bedrock
	A Pahoehoe clearing				
	B Pahoehoe clearing				
	C Pahoehoe clearing				
	D Pahoehoe clearing				
T-123	Buried alignment	Indeterminate	M M M	+ + +	Semicircular-shaped boulder alignment buried in sand
T-124	Walled depression	Indeterminate	L L L	- - -	No portable remains present
T-125	Terrace	Indeterminate	L L L	- - -	Two pieces shell present; structure appears vague
T-126	Complex (3)	Indeterminate/ misc.	L L L	- - -	Feas. B and C poss. boundary markers
	A Walled depression				
	B Cairn				
	C Cairn				
T-127	Complex (3)	Indeterminate	L L L	- - -	Consists of rubble walls around edge of depressions; Fea. B utilizes several upright slabs
	A Walled depression				
	B Walled depression				
	C Walled depression				
T-128	Complex (2)	Temporary	L L L	- - -	Fea. A contains sparse amounts of marine shell hidden
	A Overhang shelter	habitation			
	B Boulder alignment				

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Table 2. (Cont.)

Site #	Formal Site/Feature Number	Tentative Interpretation	Significance Evaluation	Field Work Tasks	Comments
		Type	R I C	DR SC EX	
T-129	Complex (6)	Habitation	M M M	+ + +	Contains marine shell midden; excellent view of the ocean; Fea. A utilized as a shelter; Fea. C contains several waterworn stepping-stones toward ocean; Fea. D c. 2.0 m in dia.
	A Modified outcrop				
	B Terrace				
	C Footpath				
	D Ash concentration				
	E Ash concentration				
	F Collapsed C-shape				
T-130	U-shaped wall	Temporary habitation	M L L	- - -	Structure in good condition; two half-gallon glass bottles and sparse shell present
T-131	Pahoehoe excavation	Indeterminate	L L L	- - -	One small waterworn boulder present
T-132	Complex (2)	Temporary habitation	L L L	- - -	Fea. B consists of coral pebbles and sparse marine shell on bedrock
	A Filled depression				
	B Coral/midden concentration				
T-133	Complex (2)	Temporary habitation	M M L	+ + +	Contains moderate amounts of marine shell midden and artifacts including volcanic glass
	A Overhang shelter				
	B Overhang shelter				
T-134	Cave shelter	Temporary shelter	L L L	- - -	Cave slightly modified with a narrow, boulder-filled crack at entrance
T-135	Pahoehoe clearing	Indeterminate	L L L	- - -	No portable remains visible
T-136	Complex (2)	Temporary shelter	L L L	- - -	Fea. A contains sparse marine shell on bedrock; Fea. B poss. utilized as a shelter
	A Hidden scatter				
	B Collapsed tube				

Table 2. (Cont.)

Site & Feature Number	Formal Site/Feature Type	Tentative Functional Interpretation	Significance Evaluation	Field Work Tasks	Comments
			H I C	DR SC EX	
T-137	Complex (12)	Habitation	H M W/H	+	Associated with Site T-138 trail; contains moderate amounts of shell midden; Feas. A and B poss. previously identified Site D20-13; Feas. C poss. a shrine; Feas. K contains waterworn stepping-stones; Feas. G contains centrally placed upright slabs; Feas. L partially destroyed(?) by high surf
A	C-shaped wall			+	
B	Cave shelter			+	
C	Low platform			+	
D	Mound			+	
E	Mound			+	
F	Mound			+	
G	Mound			+	
H	Walled blister/tube			+	
I	Walled blister			+	
J	Cairn			+	
K	Poss. trail			+	
L	Terrace remnant			+	
T-138	Footpath	Transportation	H H H	- - -	Portion of coastal trail to Kahoia Bay
T-139	Complex (2)	Religious/religious habitation	M/H H H	+	Feas. A poss. shrine; Feas. B midden on bedrock
A	Coral boulder mound			+	
B	Midden concentration			+	
T-140	Complex (13)	Habitation	H H M	+	Contains moderate to high amounts of marine shell midden and artifacts, including volcanic glass; deposit disturbed by pot-hunter excavation; complex situated at Kahoia Bay; associated with T-138 trail; Feas. A poss. previously identified Site D20-13
A	C-shaped wall			+	
B	Cave shelter			+	
C	L-shaped wall			+	
D	C-shaped wall/cairn			+	
E	Cairn			+	
F	Cairn			+	
G	Cairn			+	
H	Cairn			+	
I	Cave shelter			+	
J	Cairn			+	
K	Cave shelter			+	
L	Terrace			+	
M	U-shaped wall			+	

Table 2. (Cont.)

Site & Feature Number	Formal Site/Feature Type	Tentative Functional Interpretation	Significance Evaluation	Field Work Tasks	Comments
			H I C	DR SC EX	
T-141	Complex (2)	Temporary habitation	H L L	+	Feas. A contains sparse to moderate amounts of marine shell midden on bedrock
A	Cave shelter			+	
B	Overhang shelter			+	
T-142	Complex (4)	Habitation	H M M	+	Deposit partially disturbed by pot-hunters, but intact deposit present; contains moderate to high amounts of marine shell midden; volcanic glass present
A	Cave shelter			+	
B	Collapsed C-shape			+	
C	Cave shelter			+	
D	Cave shelter			+	
T-143	Bedrock excavation	Indeterminate	L L L	- - -	Crude terrace at entrance
T-144	Cairn	Indeterminate	L L L	- - -	No visible trail in area
T-145	Modified/terraced outcrop	Indeterminate	M/H H H	+	Utilizes numerous coral boulders; poss. shrine
T-146	Wall or trail causeway	Indeterminate	M M L/H	+	Area overgrown with <u>klava</u>
T-147	Cairn	Indeterminate	L L L	- - -	No visible trail in area
T-148	Modified outcrop	Indeterminate	L L L	- - -	Poss. natural feature
T-149	Terrace	Habitation	H M M	+	Contains soil surface; waterworn basalt boulders present
T-150	Complex (2)	Temporary habitation	M L L	+	Feas. B contains waterworn basalt boulders on top
A	C-shaped wall			+	
B	Rubble pile			+	
T-151	Shelter remnant	Temporary habitation	M L, L	+	Poss. a collapsed C-shaped wall

Table 2. (Cont.)

Site & Feature Number	Formal Site/Feature Type	Tentative Functional Interpretation	Significance Evaluation			Field Work Tasks	Comments
			M	L	L/H	DR SC EX	
T-162	Complex (4)	Poss. Habitation	M	L	L	+	Fea. A poss. collapsed platform; Fea. B poss. a pen
A	Rubble pile						
B	Walled shelter						
C	Cairn						
D	Rubble pile						
T-163	Collapsed platform	Indeterminate	L/H	L/H	L/H	+	Poss. burial
T-164	Complex (3)	Habitation	H	M	M	+	Deposit extensively excavated by pot hunters; very little intact deposit remaining; contains moderate to high amounts of shell midden and artifacts incl. volcanic glass
A	Large cave						
B	Overhang						
C	Rubble piles around Fea. B						
T-165	Complex (37)	Habitation/ceremonial	H	H	L/H	+	Site complex associated with and constructed along Site T-183 trail; features situated near or on north edge of aa flow; scattered marine shell midden and artifacts present; site complex also appears associated with Site T-164; hearth feature containing ash and organic matrix present on Fea. C; several features poss. burials
A	Large terrace						
B	Small platform						
C	Cairn						
D	C-shaped wall						
E	Walled shelter						
F	Platform						
G	As excavation						
H	C-shaped wall						
I	Platform						
J	Platform						
K	C-shaped wall						
L	Walled shelter						
M	Walled shelter						
N	Walled shelter						
O	As excavation						
P	Cairn						
Q	Cairn						
R	Walled shelter						
S	Walled shelter						
T	Walled overhang						
U	Walled overhang						
V	Compartmentalized shelter						
W	Walled overhang						
X	Cairn						
Y	Walled shelter						

Table 2. (Cont.)

Site & Feature Number	Formal Site/Feature Type	Tentative Functional Interpretation	Significance Evaluation			Field Work Tasks	Comments
			M	L	L/H	DR SC EX	
T-152	Complex (2)	Indeterminate	L/H	L/H	L/H	+	Poss. grave markers; contains coral and waterworn boulders
A	Cairn						
B	Cairn						
T-153	Complex (5)	Habitation	M	L	L/H	+	Contains scatter of marine shell midden; waterworn boulders and thin soil in area; Fea. C poss. burial
A	Enclosure						
B	Terrace						
C	Cairn/platform						
D	Terrace						
E	Cairn						
T-154	Enclosure	Temporary habitation	M	L	L	+	Contains marine shell midden and volcanic glass; thin soil present
T-155	C-shaped wall	Temporary habitation	M	L	L	+	Box-shaped; marine shell midden present on bedrock
T-156	Wall remnant	Indeterminate	L	L	L	-	Waterworn basalt boulders present; poss. walled shelter
T-157	Complex (3)	Habitation	H	M/H	M	+	Contains moderate amounts of marine shell midden and artifacts including volcanic glass;
A	Enclosure						
B	U-shaped wall						
C	Hidden scatter						
T-158	C-shaped wall	Temporary habitation	M	L	L	+	Midden, soil deposit present
T-159	Enclosure/terrace	Habitation	H	M	M	+	Marine shell midden present; site partially destroyed by high surf
T-160	Complex (2)	Poss. habitation	M	L	L	+	Situated on top of knoll; excellent view of coast
A	C-shaped wall						
B	Enclosure wall						
T-161	Cairn	Road marker	L	L	L	-	Marks junction of present jeep road

Table 2. (Cont.)

Site & Feature Number	Formal Site/Feature Type	Tentative Functional Interpretation	Significance Evaluation	Field Work Tasks	Comments
			R I C	DR SC EX	
T-174	Complex (2)	Indeterminate	L L L	- - -	No visible trail in area; isolated feature
A	Cairn				
B	Cairn				
T-175	Rubble pile	Survey marker	L L L	- - -	Remnants of old survey station; situated on Puu Kuili
T-176	Complex (2)	Indeterminate	L L L	- - -	Fea. B poss. recent; situated on Puu Kuili
A	Rubble pile				
B	Rubble pile				
T-177	Rubble pile	Indeterminate	L L L	- - -	Situated on Puu Kuili
T-178	Wall remnants	Poss. shelter	L L L	- - -	Situated on Puu Kuili
T-179	Modified pond	Recreation/ aquaculture	H H H	+ - -	Anchialine pond deepened and modified with walls and platforms
T-180	Modified pond	Recreation	L H H	- - -	Anchialine pond deepened by removing submerged rocks
T-181	Modified pond	Aquaculture	M/H H H	+ - -	Anchialine pond modified with wall
T-182	Footpath	Transportation	M H H	+ - -	Coastal footpath to Makalewena
T-183	Footpath	Transportation	M H H	+ - -	Coastal-inland footpath to Makalewena
T-184	Complex (15)	Habitation	H H L/H	+ + +	Site complex associated with and constructed along Site T-183 footpath; scattered marine shell midden present; Fea. B contains soil under
A	Walled shelter				
B	Walled shelter				
C	Walled shelter				
D	Walled shelter				
E	Walled shelter				
F	Walled shelter				
G	Walled shelter				

Table 2. (Cont.)

Site & Feature Number	Formal Site/Feature Type	Tentative Functional Interpretation	Significance Evaluation	Field Work Tasks	Comments
			R I C	DR SC EX	
T-165	Complex (cont.)				
Z	Faced hole				
AA	C-shaped wall				
BB	Terrace				
CC	Platform				
DD	Walled shelter				
EE	C-shaped wall				
FF	Partially walled platform				
GG	C-shaped wall				
HH	As excavation				
II	Leveled area with overhang				
JJ	As excavation				
KK	As excavation				
T-166	Overhang shelter	Temporary shelter	L L L	- - -	No portable remains
T-167	Complex (3)	Poss. Agriculture	M L L	- - -	Consists of walls built around the perimeter or in older kipu on the as flow
A	Wall section				
B	Enclosing wall				
C	Enclosing wall				
T-168	Complex (3)	Temporary shelter	L L L	- - -	Contains two shell fragments; marginal use
A	Overhang				
B	Modified outcrop				
C	Modified outcrop				
T-169	Complex (2)	Temporary shelter	M L L	- - -	No portable remains visible; situated on as flow; Fea. A perimeter is boulder lined
A	Level area				
B	C-shaped wall				
T-170	Complex (2)	Indeterminate	L L L	- - -	Situated on north edge of as flow
A	Cairn				
B	Cairn				
T-171	C-shaped wall	Temporary shelter	L L L	- - -	No portable remains
T-172	Cave shelter	Temporary shelter	L L L	- - -	Very sparse shell midden on bedrock
T-173	Enclosure	Indeterminate	L L L	- - -	With exception of coral fragments, no portable remains

Table 2. (Cont.)

Site & Feature Number	Formal Site/Feature Type	Tentative Functional Interpretation	Significance Evaluation P I C	Field Work Tasks		Comments
				DR	SC EX	
T-184	Complex (cont.)					gravel floor; Feas. K and O poss. burials
H	Walled shelter					
I	Walled shelter					
J	Walled shelter					
K	Walled shelter/crude platform					
L	Walled shelter					
M	Walled shelter					
N	Walled shelter					
O	Small platform					

APPENDIX A:
PRELIMINARY HISTORICAL DOCUMENTARY RESEARCH
PROPOSED AWAKEE RESORT DEVELOPMENT PROJECT AREA

Land of Awakee
North Kona, Island of Hawaii

by

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INTRODUCTION

It is the intent of this preliminary historical research effort to identify and examine immediately available sources for information relative to the Awakee project area. A sampling of specific mythological, cultural and historical information has been assembled from the writings of native historians, from descriptive accounts, from land records, and from cartographic sources.

Before proceeding with details relative to Awakee, North Kona, a cursory study will be presented of the larger land division in which Awakee is situated. It is intended, by this approach, to properly define the setting that backdrops the project area, so as to provide a historically faithful context from which Awakee can be viewed.

Kakaha - A Traditional Perspective

A distinct set of traditions exists for that broad North Kona land section anciently known as Kakaha. In describing its expanses and boundaries, a kana'ina wrote:

Kakaha (barren, desolate) was the name given to that section of North Kona from Honokohau, North of Kailua, to Napuu (the Hille), meaning Puuawaea and Puunahulu, and along the coast to Anuehoosilo, the boundary of South Kohala.

It is often spoken of as Kekaha-Wai-Ole (the desolate land without water). Pele, the Volcano, has literally eaten the heart out of this section.

One readily sees the great lava stretches of country, as one travels along the road. It is no wonder that the simple fisher-folks living along the sea-coast personified the Volcano as a dreadful being with supernatural powers whose wrath bore down on them so much destruction, laying waste their gardens, and filling their fishponds with rocks, leaving them on a narrow strip of beach, the ocean on one side, and lava fields on the other (Maguire 1926:5).

The district's waterless condition is memorialized by generations of native residents in the familiar saying (quoted in part above):

Kekaha wai'ole o na Kona.
Waterless Kekaha of the Kona district.

Kekaha in Kona, Hawaii, is known for the scarcity of water but is dearly loved by its inhabitants (Pukui 1983:185).

Another saying fixed in oral tradition comments on the life-sustaining qualities of the sea off Kekaha:

Ole aku la ke sina kaha, ua pua ka lehua i kai.
Life has come to the kaha lands for the lehua blooms are seen at sea.

"Kaha lands" refers to Kekaha, Kona, Hawaii. When the season for deep-sea fishing arrived, the canoes of the expert fishermen were seen going and coming (Pukui 1983:271).

Kekaha was also known among those who dwelt at Kailua as the land from which the gusty Hoolua wind blew. John Papa Ii noted:

A little more frequent was a cold wind from Kekaha, the Hoolua. Because of the calm of that land, people often slept outside of [on] the tapa drying sites at night. It is said to be a land that grows cold with dew-laden breeze, but perhaps not so cold as in Hilo when the Alahoua blows (Ii 1973:122).

Thus did natives of that land characterize Kekaha in elemental and physical terms. Despite those shortcomings acknowledged above, a fairly unique history sprang from this district.

Kekaha - A Historical Brief

The native historian S.M. Kasakau recorded that in the war between Kakauike of Maui and Alapaiui of Hawaii, Kakauike, in fleeing from Alapaiui's forces, pillaged Kona and Kohala and "abused the country people of Kekaha" (Kasakau 1961:66-9). Kakauike ruthlessly laid waste the coconut groves of both districts. This deliberate act of destruction was a matter of no small consequence, for to fell trees of such usefulness

(to the ancients) was considered truly inhuman. Kekaha's common-folk were also slaughtered by the retreating Maui forces.

Kasakau also stated that Kekaha lands had been set apart from the whole of Hawaii island for the priestly class:

Haikea was given to the Pao kahuna class in perpetuity and was held by them up to the time of Kamehameha III when titles had to be obtained. But there was one land title held by the kahuna class of Pao for many years and that was Pupepa in Kohala. In the same way the land of Kekaha was held by the kahuna class of Ka-uahi and Nahulu (Kasakau 1961:231).

These Kauhii and Nahulu lines of priesthood assumed active and influential roles well into the historic period. They served as counsel to kings and later even dared to strongly voice their disapproval over Liholiho's "free-eating" and his general disregard of traditional precepts. Their Kekaha lands were thus guaranteed by chiefs such as Kalaniopu'u and were passed quietly to their progeny. Individuals descending from one of these priestly lines, the Nahulu, included the twin chiefs Kameeiamoku and Kamehameha.

Of particular note in relation to Kekaha is Kameeiamoku's son, Ulumehiehoi Hoipili, who was well-trained in all of the arts of this esteemed lineage. Kasakau recalled:

He [Hoipili] belonged to the priesthood of Nahulu and was an expert in priestly knowledge. He had been taught astronomy and all the ancient lore (Kasakau 1961:354).

Kasakau further enumerated upon some of the skills at which Hoipili excelled: debate, knowledge of the history and rule of the chiefly lines, ancient protocol, royal genealogies, and proficiency and literacy in the English language. He was entrusted with many key political positions and governed justly and well. So faithful and dependable was he that, upon the demise of Kamehameha I, Hoipili was given the guardianship of the "Conqueror's" sacred remains, which (it is believed) he carefully hid in Kekaha in Kalo (Kasakau 1961:215, 355).

With facility we are able to see that, in spite of an unassuming appearance, Kekaha is distinguished by its unique history and in its religious and cultural significance. Now that a sketch of the broad land area of Kekaha has been established, we are better able to center specifically on Awakee.

AWAKEE - MYTHOLOGICAL TRADITIONS

Three separate legendary traditions arising from landforms and features in the area were traced. The first concerns two hills:

"Akahipuu" (situated on the exact upland boundary of Awahee and Makalevema) and "Kuili" (located on the seaward portion of Awahee).

Maguire wrote:

The legend tells how the little Menehune wanted to take the peak of Akahipuu off and place it on the top of Kuili, which is a hill below, near the sea-coast.

The hill of Kuili has a depression on its top, and the Menehune thought it would be a fine thing to take the pointed top off Akahipuu and place it in the hollow top of Kuili, for a cap.

These little Menehune were not only wonderful workers but were often mischievous, and delighted in doing all sorts of tricks.

They started to dig around the top of Akahipuu and were working away vigorously when suddenly a rooster crowed.

Down went their kauila sticks which they were using as crow-bars to pry up the hill top.

The Menehune stopped working, as it was against their law to work after dawn, but they were most anxious to accomplish this undertaking, for they deemed it a fitting memorial of their great powers as supernatural beings.

They made another attempt again the second night, and again, the rooster crowed.

They were so filled with wrath over the crowing of this rooster, that they decided with one accord to catch and kill him. They sent out three of their number. Pabulu, who was their Alii (Chief); Kuhlukoe, their Marshall, and Nehulu, the Messenger.

Now this rooster that crowed so early in the morning and prevented the Menehune from finishing their work, was also a God. His name was Moanuihaha and he lived in the tall lehua forest about two miles above Akahipuu.

In the midst of this forest is a beautiful hill with a deep crater filled with ferns and luxuriant vegetation. This hill was also called Moanuihaha. Below the hill was a cave with a pool of water in it, and the rooster lived in the cave.

The water of this cave was kapu, forbidden, to women and this rooster was the guard over this pool of water.

Kane, who was the greatest God of the forests and the

waters, was the possessor of this water and it was he who placed Moanuihaha as its guard.

He also gave him orders to watch the Menehune digging around Akahipuu and to prevent them from taking its peak off and placing it on Kuili, and thus their plan for distinguishing themselves as most supernatural beings would fall through.

Let us return and see what Pabulu, the Chief of the Menehune, and his two followers are doing.

They started, as had been arranged, to go and catch this rooster and kill him, so that their work would be accomplished. When Pabulu and his men arrived on the top of Moanuihaha Hill, they waited until the rooster should crow again; and that is also the time when the Elepaio (a Hawaiian bird) sings its olehala, last note, heralding the dawn; and the Kahuli (land shell's) piercing song is heard through the woodland.

At last, when these signs of approaching day had died away, the rooster crowed, and these Akua (Gods) sprang up and caught and killed him.

The third night the Menehune again started digging around Akahipuu, while just below them was the imu in which they had placed the rooster to kahu (bake).

The top of Akahipuu was about to be raised; the kauila sticks were in position, and just as the command was to be given, to hapai like (lift all together), the crow of a rooster was heard from the top of Moanuihaha.

They all stood aghast! Then they began to berate the three Menehune who had caught and killed the first rooster, and they said: "Why did you not see there was another rooster, and caught and killed him too?"

They argued with one another until at last they uncovered the imu and behold! No chicken in the imu!

The Menehune were so enraged at being so fooled, and deprived of their power to fulfill their desire, that they left everything as it was and fled never to appear there again. It was indeed true; the rooster Moanuihaha had come to life again. The God Kane had seen him killed, so he gave him the water of life, and thus he lived again.

After the Menehune had left Akahipuu, Kaleikini, a person of power and renown, a distinguished warrior, came and with a kauila rod, thrust it nine feet deep, and fastened the hill

down firm so that the Menehune could not come again and take it away.

This kauila log was in the side of the hill when we first came to live at Huehue, but now there is no trace of any kauila. A forest of eucalyptus, pine, kukui and other trees covers the whole hill (Maguire 1926:11-3).

Adjacent to the above-mentioned Akahipuu is a prominent cave known as Makalei.

In this second tale, the child Makalei, his parents and two sisters move from Windward Oahu and settle near Akahipuu. Although there is little available water in the area, they are able to cultivate a variety of fruits and vegetables, using water from a rain-catchment system. Long-time residents inform the newcomers that additional water is available, but only at risk from certain privately owned caves; to be caught stealing this water was punishable by death at the hands of the cave owner.

One day Makalei discovers a wet underground cave in the back of his house. Father and son quickly fill the cave with troughs and canoes to catch and store water dripping from its ceiling and walls. This provides the family with an ample supply on which they live comfortably. Eventually, the family moves away but they leave the wet cave entrance well-concealed.

As a young man Makalei decides to visit the area and consequently challenges some of the local youth to games and sports. After having proven his skill by winning all competitions, he asks for a drink of water. The residents argue that water cannot be had as it is very scarce. He refuses this and begins to dig at the entrance to the underground cave. Once opened he reveals his identity and thus the cave is known by his name to this day (Maguire 1926:27-30).

The final tradition deals with the bay of Maniniowali, which is situated between Kukio and Awaake.

At the birth of their children, two families decided to betroth Uluvueu, the son of one, to Maniniowali, the daughter of the other. As the wedding day drew near, the groom-to-be took ill; so ill, that the wedding was postponed. Immediately he recovered, only to become ill again when the second set of wedding plans was made. A kahuna was brought in to diagnose the cause of his strange malady. Kikaua (the kahuna) proclaimed his sickness to be due to Uluvueu's love for the Princess Kahavalivali. News of this scandal reached Maniniowali, who then became similarly afflicted over the loss of her intended. Kikaua was again consulted, and he suggested two courses of action for the lovesick and heartbroken couple. Either they would marry immediately or he could do away with them all:

The mother answered, "Do away with them all!"

"That is the decree!" said the kahuna; and he immediately began to work his black art. He is told as having prayed to his Gods, the Goddess Pele being the principal one, and the young girls and the young man were all disposed of.

Uluwueu was turned into a stone which is seen standing at the edge of the sea to this day. He stands on the shore, his lower limbs firm and fast, and where the upper part is joined to the firm rock in the ground, is a groove like a door hinge which rocks back and forth when the waves dash against it.

Kahavalivali, the Princess, was turned into a long stone about thirty feet high, which stands in the sea. The lower part has two sections, and it is said they represent her legs, through which the sea flows continually.

Maniniowali, however, was alert and ran and laid down on the sand at the edge of the sea, so when she was turned into a stone she was firm in the sand. When the tide comes in, she is covered, and when the tide goes out the sand is washed away and her form is seen lying clearly outlined on the beach.

But the strangest thing of all is: a kawili (school) of manini, in a line so close together that it looks like a string or a long fish resembling a shark, trails across this little bay of Maniniowali from end to end.

During the evenings of Ku, that is when the moon is in the West at sunset, this string of manini is seen; also in the mornings of Lono and Maui they follow in a long line. It is said that this Maniniowali (twist or string of manini) is the girl's fish body and she was called that name on that account, and that is why the manini strings across this bay are named after her (Maguire 1926:31-5).

Thus were the various physical features within Awaake preserved in tradition. They hark back to an era of menehune and kupua gods, heroes and lovers, and they provide an insight into the manner in which the local residents viewed familiar landforms and explained how they came to be and how they were named.

AWAKE - DETAILED LAND HISTORY

Native historians noted little in the way of specific information relative to Awaake. Land records, however, reveal something of the status of the ahupua'a in early historic times.

The native historian Samuel M. Kamakau wrote:

Another important event which occurred in the fourth year of Kamehameha's rule was the lava flow which started at Hu'e'u'e in North Kona and flowed to Mahai'ula, Ka'upulehu, and Kiholo. The people believed that this earth-consuming flame came because of Pele's desire for sea fish from the fish ponds of Kiholo and Ka'upulehu and aku fish from Ka'elehuluhulu; or because of her jealousy of Kamehameha's assuming wealth and honor for himself and giving her only those things which were worthless, or because of his refusing her the tabu breadfruit of Kameha'ikana which grew in the uplands of Hu'e'u'e where the flow started. Perhaps the people were all wrong, since the true God is in heaven and fills the heavens with wonders and the earth with all it contains. Kamehameha was in distress over the destruction of his land and the threatened wiping-out of his fish ponds. None of the kahunas, orators, or diviners were able to check the fire with all their skill. Everything they did was in vain. Kamehameha finally sent for Pele's seer (kaula), named Ka-maka-o-ke-akua, and asked what he must do to appease her anger. "You must offer the proper sacrifices," said the seer. "Take and offer them," replied the chief. "Not so! Troubles and afflictions which befall the nation require that the ruling chief himself offer the propitiatory sacrifice, not a seer or a kahuna." "But I am afraid lest Pele kill me." "You will not be killed," the seer promised. Kamehameha made ready the sacrifice and set sail for Kekaha in Mahai'ula.

When Ka-'ahu-manu and Ka-heihai-malie heard that the chief was going to appease Pele they resolved to accompany him and if necessary die with him... Other chiefs also took the trip to see the flow extinguished. From Keshole Point the lava was to be seen flowing down like a river in a stream of fire extending from the northern edge of Hualalai westward straight toward Ka'elehuluhulu and the sweet-tasting aku fish of Hale'ohi'u...

The flow had been destroying houses, toppling over coconut trees, filling fish ponds, and causing devastation everywhere. Upon the arrival of Kamehameha and the seer and their offering of sacrifices and gifts, the flow ceased; the goddess had accepted the offering.

The reasons given for the flow may be summed up as: first, Pele's wanting the aku of Hale'ohi'u and the 'ahi' fish of Kiholo; second, her anger at being denied the breadfruit of Kameha'ikana in upper Hu'e'u'e; third, her wrath because Kamehameha was devoting himself to Ka-heihai-malie and neglecting Ka-'ahu-manu... (Kamakau 1961:184-6).

To the above account, Westervelt added:

...Numerous offerings were presented and many hogs were thrown alive into the stream to appease the anger of the gods.

Awakee is listed among the lands belonging to Kamehameha I as a direct result of the battle of Mokuohai (Int. Dept. Doc. 374). This battle marked the first in the series of victories that Kamehameha experienced in bringing about the unification of the island chain under his rule.

At the time of his death in 1782, Kamehameha's uncle, the chief Kalaniopu'u, had attained virtually complete rule of the island of Hawaii. Shortly after his death, Kamehameha and his cousin Kivalao were pressured into battle. Contention between the two had been kindled in part by several chiefs who were discontent over the division of land districts on Hawaii. Intentional acts of destruction against the innocent natives of south Kona (who were under Kamehameha's protection) could not be ignored and the conflict was brought to a bloody resolution.

Kivalao was the first to arrive on the battlefield, with the men who were to fight with him. Kamehameha was getting ready, and was preceded to the battlefield by Keaumoku Papahihahi, his uncle. Kalaniasuhu, Kamehameha's younger brother, was in charge on Kamehameha's side. They went to the place where they were to encamp, for the purpose of asking the will of the gods. While they were encamped there, a report came that Keaumoku had been taken captive by his opponents and was to be stabbed. Kivalao, who was standing close by, said, "Be careful of the niho palaoa on Keaumoku's neck," and at these words, Keaumoku thought, "The chief has no regard for the life of a hulu makua (an older relative)." This news of Keaumoku's peril caused Kamehameha to hasten to the battlefield. Keaumoku, later the wife of Kamehameha, and the daughter of Kamehameha, was borne thither on the back of Pahia, a man who was an expert in stone throwing. When they drew near to Kivalao, Pahia let Keaumoku down and took some stones into his hand which he flung with such force that Kivalao fell when they struck his temple. Kivalao landed on Keaumoku, who took him by the throat and slashed it with a lei o mango, or sharktooth knife, killing him (H 1959:14).

Thus the battle of Mokuohai resulted in the following assignment of districts to three ruling chiefs:

- to Keoua went Kau and half of Puna;
- to Keavenuehili went half of Puna, Hilo, and half of Hanaakua;
- to Kamehameha went half of Hanaakua, Kohala and Kona.

Possession of Awakee, North Kona, though acknowledged by some after the death of Kalaniopu'u as belonging to Kamehameha, was now unquestioned.

In 1801, a volcanic flow seared through the northernmost boundaries of Awakee. In this vicinity grew the sacred breadfruit grove of Kamehameha.

265-011387

found that of Kahaialii, who purchased 401 ac of Awakee land at 25 cents per acre; the description attached to the parcel stated: "poor land, good pasture." Regarding these sales, Fuller commented:

I would observe that none of these lands are fully paid for, but after the sales are confirmed I shall proceed to collect the balance as soon as possible - Yet it is necessary to give the purchasers considerable time; as they are mostly poor and have but little which they can turn into cash. - To encourage them, I have agreed to take goat skins, Pulu and wood, and pay the cash for them -

Your Excellency will perceive that I have sold this poor land in large tracts for goat-runs and pastures, as in small lots it would be perfectly worthless... (Interior Dept. 5/28/1855)

Approval on these sales was granted and, in May of 1856, Kahaialii is formally awarded his parcel under Grant 2023. The metes and bounds description was given as:

Beginning at the western corner of this /parcel/, at the pile of stones on the beach nearest to Makalevuna, run

North 61° 46' east 9.50 chains along the beach
 South 71° 16' east 9.18 " " "
 North 38° east 33. " " "
 North 43° 45' east 34.22 chains along the beach to the north corner (stone pile)
 South 66° 45' east 3.00 chains to Maninoweli
 South 66° 45' east 10.41 " " "
 South 53° east 25.00 " " " the east corner
 South 31° 15' west 62.15 chains to the government land at the western corner
 North 70° 30' east 64.40 chains to Makalevuna, to the point of commencement. 401 Acres.
 (Grant Deed 2023 Bk.10:451)

(Researcher's Note: the above description was translated as correctly as possible utilizing badly scratched microfilm.)

As no separate boundary description relative to Awakee could be located on file, the description for Makalevuna was employed for the markers delineating the common boundary they share.

Of the two natives who gave testimony at the Boundary Commission hearing, one was Kahaialii. The Makalevuna-Awakee boundary was given as:

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by whom they supposed it was directed, and to stay its devastating course. All seemed an unrelenting until one day King Kamehameha went to the flowing lava, attended by a large retinue of chiefs and priests, and as the most valuable offering he could make, cut off part of his own hair which was always considered sacred and threw it into the torrent. In a day or two the lava ceased to flow. The gods, it was thought, were satisfied. The people attributed this escape to the influence of Kamehameha with the deities of the volcanoes....

The account in the Kukua, a newspaper published in the native language, in 1867, adds to the story of the foreigner the element of superstition and is practically as follows:

Pele began to eat Hue-hue, a noted breadfruit forest owned by Kamehameha. She was jealous of him and angry because he was stingy with his offerings of breadfruit from the tabu grove of Hue-hue. This was the place where the eruption broke out.

After she had destroyed the breadfruit grove, she went in her river of fire down to the seashore to take Kamehameha's fishponds. She greatly desired the sea fish with the mullet in the fishpond at Kiholo, and she wanted the aku or bonito in the fishpond at Ma-ele-hulu-hulu. She became a roaring flood, widely spread out, hungry for the fish.

Kamehameha was very much ashamed for the evil which had come upon the land and the destruction of fishponds. Villages had been overwhelmed. Several coconut groves had been destroyed, and lava land was built out into the sea. (Westervelt 1963:147-8).

During the mid-19th century division of lands resulting from the Great Hehele of Kamehameha III, Chief Rukia Nanaulu registered his claim for the shupua'a of Awakee. He submitted his letter of registration on February 4, 1848 (Native Register v.4:559). On October 6th of that same year, Nanaulu died and left his estate to the management of his widow, Kapoli. Kapoli later requested that Nanaulu's cousin and heir, the Chief Mataio Kekuanoa be appointed as a joint administrator.

Nanaulu's will specified that Mataio Kekuanoa receive the bulk of his lands and houselots, reserving one-third of the property for the widow Kapoli. Rights of the native tenants upon these lands were to be guaranteed, providing they resided peacefully under Kapoli (1 Probate 885). Testimony verifying Nanaulu's claim to Awakee shupua'a for Kekuanoa was entered (Native Testimony v.10:188). Kekuanoa, in lieu of commutation, then surrendered Awakee to the U.S. Government (Interior Dept. 8/27/1850).

In May of 1855, Kona Land Agent, J. Fuller, submitted a report listing government lands in Kona sold to individuals. Among the names is

...We have set flags on every boundary by the coast save one, where a prominent rock made it unnecessary, between the Ahupuaas in this district, as far as Mahaloahumakahi between Makalevua & Mahuila /sic/. Our Ahupuaa station is on the exact boundary between Awakee & Makalevua. We have taken horizontal & vertical angles to every visible hill, cape, bay or point of interest in the district recording its local names and the name of the Ahupuaa in which it is situated. Every item of local historical, mythological or geological interest has been carefully sought & noted. Perryman has embellished the pages of the field book with twenty four neatly executed views & sketches from the various trig. stations we have occupied... (Survey Correspondence 5/21/1882).

Two of Perryman's views depict details of Awakee (Figures 28 and 29).

The supplementary notes Emerson makes reference to are found in his field books. He recorded:

- 20 Lee o Kaiwikohola
Makalevua 112° 10' 0" 3° 36' 30"
owes its name to the death of a whale that was unfortunate enough to wedge himself in the rocks while in chase of a boat (cancee).
21 Awakee Bay 107° 3' 0" 5° 38' 40"
Head - in Awakee Depress 142° 21' 0" 7° 42' 20"
22 Kaholeva Cape 162° 52' 0"
Extremity in Awakee
23 Kaholeva Bay 180° 6' 0"
Head in Awakee
Kalohuhui flag
Boundary between Awakee and Maniniowali.
170° 27' 0"
Kuli Tomb
Grave of Lasui, former owner of this Land of Awakee, buried August, 1879. Distance from signal - 25 feet.
5° 34' Depress
24 Lee o Punaloa 190° 17' 0" 7° 24' 0"
Extremity Maniniowali Depress.
(Survey Division Field Book)

104 acres of land in Awakee, Kukio 1 & 2 and Maniniowali were sold by the Hawaiian Government in 1888 to John Maguire under Grant 3438. These lands are situated at the upland or south-eastern boundary, where Awakee, Maniniowali and Kukio converge (Grant Index 1916:159).

During the closing decade of the 19th century, Awakee land history is characterized by contention between various parties over land use. In summary it can be said that beginning early in 1890, a sizeable corps of native Hawaiians from North Kona make constant application to the Minister

Kahaialii (k.)

I was born at Makalevua, Kona Akaun Hawaii, at the time of Palakee, Kiseaku, at Honsansu. Have always lived there and know the boundaries - my makua (now dead) pointed them out to me...thence to a high hill called "Akahi" the boundary being on the brow of said hill and the South pali on Mahaiula thence to a place, a short distance above the hill, called Punuhulu, where Makalevua corners with the lands of Mahaiula and Awakee, on the boundary of Kaupulehu - I do not know where Kaohimau's land ends. Thence turn makai along the iwi aina of Awakee, over the top of Puu Akahi, to Kaumua, a kihapai at the Government road thence makai, to a place, on the North side of an old kihapai si called Haleoku, thence makai to Hehapaipai a small water hole in a small patch of paboshoe bound upon north side; thence to the prickly pears growing on the sea, and from thence the boundary strikes across the sea, to Hukuinsapulehu, ss, thence to Mokuopohaku, on Kaiwikohola, a large round stone, thence to Mokuopohaku, on Kaiwikohola, a large rock in the surf...

The second to submit testimony was Mamee:

Mamee (k.)

I was born at Makalevua North Kona Hawaii but I do not know when (appears to be a middle aged man); have always lived there, and know a part of the boundaries, having heard where they are from the last witness...Thence up the south side of Puu Akahi, and from thence make to Punuhulu the corner of Makalevua Mahaiula and Awakee and where these lands are cut off by Kaupulehu. Thence turn makai across the top of Puu Akahi to Kaumua, at the Government road, thence makai to Kaopapepa Hehapaipai, the boundary running to the North of it, thence to prickly pears on the paboshoe, and from thence to Kukuinsapulehu; as with pill growing on it. Thence to Pohakunasepoou a large rock at the sea shore, and from thence to a large rock in the sea called Kaiwi Kohols (Boundary Commission Vol. A:373-5).

In April of 1875, two individuals sought leases of tracts of North Kona lands, of which Awakee is a part - A.S. Cleghorn and John Broad both expressed their interest in these lands, apparently for pasture use. Broad applied for a lease of five years at the sum of 34 dollars per annum. No follow-up correspondence could be found indicating whether or not either received their request (Interior Dept. April 1875).

Then in May of 1882, Government Surveyor J.S. Emerson penned the following description of his work in North Kona in a letter to the Surveyor General:

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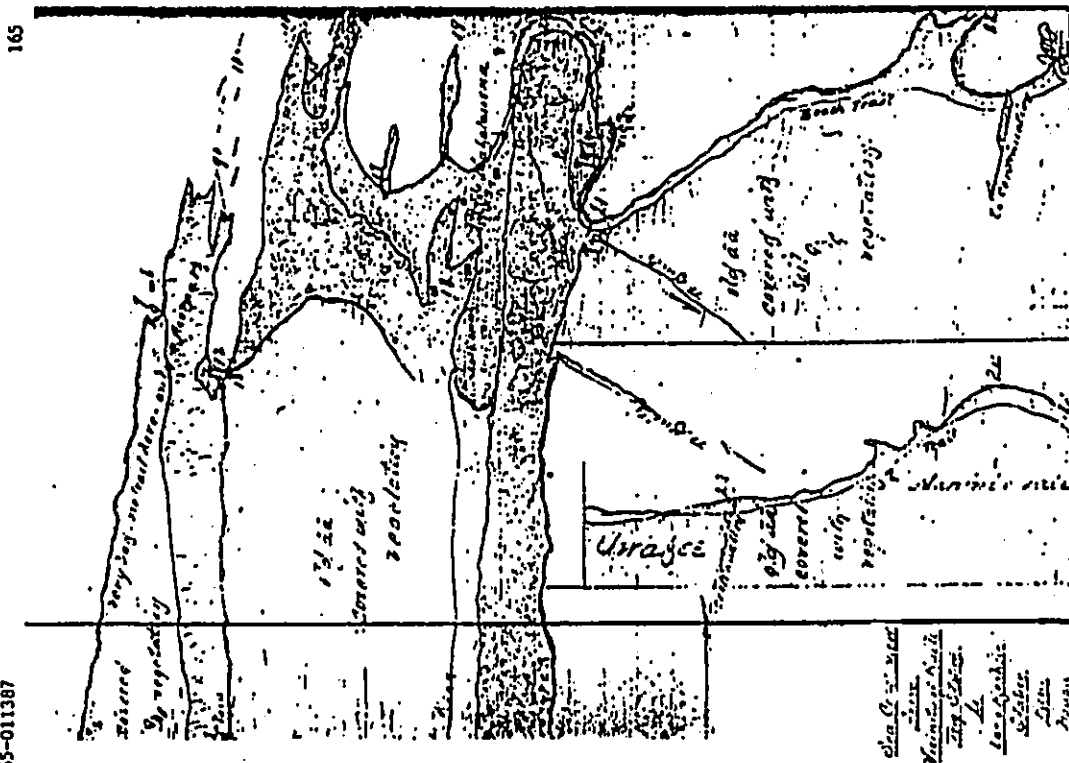


Figure 28. View of Awake Coastline from Uplands (1882)

265-011387



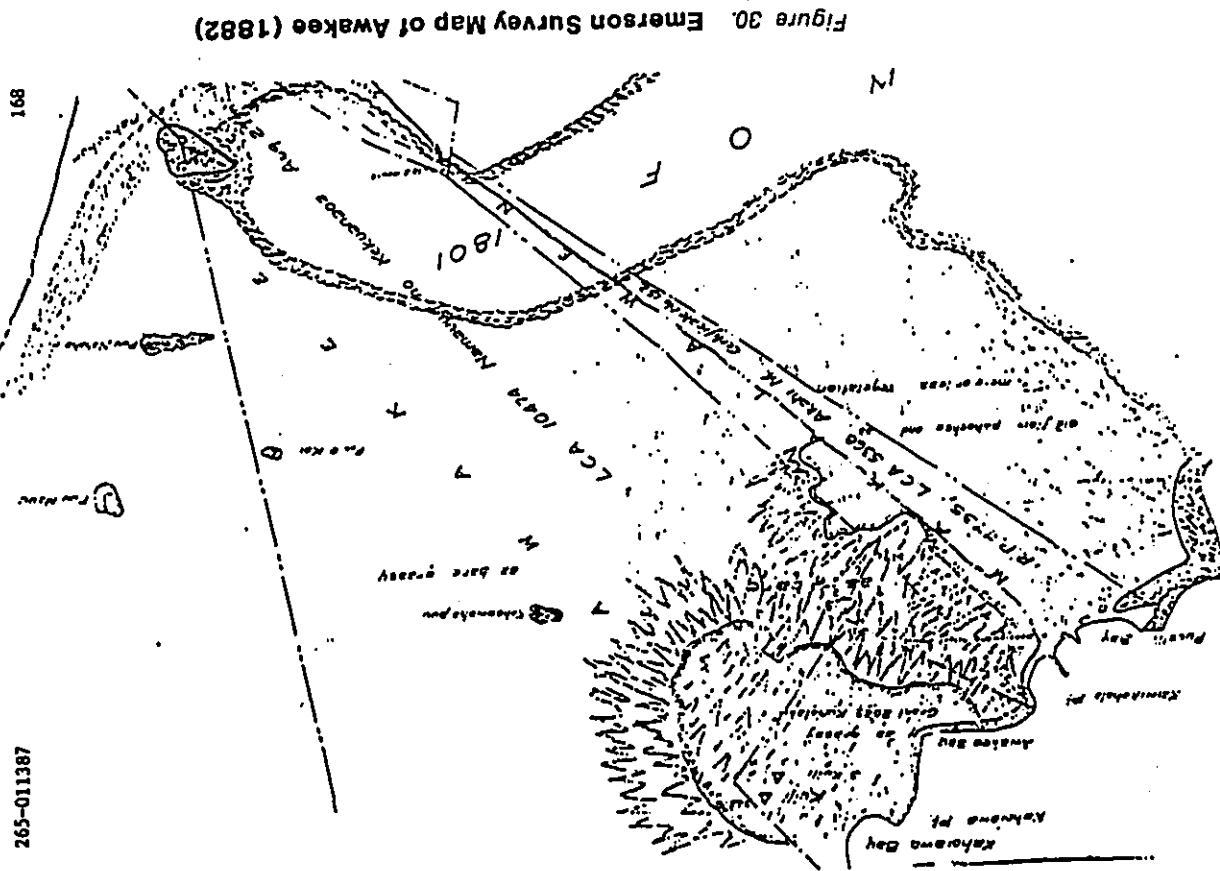
Figure 29. Sketch of Awake Coastline from Perryman (1882)

of the Interior for government lands and upland remnants to be set aside and laid out for homestead purposes. They described themselves as being destitute, homeless and in desperate need of land on which to settle. The Minister of the Interior had also received applications for the lease and purchase of Awakee lands from various individuals who intended these lands for ranching, coffee and fruit tree cultivation. The outcome was that the Survey Office recommended that the Government decline lease and purchase requests and instead favor the subdivision of lands for homesteading (Interior Department 1890-5).

CARTOGRAPHIC SOURCES

In addition to the survey notes and extracts from correspondence to the Surveyor General which were discussed in the previous section, attention should be directed to the sketches of the vicinity prepared by Perryman. The second, which is entitled "Sea Coast from Kaupulehu Village to Makalevua", bears the land feature numbers 53 and 54. The corresponding field book entry lists "Awakee fish ponds" for these numbers. This site, as well as the grave of Lasmui, hints of two trails (one along the seacoast and one further inland, leading from Awakee Bay to Kuili Hill), are to be noted as present in 1882.

A single map (Figure 30) of interest relative to the area is included in this report. Although Emerson does not plot any supplementary data on it, he does provide notes on vegetation and terrain.



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CARTOGRAPHIC SOURCES

In addition to the survey notes and extracts from correspondence to the Surveyor General which were discussed in the previous section, attention should be directed to the sketches of the vicinity prepared by Perryman. The second, which is entitled "Sea Coast from Kapulehu Village to Makalewena", bears the land feature numbers 53 and 54. The corresponding field book entry lists "Awakee fish ponds" for these numbers. This site, as well as the grave of Lamani, hints of two trails (one along the seacoast and one further inland, leading from Awakee Bay to Kuli Hill) are to be noted as present in 1882.

A single map (Figure 30) of interest relative to the area is included in this report. Although Pearson does not plot any supplementary data on it, he does provide notes on vegetation and terrain.

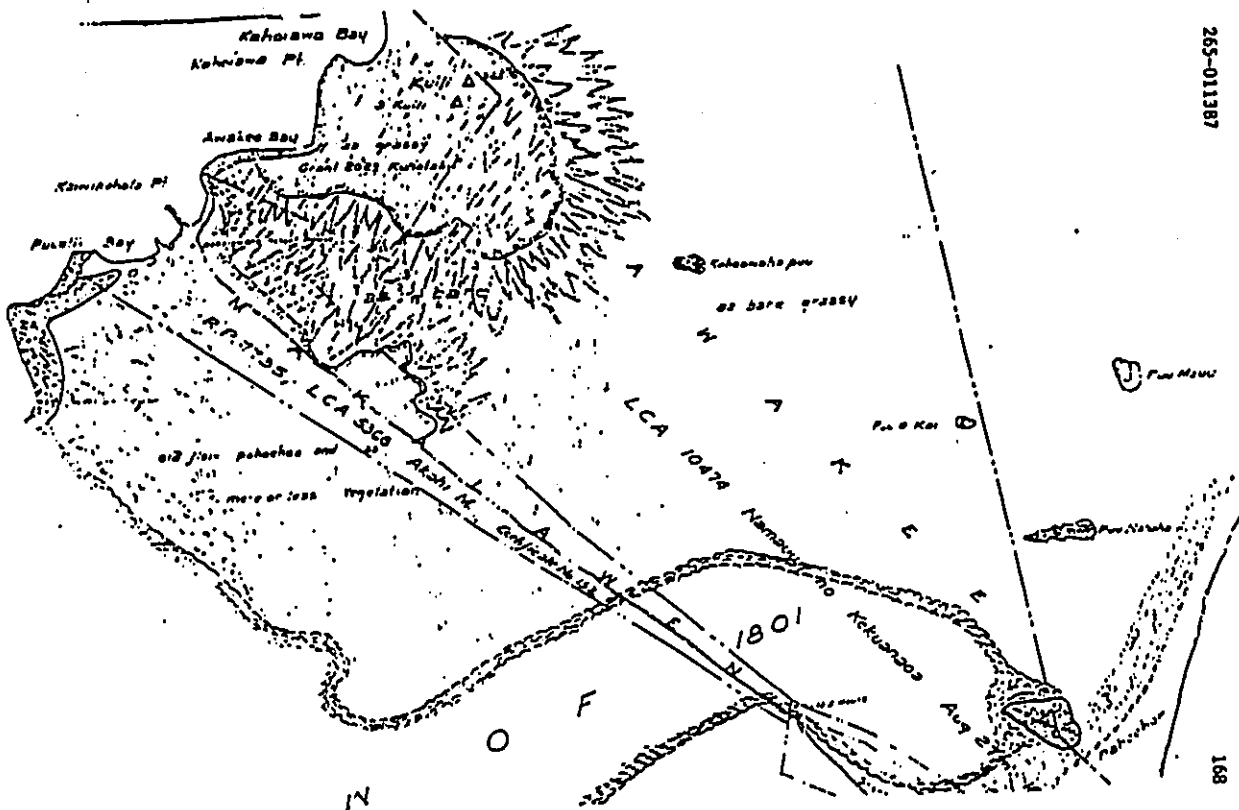


Figure 30. Emerson Survey Map of Awakee (1882)

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APPENDIX B:
REGIONAL NOTES FROM KEKAHA: AWAKEE

Land of Awakee

North Kona, Island of Hawaii

by

Hannah Kihalani Springer

ENVIRONMENT

The ahupua'a of Awakee is part of the region of Kekaha, North Kona, which includes those lands from Honokohu through Pu'uamahu (Figure 31).

Geology

The principal rift zone of Hualalai trends approximately N 50° W; it is well-defined by cinder and spatter cones, and it runs through Kekaha. The hills, Kuli (literally, "memorized temple prayer") and 'Akahipu'u ("one hill") are conspicuous elements of the Awakee landscape, as are the lavas of the 1801 cone, Puhisepela ("blown out by Pele") (Pukui, Elbert and Hookini 1974:120, 8, 192).

The spatter cone Puhisepela, formed by the 1801 eruption of Hualalai, is c. 490.0 m above sea level. The flow moved down the western flank of Hualalai and entered the sea over a front approximately 6.5 km wide. It destroyed the "...fishponds Paeles in Makena and Kaulana in Kekaha" (Li 1973:132) and the "...tabu breadfruit of Kamehameha which grew in the uplands of Hu'ehe'u where the flow started" (Kamakau 1961:185). In Awakee, lava from Puhisepela covers the landscape between the elevations of c. 240 m and c. 510 m.

Though there has been no eruption of Hualalai since 1801, earthquake activity is not unknown. In 1929, the Stillman family of Hu'ehe'u evacuated their home, Kuku'ohiwa, in Ka'upulehu at c. 610 m above sea level, when "a series of several thousand earthquakes came from beneath its northern flank" (Macdonald and Abbott 1970:292). According to geologist Richard Moore (pers. com.), "there are a few earthquakes each year, from Hu'ehe'u Ranch on out to sea...but we do not see swarms of earthquakes, nor do we see harmonic tremor."

Along the lava coast of Awakee (literally, "bent harbor") (Pukui, Elbert and Hookini 1974:15), there are coral and rock cobble beaches at

265-011387

Climate

1

Water

1

3

Vegetation

1

•



**KEKAHA, NORTH KONA
ISLAND OF HAWAII**

(*Capparis sandwichiana* DC.). Invasive fountain grass (*Pennisetum setaceum* [Forst.] Chiov.) is becoming well-established on the Puhiapale lava, as well.

On the older lavas below the c. 240 m elevation, fountain grass has become the dominant ground cover since the 1950s. Though fountain grass was introduced to Hawaii Island in Kakaia in the early decades of this century, it was not until the 1950s that it spread aggressively across the countryside. Kuili cone is covered by a dense mat of fountain grass that completely obscures the red cinder substrate from view; but through the 1950s, the cone was popularly known as "Red Hill" to fishermen who used the prominent feature as a landmark.

Below the 60 m elevation, a dense kiawe (*Prosopis pallida* [Humb.] and Bonpl. ex Willd.) HKK.) grows to within several meters of the ocean. *Ilia* (*Sida fallax* Walp.) is scattered through these low elevations. Around the brackish ponds at Awake's are milo (*Thespesia populnea* L.) and the remnants of the nui (*Cocos nucifera* L.) grove indicated on Reg. Map 2035 for North Kona, Hawaii, "Akahipu'u" Section. A planting of ironwood (*Casuarina equisetifolia* L.) is present at the Awake's-Makalei boundary. Not far above the high-tide mark of Kaho'iwaha, trees heliotrope (*Hesperaloe parviflora* [L.f.] Johnston) grows in the coral and rock rubble.

Bird Life

Above the 1801 lava flow, francolins (*Francolinus*), pheasants (*Phasianus*), and chukars (*Alectoris chukar*) are found in the rangelands. Chukar and francolin are also present in the kiawe thickets at lower elevations. The mynah (*Acridotheres tristis* L.), barred dove (*Geopelia striata* L.), spotted dove (*Streptopelia chinensis* Scopoli) and cardinal (*Richmondia cardinalis*) are all present in the vegetated parts of the ahupua'a.

Indigenous migratory birds that frequent the Awake's shoreline are: 'ulili (*Heteroscelus incanus* Gmelin), 'akekeke (*Arenaria interpres* interpres L.), and bunakai (*Crocecinus alba* [Pallas]).

FOOD SOURCES

Planting

William Ellis, on his tour of Hawaii in 1823, described Kailua, North Kona, as follows:

The houses, which are neat, are generally erected by the seashore, shaded with cocoa-nut and kou trees, which greatly enliven the scene. The environs were cultivated to a considerable extent; small gardens were seen among the barren rocks

on which the houses are built, where ever soil could be found sufficient to nourish the sweet potato, the watermelon, or even a few plants of tobacco, and in many places these seemed to be growing literally in the fragments of the lava collected in small heaps around their roots.

The next morning, Messrs. Thurston, Goodrich and Hardwood visited the high and cultivated part of the district...enjoyed the agreeable shade of breadfruit and ohia trees...quite a garden compared with that through which they had passed, on first leaving town. It was generally divided into small fields, about fifteen rods square, fenced with low stone walls, made of fragments of lava which had been gathered from the surface of the enclosures. These fields were planted with bananas, sweet potatoes, mountain taro, paper mulberry plants, melons, and sugar-cane, which flourishes in every direction (Ellis 1899:60-61).

Areas of planting in Kakaia have been described as follows:

Wherever a little soil could be heaped together along the dry lava coast of North Kona, a few sweet potatoes were planted by the fishermen at such places as Honokohau, Mahai'ula, Makalei, wena, Ka'upulehu, Kiholo, Keauaiki and Kapalaia. Doubtless potatoes were planted on the upland of North Kona, on the lower slopes of Hualalai toward Pu'uwa'awa'a, up to a considerable altitude in rainy seasons. In recent times the flatlands of Pu'u Anahulu, having an elevation of 2,300 feet, have supported a number of patches planted by Hawaiian cowboys (Handy, Handy, and Pukui 1972:527-528).

In the uplands of Hu'ehu'e, the upper terminus of the ahupua'a of Kuki'o, Manini'owali, Awake's, Makalei, and Mahai'ula, Ellis' description probably can be applied. In "The Cave of Makalei," the cultivation of kalo (*Colocasia esculenta* [L.] Schott), 'uala (*Ipomoea batatas* [L.] Lam.), 'ai'a (*Musa paradisiaca* L.), ko (*Saccharum officinarum* L. hybrid), and 'ava (*Piper methysticum* Forst. f.) is described (Maguire 1926:27).

The 'ulu (*Artocarpus communis* Forst.) grove of Kamehikana is identified by Kamehikana as growing in the uplands of Hu'ehu'e (Kamehikana 1961:185). It no doubt was breadfruit from this grove that Pabimbina and Koloa'o were preparing in "The Two Girls Roasting Breadfruit" (Maguire 1926:18-20).

Norman Keana'sina recalls that "...the old folks grew gardens back by Kapo'ikai Pond where they had a good source of water." Personal experience indicates that even kalo will grow well by the shore, given a good water supply and rich mulch as provided by hau (*Hibiscus tiliaceus* L.), milo or kiawe leaves.

Cinder from the Kuili cone no doubt provided a growing medium appropriate to the technology and understanding of the na kama'aina of that place.

Fishing

The Hawaiians exploited both inshore and offshore ocean resources extensively. Management of these resources corresponded to observed natural cycles and, where conditions permitted, included man-modified environments.

Kekaha was famous for its offshore fishing grounds. Kamekau notes the High Chief 'Umi-a-Liloa fishing for aku (*Katunus pelamis* L.) off Maka'ula (Kamekau 1961:20). When Kamekau declared the Mahele of 1848, Haleohi in Kekaha was one of the ahupua'a which he reserved for himself (Kelly 1971:4). Much of the ahupua'a had been rendered barren by the Puhispele flow; it is perhaps that Kamekau desired the ahupua'a not for its terrestrial resources, but rather for the offshore fishing grounds.

People living in upland Kekaha today recall the "old folks" who lived at Makalevua and Ka'upulehu Beaches, and caught and dried 'opelu (Decapod *Penaeus* spp.) for home use, to exchange with family living in the uplands, and to sell or trade at stores. To supplement their protein sources, in addition to deep-sea and coastal fishing and mussels and fowl resources, the Hawaiians also innovated systematic breeding and nurturing networks, or ponds, for certain fish. Kekaha was noted for its fishponds. The ponds at Honokohau and Kaloko remain, while those of Pa'alea and Kiholo were destroyed by the Hualalai flow of 1801 and the Mauna Loa flow of 1859, respectively.

Another aquatic cultigen was 'opae'ula (*Halocaridina rubra*). The 'opae are those brackish ponds where the 'opae are present. The 'opae were exploited for the shrimp, which were formerly popular chum for 'opelu. Many of the favored 'opae were modified to improve access, increase depth, or otherwise make the use of the resource easier. 'Opae, today popularly known as 'opae'ula, is a very large 'opae.

Kapo'ikahi is part of a system of brackish-water pools and ponds in southern Awa'e'e and northern Makalevua.

Mammals and Fowl

Pigs and chickens have been kept at the consistently inhabited places of Kekaha, such as Kiholo, Ka'upulehu and Makalevua, until recent times. The feral goats and donkeys that wander the coastal lava plain of Kekaha are descended from the herds kept by different families. For example, the Ka'alewahale family of Mahai'ula was associated with raising donkeys, as was Keka Punihale. Goats were raised commercially and for personal use. In the 1880s, Hopena'au was a herdsman from Kaula. At Makalevua, goats were raised by Annie Punihale Una and by her widower, Porto

Alseoder, after her death. The herd of feral goats that frequents the lower elevations of Awa'e'e and Makalevua is noted for the quality of the stock, which resulted from occasional introduction of improved stock to the herd of Annie and Porto.

The flanks of Kuili were a popular hunting spot, as recalled by Thelma Kihalani Stillman Springer. Through the early 1960s, she would accompany Kino Aka, Thomas Lindsey, and Kasuo Matsumoto, Hu'ehu'e Ranch cowboys, on after-work goat hunts. The meat thus secured augmented the diets of the cowboys' families.

Like the kiawe, these feral herds can become ubiquitous and noxious elements of the environment, unless given appropriate attention. In recent years, since the completion of Queen Kaahumanu Highway, the numbers of these animals have been greatly reduced. Improved access to formerly remote areas has increased the pressure from recreational, as well as "subsistence", hunters.

AWAKE'E

Legendary Accounts

In 1923, Isaac W.H. Kibe, a Hawaiian school teacher in Kekaha during the time of the monarchy, wrote a series of legends for "Ka Hoku O Hawaii," a Hawaiian newspaper published weekly in Hilo and edited by the Rev. Stephen Desha. In 1926, Eliza Davis Low Maguire, the second wife of John Avery Maguire of Hu'ehu'e, compiled and translated these legends; the result was the book, "Kona Legends."

One of the most enduringly popular stories is "Akahipu'u". The legend tells of how a group of menhune wanted to pry off the top of 'Akahipu'u, take it down the slope of Hualalai, and place it in the hollow on top of Kuili cone, near the seacoast. The effort of the menhune was thwarted by the greater power of the god, Kane, and his magical rooster, who lived in the tall 'ohi'a forest in a water cave at Momu'iaha (Maguire 1926:11-13). (Momu'iaha is another cone defining the northwest rift of Hualalai, with an elevation of c. 980 m.)

In 1978, "Ho'ela," an album recorded by the Brothers Cazimero, included a song entitled "Na Menhune 'Ekele", a lyrical re-telling of the legend of 'Akahipu'u. The song was composed by Keli'i Taus and Friday Feller.

Access and Use

Registered Map No. 1280 (Hawaii State Survey Office), based on survey work done c. 1888 by J.S. Emerson, and traced by H.K. Aki in 1952, shows a trail going south (inland) from Awa'e'e Bay to the Makalevua School and beyond. This trail approximately bisects the ahupua'a of Makalevua. At

Bobby Camara, Linda Dayton, Marilyn Hopkins-Wills, and Michael Tomich. On one particularly good day, 24 whales were observed.

The presence of whales is consistent with Robert Keakealani's name, "Kaiwikohola," (the whale bone) for the point at the Awake'e-Makalevena boundary." The point is so named on Reg. Map 1280 and on Reg. Map 2035, but recent USGS maps and the University Press of Hawaii Reference Map by James A. Bier note it as "Kaiwikohala" and "Kaiwikahala", respectively.

As a vantage point, Kuili offers the additional benefit of being an excellent spot from which to observe tide and swell conditions. After a few hours of whale watching, the group would usually make its way to a nearby spot which is well-suited for oceanic recreation; Kuki'o for diving or Manini'owali for body surfing.

INFORMANT CONCERNS AND CONSIDERATIONS

The anchialine pond system behind Kaiwikohola Point should benefit from management that will allow it to remain an amenity in the present, as it was in the past.

The Kuili cone is a prominent feature upon the landscape, the integrity of which should be maintained. Some of the traditions associated with this feature have archipelago-wide recognition, as well as a regional familiarity.

Further ethnographic and archival work would generate the most complete history of Awake'e. Special attention to information in the Hawaiian language newspapers will yield a variety of insights into the region.

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c. 290 m. elevation, at "P. Kula's House" as noted on the map, the trail then goes through Mahai'ula to the southern flank of Pu'u'io in Pu'u'ula and continues southeast to the old Pu'u'ula School.

During the first half of this century, Hu'e'u'e was a popular point of departure for people going ma'ka'i (seaward). The various gates below the ranch headquarters were not locked and were commonly used to access the various trails ma'ka'i.

George Magoon of Mahai'ula recalls that his family gained access to their home at Mahai'ula Beach by boat, or from Hu'e'u'e by foot or donkey, until the late 1940s or early 1950s. At that time, a jeep trail was built from the Masalahos Highway below Kileo, to Kuili, and then across to the beaches of Makalevena and Mahai'ula.

Today, the most popular access to Kaho'iawa, Awake'e and Makalevena Beaches is from Queen Kaahumanu Highway, through Awake'e.

Land Court Award 10474 was awarded to "Mamau no Kekuanoa, August 27, 1850," and was comprised of the majority of the Lands of Awake'e. A smaller parcel, Grant 2023, was awarded to Kaha'alii. This smaller parcel included the seaward slopes of Kuili and the bays, Kaho'iawa and Awake'e.

Mama'u was the brother of Kekuanoa. The child of Mahiolen and Inaina, Kekuanoa was the father, with Paubiniui, of Ke'alikolani, and of Lota Kapu'iwa. Alexander Libolihio, and Victoria Kama'ala, with Kinau. Paubiniui was a granddaughter of Kamehameha I, and Kinau was his daughter.

Robert Keakealani was born to Keakealani (k.) and Keola Ma'aho (w.) in 1916 at Ka'upulehu Beach. He lived there until he was about eight, then moved up to the family land at Pu'u'uanahulu Homesteads. His memories of his youth at the beach are among his most rich and cherished.

Auntie Ana and Tutu Uns figure greatly in his recollections. He recalls going to stay with them at Makalevena. "If we were going for church, we would go over on Saturday, nanea (relax, enjoy), then come back after church on Sunday... and we would usually stop, spend time at Kuki'o."

When visiting Makalevena from Ka'upulehu, the family would walk the old coastal trail that joined with the trail described earlier at Awake'e Bay. Though there were ruins and artifacts from the numerous families that once inhabited the Awake'e coastline, their descendants had concentrated their activities at Makalevena by the second decade of this century.

During the 1970s, the dramatic underwater landscape of "Red Hill" (Kuili) proved to be rich ground for tropical fish collectors. These grounds were worked heavily and cautiously. Divers speak of the rich fish populations, of the eerie lava and coral formations, and of the sharks.

During the 1976 whale season, Kuili cone, with an elevation of c. 300 m, became a favored whale-watching spot of the author and friends.

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